

नुमालीगढ़ रिफाइनरी लिमिटेड

भारत सरकार का उपक्रम

नुमालीगढ़ रिफाइनरी लिमिटेड

ভাৰত চৰকাৰৰ এক প্ৰতিষ্ঠান

**NUMALIGARH
REFINERY
LIMITED**

A GOVERNMENT OF INDIA ENTERPRISE



Ref:

Date:

Dec,01, 2021

To

The Regional Officer,
Ministry of Environment, Forest and Climate Change,
Integrated Regional Office, Guwahati,
4th Floor, Housefed Building, GS Road, Rukminigaon Guwahati-781022

Ref. No: NRL/ENV/MOEFCC/21/13

Sub: Submission of Half Yearly Compliance status on Environment Stipulation during the period April'21 to September'21.

Dear Sir,

Kindly find enclosed herewith the point wise Half Yearly EC Compliance Status pertaining to the conditions of following ECs granted to Numaligarh Refinery.

SN	Project Name	MoEF&CC File No.	EC issued Date
1	i)Petroleum Refinery at Numaligarh (3 MMTPA) ii) NOC,SPCB,Assam	i)J-11011/16/78-IA. II ii)WB-T-843/89-90/154	i)May 31,1991 (EA) ii)01.09.1990
2	BS-III Motor Spirit Project at NRL	J-11011/92/2003-IA II (I)	February 13, 2004
3	Coke-Calcination Unit (0.1 MMTPA)	J-11011/203/2003-IA II (I)	March 22, 2004
4	Diesel Quality Up-gradation Project (DQUP) at NRL	J-11011/272/2008-IA-II (I)	November 10, 2008
5	Paraffin Wax	J-11011/113/2009-IA-II (I)	September 5, 2012
6	Naphtha Splitter Unit	J-11011/534/2009-IA-II (I)	September 12, 2012
7	Installation of new LPG mounded bullet & up-gradation of existing LPG bottling plant and BS-IV HSD project at NRL	J-11011/150/2015-IA-II (I)	December 9, 2016
8	Expansion of the refinery from 3 MMTPA to 9 MMTPA	J-11011/274/2015-IA-II (I)	July 27, 2020

Hope, the above will meet the requirement.

Your's faithfully

(Alok Nayan Nath)

Chief Manager (Tech Service-Environment)

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**POINT-WISE STATUS OF CONDITIONS STIPULATED IN THE
ENVIRONMENTAL CLEARANCE, DATED MAY 31st '1991
OF MOEF, GOVT. OF INDIA**

1. The layout of the refinery should be so planned within the proposed site so as to ensure that it is situated as far to the eastern side of the site as possible, to ensure that there is the maximum possible distance from the eastern boundary of the Kaziranga National Park. The layout of the site of refinery may be finalised in consultation with this Ministry.

- The layout of the refinery was finalised in consultation with MoE&F.

2. The residential site as proposed should not be to the west of the refinery as it is only 19.5 kms from the boundary of Kaziranga National Park. It should be shifted further away, but keeping in view the distance from the Garampani Sanctuary, which is only 24 kms south of the proposed refinery site. The newly proposed site of the residential colony should be settled to the satisfaction of this Ministry.

-The NOC for the residential site has been issued by MoE&F vide No.J-11014/2/91 IA.II dated 18th January 1994 with six conditions. Details on the present status of compliance on these conditions are enclosed as annexure A.

3. The National Highway-37 should be diverted away from the Kaziranga National Park and that portion of this road through and along the National Park (From Jakhlabandha to Bokakhat) to be denotified from all highway records and handed over to the National Park Authorities for regulating traffic. No movement of personnel, material or equipment for the project shall take place on the existing National Highway-37. The realignment of the National Highway-37 would be finalised in consultation with the Ministry of Environment and Forests, so that the wildlife habitat in the nearby Mikir Hills and areas rich in biological diversity therein are protected. Work on the diversion of NH-37 will start before construction of the refinery begins and the Ministry of Petroleum should ensure that the road is completed before the commissioning of the project.

- The original NGT application no.174 of 2013 in this matters disposed of in July'18. Order submitted to MoEF RO earlier.

4. A No Development Zone must be notified before the project construction starts within a radius of 15 kms all around the refinery site, except towards the northwest where the no development zone would extend into the Eastern boundary of the Kaziranga National Park.

- The Govt. of Assam has already notified the "No Development Zone" on 19.01.95.

5. No pipeline will be laid through the Kaziranga National Park and adjacent wildlife habitats in the Mikir Hills. Pipeline alignment shall be finalized in consultation with



the Ministry of Environment and Forests to minimize impact on environment and forests.

- *NRL has not laid any pipeline through KNP*

6. The project authority must strictly adhere to the stipulations made by the SPCB and the State Government.

- *The stipulations laid down by SPCB, Assam and the State Govt. are adhered to. The status on the compliance report has been regularly sent to PCBA, Regional Office, Golaghat. A copy is enclosed as Annexure B.*

7. Any expansion of the plant either with the existing product mix or new products can be taken up only with the prior approval of this Ministry.

- *This is complied with as and when a change or expansion is contemplated. Any expansion of the plant either with the existing product mix or new products will be taken up with prior approval of the Ministry.*

8. The gaseous emissions from various process units should conform to the standard prescribed by the concerned authorities, from time to time. At no time, the level should go beyond the stipulated standards. In the event of failure of any pollution control system adopted by the unit, the respective unit should be put out of operation immediately and should not be restarted until the control measures are rectified to achieve the desired efficiency.

- *Automatic online stack analysers have been provided in all the major stacks for continuous monitoring of SO₂, NO_x, CO & SPM. Further manual stack monitoring is being carried out bi-monthly as per latest MOEF notification. Monitoring reports of stack emissions are regularly submitted to the PCBA Regional Office, Golaghat and CPCB Regional Office, in every month. Real-time emission data has been transmitted to CPCB server on continuous basis.*

9. A minimum of five air quality monitoring stations should be set up in the downwind direction as well as where maximum ground level conc. is anticipated. Furthermore, stack emission should be monitored by setting up of automatic stack monitoring units. The data on stack emission should be submitted to the SPCB once in three months and to this Ministry once in six months, along with the statistical analysis. The air quality monitoring stations should be selected on the basis of modeling exercise to represent the short-term ground level conc.

- *As an action of compliance, five (5) nos. of ambient air quality monitoring stations have been set up at the following locations:*

SS 1 : *Inside the refinery (Near WT No.5).*

SS 2 : *At the Eco-Park in NRL Township.*



- SS 3 : At the Raw Water Intake.
SS 4 : Near the NH-39 bypass.
SS 5 : Near the Kaziranga Wildlife Sanctuary at Agartoli.

-Ambient Air Quality monitoring at the above locations is being carried out *in line with NAAQS-2009 in totality*. The Ambient Air Quality Monitoring reports are regularly submitted to the PCBA HQ Guwahati, PCBA Regional Office, Golaghat and CPCB Regional Office, Shillong in every month.

- *Automatic online stack analysers have been provided in all the major Stacks for continuous monitoring of SO₂,NO_x, CO & SPM. The monitoring reports of stacks emissions are regularly submitted to the PCBA Regional Office, Golaghat and CPCB Regional Office, Shillong in every month and to the MoEFCC Regional Office, Shillong in every six month.*

NRL has installed one continuous Ambient Air Monitoring System inside the refinery premises. Real-time emission data is transmitted to CPCB server on continuous basis.

One more CAAQMS installed as per MoEFCC's recommendation in the refinery premises in 2019.

-Ambient air quality for the period April'21 to Sept'21 is enclosed as **annexure-IV**.

10. There should be no change in the stack design without the approval of SPCB. Alternate Pollution control system and proper design (Steam Injection System) in the stack should be provided to take care of excess emissions due to failure in any system of the plant.

- *Prior approval of SPCB will be taken for any change in the stacks design. Pollution control measures like – Low NO_x burners, Steam Injection System, Low excess air firing, ID and FD fan, Stack dampers have been provided.*

11. Only natural gas after de-sulphurization has to be used as fuel with low NO_x burners.

- *Permission has been obtained from MoE&F, New Delhi vide No. J-11011/16/90-IA.II(I) dated 22 May,1996 to use Naphtha, which is produced in the refinery itself. Low NO_x burners have been installed in all the refinery furnaces.*

12. Fugitive emissions should be monitored continuously.

- *Regular monitoring of fugitive emission has been carried out using GMI since May, 2005 onwards.*

The GMI survey has been carried on all gas/vapour valves, light liquid valves, hydrogen valves, light liquid pump seals, hydrocarbon compressor seals, hydrogen compressor seals, safety relief valves, flanges, connections, open-ended lines, drains, tankages, furnaces etc in line with the MoEF notification 2008.

13. All gaseous emissions in the system shall be taken to the flare system and the flare should be smoke-less and non-luminous.

- All gaseous emissions have been taken to the flare system. A non-luminous elevated flare has been installed as regular flare. However, additionally, a ground flare has been also installed for using during emergencies.

14. A sulphur recovery plant should be commissioned along with the refinery.

- The Sulphur Recovery Block (SRB) has been commissioned alongwith the refinery and has been under continuous operation since September'2000.

15. Zero discharge of effluents should be ensured and built into the system. In case the effluent has to be discharged due to process disturbances etc. the contributing unit shall be immediately stopped from operation and will not be re-started without bringing the system to normalcy. To meet the emergency needs adequate number of effluent quality monitoring stations must be set up in consultation with the SPCB.

*- Zero discharge of effluent has been ensured. Since October, 2006 no effluent from refinery has been discharged into the River Dhansiri and since April, 2007 township effluent also routed to the refinery, so no effluent from refinery & township is discharged outside and the total effluent is recycled and reused within the Refinery as Fire water makeup, watering Green Belt and filter back washing in Cooling Tower. Treated effluent quality for the period April'21 to Sept'21 is enclosed as **annexure-V**.*

16. Guard ponds of sufficient holding capacity to take care of monsoon rains should be provided.

- Guard ponds (of capacity: 5329 m³) for oily water sewer (OWS) and Surge tank (of capacity: 5760 m³) for contaminated rain water system (CRWS) have been provided in the Effluent Treatment Plant. Further, as a step towards conservation of water, implementation of storm water recycle scheme as fire water make up is implemented.

17. The solid waste from the ETP and waxy sludge should be incinerated.

- NRL has installed an Incinerator for disposal of non hazardous incinerable wastes in February, 2008 and the same is being operated on a continuous basis for which NRL has received the consent to operate from SPCB.



18. The solid waste (other than waxy sludge) dumping area should be made impervious so that the ground water, is not affected due to leaching and seepage of associated water containing pollutants. The solid waste disposal plan should be submitted to the Ministry once the process design and technological package is finalized.

-As per the recommendation of NEERI's report on Solid Waste Management, scheme for disposal of solid waste through Secured Landfill had been prepared. As compliance of the same a Secured Landfill facility was constructed within the Refinery premises and commissioned on 4th March, 2004.

The proposal of solid waste disposal by Secured Land Fill was submitted to MoE&F and PCB, Assam.

NRL has installed another Secured Land Fill facility of capacity around 6000 m³ as per the latest CPCB guidelines. Also, NRL has construed a new bio-remediation facility in line with the requirement by applying "Oilzapper" for disposal of oily sludge generated during cleaning of tanks.

Alternately, some quantity of oily sludge being disposed by selling to authorized recyclers.

19. The project authorities should recycle the waste to the maximum extent and the recycling plan should be submitted along with a comprehensive EIA.

- All types of wastes generated from the refinery are recycled to the maximum extent possible. -The recycling plan for all types of wastes have been submitted to the MoE&F, Shillong vide letter no. NRL/NG/ENV/2.1/2 dated May'23, 2002.

20. A detailed risk-analysis based on Maximum Credible Accident analysis should be submitted once the process design and the layout are frozen. Based on this a disaster management plan has to be prepared and after approval by the concerned nodal agency, should be submitted to this Ministry.

- NEERI was engaged for Quantitative Risk Assessment including Maximum Credible Accident (MCA)analysis, Hazard Assessment and Evaluation, Disaster Management Plan (DMP) and Emergency Preparedness Plan(EPP).The report was submitted to the MoE&F on 03.02.97.

21. A comprehensive EIA report covering one year (4 seasons) data should be submitted once the process design and technology package and layout are frozen. The Ministry or any other competent authority may stipulate any further conditions after reviewing the comprehensive impact assessment report.

- CEIA report prepared by NEERI has been submitted to MoE&F on 22.04.96.



22. A comprehensive study of the ecological status and likely impact of development should be initiated in consultation with the Ministry of Environment and Forests. The proposal should be submitted to this Ministry within three months.

- *This is included in the CEIA report and submitted.*

23. A green belt with a minimum width of 500 mtrs should be provided and the green belt development plan taking into account various aspects including attenuation of noise and air pollution should be submitted to this Ministry within six months.

- *Initially, as per Environmental Clearance granted for the Numaligarh Refinery Project, Ministry of Environment & Forest had stipulated a 500 mtrs wide green belt all around the refinery based on the EIA of Numaligarh Refinery carried out by NEERI.*

On request from Numaligarh Refinery, the width of the Green Belt was later reduced from the suggested width of 500 mtrs to 100 mtrs because of the reason that almost all the surrounding areas are having tea garden with shade trees. A wide natural green belt already existed all around the refinery.

Accordingly, a Green Belt covering a total area of around 60 hectares of land and around 100 mtrs width around the refinery and around 25 mtrs width around the NRMT has been developed as per the Green Belt Development Plan. (The Green Belt Development Plan has been submitted to MoEF along with the Half Yearly Report to MOEF on the 15th October, 2001).

Periodically, massive plantation is carried out in the Green Belt so as to it can provide a natural barrier for attenuation of noise and air pollution. Nos of local variety have been planted including some fruit bearing samplings in & all around Green Belt.

Phase wise replantation is in progress in various locations in Green Belt, inside the refinery and in and around the township to increase the density.

24. The rehabilitation plan for the persons to be displaced from the project site including township should be prepared and submitted to the Ministry for approval within 3 months. Plan should inter-alia contain rehabilitation site details, the facilities and compensation package to be provided.

- *Rehabilitation of the displaced persons from the refinery site has been done by the State Govt. NRL has paid the compensation as fixed by Collector. Similar action has also been taken in case of those displaced from the Township site for which land acquired. Amenities like drinking water facility, building primary school, constructing roads in the villages etc. have been contributed by NRL.*

25. The project authority must set up a laboratory facility for collection and analysis of



samples under the supervision of competent technical person, who will directly report to the Chief Executive.

-The laboratory facility had been set up for collection and analysis of samples under the supervision of competent personnel, reporting to the Chief Manager (QC) and who reports to the General Manager (Technical). The QC lab is a NABL accredited Laboratory and it has been proposed to apply as Environmental Approved Laboratory under EPA act.

26.A separate environment management cell with suitably qualified people to carry out various functions should be set up under the control of senior executive who will report directly to the head of the organization.

- A fully functional, dedicated environment management cell manned by qualified engineers/officers and headed by Chief General Manager (Technical) has been continuously working for constant improvement, monitoring, safe guarding and reporting of environmental activities of the refinery. Also, a multidisciplinary Apex-level Committee on Environment which includes senior level officers from various departments as members under the chairmanship of Director (Technical) constantly guides the Environment Cell regarding all the environmental issues in the refinery. The Apex Committee that convenes quarterly discusses the unresolved issues if any, regarding the environment and monitors the regular environmental activities.

27.The funds ear-marked for the environmental protection measures should not be diverted for other purposes and year-wise expenditure should be reported to this Ministry.

- The same has been complied with.

a). The Ministry may revoke clearance if implementation of the conditions is not satisfactory.

- Noted

b). The above conditions will be enforced inter-alia under the provisions of the Water (Prevention & Pollution) Act, 1981, and Environment (Protection) Act, 1985 along with their amendments.

- Noted



CPMPLIANCE STSTUS OF THE SIX CONDITIONS GIVEN WITH THE DEVELOPMENT OF TOWNSHIP OBTAINED VIDE LETTER NO. J-11014/2/91-IA.II DATED 18TH JANUARY, 1994 FROM MOEF NEW DELHI.

CONDITIONS:

i) The hill slopes should not be used for civil construction purposes

- Noted.

ii) Land use planning of the colony and the land around it should be finalized in construction with the State Town Planning Department.

- Consultation was done, but minutes of the same are not available at present.

iii) More open space should be left and the building construction may be done by acquiring minimum land and the houses should be constructed on ground plus two floors basis.

- Noted.

Open space left within the township is around 82% of the total area.

iv) Township site should not involve any forest area.

- Township is constructed only in the permitted area.

v) The existing forest cover towards the west and north of the proposed colony site should not be disturbed.

- It is not disturbed.

vi) No organized human settlement or private colonies should be allowed in the hill or the areas adjoining the hill. (Atleast in a radius of 10 kms).

- The Govt. of Assam has already notified the "No Development Zone" on 19.01.95.



***POINT-WISE STATUS OF CONDITIONS MENTIONED IN THE
“NO OBJECTION CERTIFICATE” VIDE NO. WB/T-843/89-90/154
DATED 01.09.1990
OF
POLLUTION CONTROL BOARD, ASSAM***

- 1. No Air, Water, Soil pollution shall be created by the industry beyond the permissible limits prescribed by this Board. The industry would incorporate adequate pollution control measures before they put the plant into operation.**

- This has been complied. For abatement of pollution, the following environment initiatives have been incorporated:

- *Effluent Treatment Plant with tertiary treatment facilities. This is further enhanced by implantation of ETP modernization and VOC recovery system in ETP. .*
- *Sulphur Recovery Block*
- *Ambient Air Quality monitoring*
- *Automatic online stack monitoring system*
- *Green Belt around refinery and NRMT*
- *Non-illuminating ground flare*
- *Low NOx burners incorporated in design*
- *Township sewage treatment plant and composting plant*
- *Hazardous oily waste and other solid waste management by Secured Landfill Facility, Bio-remediation and selling to approved recyclers.*

- 2. To maintain the environmental and ecology in the area provision for planting selected species of these within the compound and approaches along with provisions for park, garden and fountain shall have to be made. Massive afforestation will have to be made by the industry in the factory and township.**

-Within the refinery premises, few gardens have been developed near various units like Hydrocracker(HCU), Captive Power Plant (CPP), Effluent Treatment Plant (ETP), QC lab, Central Control Room (CCR) etc. Plantation of different variety of saplings have been widely carried out mainly along the all roadside areas all throughout the refinery. Fountain has been made in front of the Administrative Building. Massive plantations have been also carried out on all along the road sides in the Township and plantation also have been done in wide scale in the Butterfly Valley, Herbal garden, public places and club premises and few other places in the Township.

3. **As per provisions of water (Prevention and Control of Pollution) Act, 1974 and Air (Prevention and Control of Pollution) Act, 1981 any officer empowered, by this Board in its behalf shall without any interruption, the right at any time to enter the industry for inspection, to take samples for analysis and may call for any information etc. Violation of this right will be withdrawal of the “NO OBJECTION CERTIFICATE”.**

-This has been followed without any exception.

4. **As per provisions of the Acts, regular monitoring are to be done by the industry from the locations/points fixed by this Board and the reports to be submitted to the Board timely as prescribed.**

- Regular monitoring of air pollution and effluent quality has been carried out and results are submitted to the PCBA Regional office, Golaghat in every month.

5. **Effluent carrying drains must be segregated from storm water drains and effluent must be disposed in effluent pond. In no case, effluent will be discharged into nearby nullah / natural watercourse etc. without treatment and bringing it within ISI permissible limits or limits fixed by the Board.**

-Effluent collection and segregation philosophy was submitted to PCBA. Discharge of any effluent ex-refinery into the River Dhansiri has been stopped since October, 2006.

6. **Standard linings and flat embankment of effluent pond shall have to be provided in the pond to prevent and control of overflow, seepage and leakage of effluent to the nearby areas.**

-This was incorporated in the design of the storage ponds of the Effluent Treatment Plant and constructed accordingly.

7. **To regularise the subsequent process, the legal provisions of CONSENT LICENCE and RETURNS shall have to be timely adhered to.**

-Submission of application for revalidation of Consent from PCB, Assam for running of the various units and Returns are being timely adhered to.

8. **Gaseous pollutants due to the burning of the fuel to run engine, boiler, etc. should be controlled by adopting preventive measures.**

-Low NOx burners have been installed in all the furnaces and also, low sulfur fuels are being used.

- 9. Solid waste that arises during the operation should be properly graded and disposed off scientifically without causing nuisance.**

-Solid waste has been properly graded, hazardous oily waste and other solid waste disposed off through the Secured Land Fill facility and bio-remediation after taking due authorization from PCBA. Spent catalyst is disposed off through approved recyclers and few quantity of oily sludge has been sold to approve recyclers.

- 10. For low-lying areas, special care is to be taken by the Industry to prevent any overflow, seepage and leakage of the effluent.**

-Does not arise.

Presently no effluent is discharged from the refinery and township into the River Dhansiri or any water Body.

- 11. For warning systems (Alarm, Siren) is to be installed by the Industry to guard against accidental pollution/mishap together with fire fighting devices.**

-Sirens have been installed at the refinery site and Township to alert workers on emergency and a complete fire fighting network has been installed. Fire tenders are readily available at site and in operation.

- 12. All pipes connections, joints, fittings etc in the factory and plant are to be frequently checked and leak proof all the time by the industry.**

-These are being physically checked on regular basis and in case of any leakage corrective action is taken at the earliest. However, for the detection of very minor gas/vapour leak - fugitive emission monitoring is done on regular basis by using Gas Measuring Instrument and rectified the leaking points on priority. In additions, acoustic survey is also carried out in various units in regular intervals.

- 13. Proper house keeping and adequate maintenance has to be ensured/enforced as per provisions of the Acts.**

- This is complied.

- 14. All unwanted/toxic chemicals/fluid/gases are to be neutralized and flared up as necessary.**

-The point is adhered to without any deviation.

- 15. Production process is to be monitored and in the event of danger, immediate shutdown is to be ensured by the Industry.**

-Production process is continuously being monitored from the Control Room and applicable step is initiated as per requirement.

- 16. Provisional “NO OBJECTION CERTIFICATE” will be valid till the proposed date of commissioning of the plant.**

-Noted

- 17. The provisional “NO OBJECTION CERTIFICATE” has been issued being on the particulars furnished by the applicant and subject to imposition of further/more conditions if warranted by the subsequent development.**

-Noted

- 18. Healthy working environment for the workers must be maintained and there should not be health hazard to the workers for inadequate arrangements for ventilation, dust removal etc. Arrangements should be adequate and full proof for the health of the workers. Their health should be regularly monitored.**

- NRL follows OISD – GDN – 166 Guideline for Occupational Health Hazard monitoring to provide specific level of occupational health & hygiene services to the employees and necessary health care.

This includes:

- a) Work Environment monitoring – Occupational hygiene.*
- b) Pre-employment / Pre-placement medical examination.*
- c) Periodic health check-up / examination.*
- d) Infrastructure for occupational health monitoring.*

The Frequency for Periodic health check-up / examination of NRL has been decided as follows:

<i>Sl. No.</i>	<i>Area</i>	<i>Frequency</i>
<i>1.</i>	<i>Hazardous</i>	<i>Half- yearly</i>
<i>2.</i>	<i>Less hazardous</i>	<i>Annually</i>
<i>3.</i>	<i>Non- hazardous</i>	<ul style="list-style-type: none"> <i>• Annually the employees of age 50 yrs and above.</i> <i>• Once in 2 yrs for employees of age group 40 – 50 yrs.</i> <i>• Once in 3 yrs for employees of age group below 40 yrs.</i>

- 19. The Industry must submit compliance report of action taken on the conditions given by the Board before commissioning of the Plant.**

-Complied.

- 20. Adequate trees should be planted and maintained in the vacant spaces of the premises and all around the factory and township.**

Massive plantation of different variety has been carried out mainly along the roadside areas, vacant places, in ETP and in the gardens within the Refinery as well as Township also.

- 21. The Board will be at liberty to withdraw the “NO OBJECTION CERTIFICATE” at any time without notice if necessary steps for prevention of pollution and preservation of environment is not taken by the Industry as per mentioned condition.**

-Noted.

- 22. The issuance of this NOC does not convey any property right in either real or personal property or any exclusive privileges nor does it authorises any injury to private property nor any invasion right nor any infringement of Central, State or Local Laws or Regulations.**

-Noted.

- 23. The NOC does not authorize or approve the construction of any physical structures of facilities or the undertaking of any work in any natural watercourse except of the works specially instructed herein.**

-Noted.

- 24. Effluent treatment plant must be constructed before commissioning of the plant and the treated effluent must conform to the MINAS and IS: 2490 all the time.**

-The Effluent Treatment Plant equipped with tertiary treatment facilities constructed before the commissioning of the plant. Treated effluent quality is checked regularly as per new MOEF notifications before every discharge from ETP for reuse in the Laboratory and has been intimated regularly to PCB, Assam and CPCB, Shillong on monthly basis. It is worth-mentioning that since October, 2006 no effluent has been discharged outside the refinery. This is further enhanced by implantation of ETP modernization and VOC recovery system in ETP.

- 25. Construction of Effluent Treatment Plant must be started before starting the construction of the Refinery itself.**

-That has been complied

- 26. Treated effluent shall be discharged through a closed pipeline into the mid-stream of river Brahmaputra after confluence point of Dhansiri river and arrangement is to be made by the Refinery authority for proper mixing.**

-Permission has been obtained from PCB, Assam to discharge treated effluent at the downstream of jetty in the mid-stream of river Dhansiri through a closed pipeline.

However, no treated effluent has been discharged since October, 2006 into the River Dhansiri or any other natural water body as 100% reuse of treated effluent is sustained.

- 27. The applicant shall provide sampling arrangement in the treated effluent carrying closed pipeline at two sites i.e. near NH crossing and before the final outfall point at Dhansiri mukh. Easy access for the sample collection at these two sites will have to be made by the Refinery Authority.**

-Provision for sampling has been made at various locations in the EDPL at the initial point of the pipeline, near Township and at the final discharge point. However, the requirement is not applicable at present as no treated effluent is discharged outside the refinery. 100% reuse of treated effluent is sustained.

- 28. Regular monitoring is to be done for the parameters, TOC and others as mentioned in MINAS and reports are to be submitted fortnightly to the Board.**

- The relevant parameters for treated effluent have been monitoring regularly as per the latest CPCB norms and the monitoring reports are being submitted regularly to the PCBA, Regional Office, Golaghat, CPCB Zonal Office, Shillong on monthly basis as per requirement stipulated in the Consent for the refinery.

- 29. The detailed design of the ETP will have to be submitted to the Board before starting construction of ETP.**

- The same has been submitted before starting the construction of ETP.

- 30. The time schedule for construction and commissioning of the ETP should be submitted to the Board quarterly.**

- This has been complied.

31. Necessary arrangements for sample collection at the following points are to be provided by the industry before commissioning of the plant.

- a) Before entering ETP
- b) Before aerobic system of ETP
- c) After leaving ETP (on EDPL)
- d) At interim point of effluent carrying pipeline near NH crossing
- e) Ultimate point of effluent discharge

-Sampling points as required have been provided.

32. Samples will have to be collected and analyzed by the industry from the above points as per condition 31 above and as well as from the following points.

- a) **Near each village situated on the bank of the Dhansiri River.**
- b) **Receiving water course (i.e. Brahmaputra) after it receives effluent from the refinery.**

The applicant is to submit the monitoring results to the Board fortnightly.

-The discharge of treated effluent from the Refinery and from the STP, NRL Township has been stopped since October, 2006 and April, 2007 respectively, as such Monitoring of Dhansiri water becomes irrelevant. Request has been placed to PCBA for discontinuation of the same.

33. Recording and monitoring activities and results:

- a) M/s. IBP Co. Ltd., are to monitor effluent everyday and maintain records of all information resulting from monitoring activities.
- b) The industry is to record for each measurement for samples to be taken to the requirement of this NOC with the following information.
 - i) The date, exact place and time of sampling
 - ii) The dates on which analysis performed
 - iii) Who perform the analysis
 - iv) Method used for the analysis
 - v) The results of all required analysis
- c) The industry is to retain for minimum of five years of all records of monitoring activities and results including all records. This period of retention shall be extended during course of any unresolved litigation regarding the discharge of Pollutants by the applicant or when required by the Board.

Regular monitoring of effluent quality has been carried out and records are kept properly.

- 34. Monitoring information shall be submitted and reported by submitting a discharge monitoring report form duly filled in and signed to the Boards Office.**

- This is complied.

- 35. The applicant will have to install automatic pH recorder, flow recorder and TOC analyzer on the effluent carrying line.**

-Flow recorder, TOC analyser and automatic pH recorder have been installed in ETP to monitor the effluent quality going through the Effluent Disposal Pipeline (EDPL). However, the discharge of treated effluent from the Refinery and from the STP, NRL Township has been stopped into River Dhansiri since October, 2006 & April, 2007 respectively.

- 36. The applicant shall not discharge effluents in excess defined as harmful in the NOC. In addition the refinery shall not discharge hazardous substances into watercourses in quantities defined as harmful in the NOC given by the Board.**

- There is no discharge of effluent from the refinery into River Dhansiri since October, 2006. No hazardous substances are discharged into any watercourses.

- 37. Nothing in this NOC shall be deemed to preclude than institution of any legal action nor receive from any responsibilities or penalties to which the industry is or may be liable.**

-Noted.

- 38. Applicant shall take adequate and efficient measures so that sulfur is recovered fully and there will not be any release of Sulfide in the effluent. Special monitoring arrangement is to be carried out by the applicant after the coagulation unit as well as at final outlet before disposal.**

-To minimize sulphur pollution, a Sulphur Recovery Block has been installed and is functioning continuously. Monitoring of sulphide in the effluent is done regularly before every reuse and sulphide level in the final treated effluent is maintained well within the standards.

- 39. The applicant must take special care to contain all the untreated effluent within their compound at the time of malfunctioning of ETP and must be treated to the prescribed limit before disposal.**

-Guard ponds and Surge Tanks of sufficient holding capacity have been provided in ETP to cater for emergency need. This is further enhanced by implantation of ETP modernization and VOC recovery system in ETP.

- 40. Refinery authority must take special care to keep the noise level within permissible limit all the time. As suggested by NEERI, Green belt development is to be taken up right from the time of construction.**

- A Green Belt covering a total area of around 60 hectares of land and around 100 mtrs width around the refinery and around 25 mtrs width around the NRMT has been developed as per the Green Belt Development Plan. (The Green Belt Development Plan has been submitted to MoEF along with the Half Yearly Report to MOEF on the 15th October, 2001).

Massive Plantation have been carried out in the Green Belt so as to it can provide a natural barrier for attenuation of noise and air pollution. Nos of local variety have been planted including some fruit bearing samplings in & all around Green Belt.

Phase wise replantation is in progress in various locations in Green Belt to increase the density.

-Noise monitoring inside the work zone has been carried out on a regular basis, and if required, corrective action is taken accordingly.

- 41. Authority shall take adequate care to keep the impact of noise within the limit at the time of loading/unloading and transportation etc.**

-Adequate care has been taken.

- 42. IBP Ltd. shall construct and commission the sewage treatment plant for their Township area and the treated effluent must confirm IS standards before discharging, special care must be taken to contain the pathogens and coliforms within count before discharge.**

-A separate Sewage Treatment Plant for Township area has been constructed and in operation. No effluent is discharged into River from STP, the same has been routed back to ETP at refinery.

- 43. Disposal of Sludge:**

a) Intake Water Treatment:

Solids, sludges, dust, silt or other pollutants separated from or water prior to use by IBP Ltd. shall be disposed off in such a manner as to prevent any pollutant from such materials from entering any such water. Any live fish or other animals

collected or trapped as a result of intake water screening or treatment may be returned to water body habitat.

-This has been complied.

b) Waste /Water Treatment:

For disposal of sludge from the treatment plant, IBP Ltd., shall have to take separate specific permission from this Board. IBP Ltd. shall apply for such permission giving three months time for detailed scrutiny of their proposal for disposal off should be intimated to the Board immediately. Detailed proposal for sludge disposal shall be submitted by IBP Ltd. immediately.

-Based on NEERI's report on Solid Waste Management, one Secured Land Fill was constructed for disposal of sludge from the treatment plant / solid waste. Proposal of the same was submitted to both i.e. MoE&F and PCB, Assam and due permission for disposal of sludge in the Secured Landfill was received from PCB, Assam. NRL has installed another SLF of capacity 6000 m³ as per CPCB recommendations.

c) Hazardous waste disposal:

For disposal of hazardous waste generated from the refinery, IBP Ltd. shall have to take specific permission from the Board separately.

-Hazardous waste disposal was incorporated in the above proposal and authorization has been granted for disposal of sludge in the Secured Landfill by PCB, Assam. Some quantity has been sold to authorised recyclers.

d) Spent Catalyst:

Spent Catalysts must be disposed off through sale only. No spent catalyst should be disposed at landfill site and must not be buried underground in concrete silo/bunker under any circumstances.

- Spent catalyst has been sold to the CPCB registered purchasers.

e) Sewage Treatment:

Solid waste generated in the sewage treatment plant should be disposed off in a proper scientific manner so that it will not create any health hazard in the environment.

-Sludge drying beds have been provided in the Sewage Treatment Plant at Township

44. Before applying “Consent To Operate” after commissioning for discharge of treated effluent, the applicant must clarify to the Board that IBP Ltd. have installed an alternative electric power source sufficient to operate all the facilities utilized by the applicant to maintain compliance with terms and conditions of this NOC.

- Complied.

45. Arrangements are to be made for analysis of bottom sludge of their units particularly of the heavy metals.

- Equipment for analysis of heavy metals in bottom sludges like Atomic Absorption Spectrophotometer, Flame Photometer and Spectrophotometer have been procured.

46. The applicant shall analyze the solid waste and submit the report to the Board regularly.

-Analysis of solid waste has been carried out regularly and submitted to Pollution Control Board.

47. The applicant shall take adequate care to contain the raw materials, chemical products etc within the site itself and proper protection arrangements will have to be made around the raw material, product storage area. No seepage/leakage shall take place from this area.

Raw materials and products are stored in their respective tanks with all the necessary precautions required for.

48. Height of chimneys shall be such that it allows proper dilution of the emitted as and it shall not be less than 30 mtrs under any circumstances.

-All the chimney heights are much more than 30 mtrs.

49. Stack emissions from the industry must meet the standards prescribed by PCB and Dept. of Environment, Govt. of India all the time.

-Monitoring of stack emission has been carried out regularly as per the latest MOEF notification and are well maintained within the standards. The monitoring results are submitted regularly to the PCBA Regional Office, Golaghat, Shillong as per the requirements.

50. The applicant is to contain the total sulphur emission into the atmosphere as SO₂ within 256 kg/hr.

-This is complied

51. Fugitive emissions from the refinery should not be more than 6.11 kg/hr.

- *Regular monitoring of fugitive emission has been carried out in various locations inside the refinery using GMI.*

The GMI survey has been carried on all gas/vapour valves, light liquid valves, hydrogen valves, light liquid pump seals, hydrocarbon compressor seals, hydrogen compressor seals, safety relief valves, flanges, connections, open-ended lines, drains, tankages, furnaces etc.

52. Ground Level conc. of SO₂ and NO_x at Kaziranga National Park, due to the release of gases from the refinery shall not exceed 2.25 and 3.51 microgram per cubicmetre resp. during highly unstable condition. Also, during stable condition, SO₂ and NO_x shall not exceed 25.0 and 39.0 microgram per cubicmetre resp.

-As a compliance of the above, an Air Quality Monitoring Station has been installed at Agratoli, near Kaziranga to monitor the required parameters on a regular basis. The same have been monitored regularly and the value found within limit. Action initiated to install another CAAQMS inside the refinery premises in the down wind direction.

53. The refinery authority must also contain the CO, HC within the specified limit and as per NEERI's report.

-CO and HC are monitored along with the parameters SO₂, NO_x and SPM in the ambient air quality monitoring. The same are found to be within standards as prescribed in the Consent for Numaligarh Refinery by PCB, Assam.

However, NRL has started monitoring of ambient air quality in line with NAAQS-2009 in totality since April' 2011. Further, real time emission data has been transmitted to CPCB server on continuous basis.

54. IBP Ltd. must install automatic SO₂ and flow measuring device at all the stacks. If at any stage SO₂ exceeds the permissible limits immediate shutdown of operations will have to be ensured.

-Automatic SO₂ online analysers have been installed in all the refinery unit stacks. The total SO₂ emission in terms of kg/hr from the stacks is done on the basis of fuel consumption in the furnaces and sulphur content in the fuel.

55. Systematic Green Belt development is to be made by the applicant in and around the refinery site as well as in Township area. Selected trees should be of fast growing with thick canopy cover, perennial and evergreen, with large leaf area, resistant to specific air pollutants.

-A Green Belt of around 100 mtrs width around the refinery and around 25 mtrs width around the NRMT covering a total area of land around 60 hectares has been developed. The Green Belt has been developed & maintain as per the Green Belt development plan.

56. The applicant will have to take Socio-Economic Development of the area.

-Various forms of Community Development Schemes have been carried out regularly.

57. Ambient Air Quality Monitoring is to be done daily by the industry in and round factory as well as at Kaziranga National Park and results must be submitted monthly to the Board.

- The ambient air quality monitoring is being carried out at 5 locations at a frequency of 8/9 samples per month, taken twice a week 24 hourly at uniform interval. (This is as per the statutory requirement of CPCB, where the minimum no. of samples to be analyzed for a station is 104 samples in a year). The monitoring results are submitted regularly to the PCBA Regional Office, Golaghat and CPCB Regional Office, Shillong in every month.

However, NRL has started monitoring of ambient air quality in line with NAAQS-2009 in totality since April' 2011. However, NRL has started monitoring of ambient air quality in line with NAAQS-2009 in totality since April' 2011. Further, real time emission data has been transmitted to CPCB server on continuous basis.

58. Stack Monitoring is to be done daily and results must be submitted fortnightly to the Board.

-This has been complied.

59. The applicant is to submit the detailed Environmental Management Plan, Disaster Management Plan, and Project Report before commissioning the refinery

-The reports have been submitted.

60. The applicant will have to install water meters at all the water carrying pipelines before commissioning the refinery.

-Water meters have been installed on all the water carrying pipelines.

61. Automatic pH monitoring of effluent should be provided for by installing automatic pH indicator and recorder.

-Automatic pH analyzer has been installed.

62. Suitable flow measuring arrangements with automatic measuring devices should be installed in the outlets to measure accurately the quantities of effluents discharged. No effluent shall remain unmeasured and records of daily flow should be maintained.

- Flow meter with totalizer has been installed on the effluent discharge pipeline and records are maintained daily. The treated effluent is reused in the Refinery premises only, there is no discharge into River Dhansiri.

63. The applicant is to take special care to raise the height of Electric Poles including towers so that animals can pass the area safely. If necessary, alternative arrangements is to be made for safe movement of animals.

-Steps have been taken accordingly.

64. The refinery authority will have to strictly adhere to the provisions of the Water (Prevention and Control of Pollution) Act, 1974; Water (Prevention and Control of Pollution) Amendment Acts, 1978 &1980; Air (Prevention and Control of Pollution) amendment Act, 1981; Environment (Protection) Act 1986.

- This is complied.

65. The Board will be at liberty to withdraw the “NO OBJECTION CERTIFICATE” at any time without notice if necessary steps for Prevention and Control of Pollution and preservation of environment is not taken by IBP Ltd. as per above mentioned conditions.

-Noted.

**COMPLIANCE STATUS ON THE CONDITIONS OF ENVIRONMENTAL
CLEARANCE FOR THE EURO III MOTOR SPIRIT PROJECT OBTAINED
VIDE LETTER NO. J-11011/92/2003 – IA II (I) DATED FEBRUARY 13,
2004 FROM MOEF, NEW DELHI**

A.SPECIFIC CONDITIONS:

- i. The company shall ensure strict implementation / compliance of the terms and conditions mentioned vide Ministry's letter No. J-11011/16/90-IA.II dated 31.05.1991.

- ,*Complied.*

- ii. The company shall ensure that the total sulphur emission from the Assam refinery (including MS Quality Improvement Project) shall not exceed 128 kg/hr as sulphur (256 kg/hr as SO₂). M/s NRL should maintain regular record of sulphur balance in the refinery. Off gases from the proposed unit should be treated in amine absorption and regeneration unit meant for H₂S removal for desulphurization of off gases. Performance evaluation of sulphur recovery block should be done regularly. Data on VOC should be monitored and submitted to the Ministry. The continuous emission monitoring systems for SO_x and NO_x in the major stacks with proper calibration facilities should be installed. The low NO_x burners should be installed in all the furnaces.

-The total sulphur emission from the refinery including Euro III Motor Spirit Project being maintained below 128 kg/hr as Sulphur (256 kg/hr as SO₂).

-Regular sulphur balance of the refinery is maintained and the average SO₂ emission from the refinery during The average SO₂ emission during this period is avg.86 kg/hr which is well below the limit..

-Off gases from the proposed unit has been treated in the amine absorption and regeneration unit.

-Performance evaluation of Sulphur Recovery Block is done on a daily basis.

- VOC data for MS is attached.

-Continuous emission monitoring for SO₂, CO, PM and NO_x have been provided in all the stacks.

-Ultra low NO_x burners have been provided in all the furnaces.

- iii. Additional water requirement shall not exceed 1200 m³/hr. The total quantity of effluent generation should not exceed 3830 m³/day as indicated in the EMP of which (3530 m³/d from the existing and 300 m³/d from the proposed unit). Treated effluent should be recycled and rest should be discharged after primary, secondary and tertiary treatment into the Dhansiri river through 11 km long pipeline. The treated effluent should comply with the prescribed standards.



-The additional water requirement is very minimal as compared to the present requirement and is maintained within the limits. Treated effluent quality in Effluent Treatment Plant is maintained within the prescribed standards and all the treated effluent is recycled inside the refinery. NRL has achieved 100 % reuse of treated effluent since October,2006.

- iv. As reflected in the EIA / EMP, the spent catalyst (0.33 TPM) along with small quantity of oily and chemical sludge should be disposed off in secured landfill site within the plant premises. The leachate from the landfill site should be sent back to the effluent treatment plant. The ground water quality around the secured landfill site should be monitored regularly and data submitted to the Ministry/CPCB/SPCB. The biological sludge generated from the ETP should be used as manure/fertilizer for the green belt.

-The oily sludge, generated in ETP is disposed off in the Secured Land Fill Facility (SLF) after recovering the oil by centrifuging. As per the requirement, leachate generated is routed back to the IRS of ETP for further processing.

The ground water quality around the Secured Landfill site has been monitored on a regular basis and the monitoring data has been submitted regularly to the MoE&F Regional Office along with the half-yearly report and to SPCB.

Spent catalyst is disposed off through authorized recyclers as per Hazardous Waste Management Handling and Tran boundary Movement Rules, of latest amendment.

Ground water monitoring data around Secured Land Fill is enclosed as Annexure –I

- v. Oil spill response facilities should be in place, in accordance with OISD guidelines with regard to the likely risks associated with transportation of finished products. All recommendations made in the risk analysis report should be complied with during design, construction and operation stages to contain the risk within the plant boundary.

-The same is complied.

- Oil from various units is routed through OWS (Oily Water Sewer) & CRWS (Contaminated rain Water Sewer) to ETP. The oily water from various units, OM&S and NRMT go through the CRWS and OWS systems to ETP for necessary oil removal and treatment in various sections. The slop oil is recovered in ETP and sent to OM&S for needful reprocessing in various units.

The Strom Water Channel from various plans are connected and channel through Oil Catchers. There are several oil catchers in the final outlet of Strom Water channel. The final outlet of storm water channel is made closed immediately in case of any accidental oil carryover and is trapped in the oil catcher for necessary removal. The accumulated oil from the oil catchers is lifted with the help of MOSRU (Mobile Oil Spill Recovery Unit).



- vi. Green Belt of adequate width and density as per the CPCB guidelines should be provided to mitigate the effects of fugitive emission all around the plant in consultation with the local DFO. The bio sludge should be used as manure in the Green Belt development.

A Green Belt of width around 100 mtrs surrounding the refinery and around 25 mtrs. around the NRMT covering a total area of about 60 hectares have been provided. with adequate trees and proper density. Massive plantation has been carried out in the Green Belt so that it can provide a natural barrier for attenuation of noise and air pollution. Nos of local variety have been planted including some fruit bearing samplings in & all-around Greenbelt. Further, to increase the density in the Green Belt, fresh plantation it being continued at regular intervals. Within the Numaligarh Refinery premises, few gardens have been developed near various units including one in ETP with varieties of flowering plants. Also, different varieties of saplings are also planted in the roadside areas, through-out the refinery.

- vii. Occupational Health Surveillance of the workers should be done on a regular basis and records maintained as per the Factories Act and the West Bengal Factories Rules.

- The same is complied.

B. GENERAL CONDITIONS:

- i. The project authorities must strictly adhere to the stipulations made by the Assam Pollution Control Board and the State Government.

-The stipulations made by the Assam Pollution Control Board and the State Government are strictly adhered to. A copy is enclosed as Annexure B.

- ii. No further expansion or modernization in the plant should be carried out without prior approval of the Ministry of Environment and Forests.

- Noted. Any expansion or modernization in the plant will be taken up only with prior approval of the Ministry of Environment & Forests.

- iii. The Company shall implement all recommendations made in the EMP and Risk Analysis reports.

- Complied.

- iv. At no time, the emissions should go beyond the prescribed standards. In the event of failure of any pollution control system adopted by the units, the respective unit should be immediately put out of operation and should not be restarted until the desired efficiency has been achieved.



- All the emissions parameters are monitored on continuous basis and are well within the prescribed limits. Adequate stack heights are provided in all the furnaces.

- v. The overall noise levels in and around the plant area should be kept well within the standards (85 dBA) by providing noise control measures including acoustic hoods, silencers, enclosures etc. on all sources of noise generation. The ambient noise levels should conform to the standards prescribed under EPA Rules, 1989 viz. 75 dBA (day time) and 70 dBA (night time).

-The overall noise levels in and around the plant premises has been maintained below 85 dBA at 1 mtr distance from the source. For the same, control measures like silencer to vent, low noise Rotary equipment have been provided. The ambient noise levels all around the refinery are monitored regularly so as to maintain the standards prescribed under EPA Rules, 1989 viz. 75 dBA (day time) and 70 dBA (night time).

-Noise monitoring result carried out is enclosed as Annexure II

- Measures taken towards noise control:

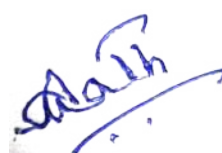
- Ensuring PPE use in high noise areas of the plant.

- vi. The project authorities must strictly comply with the rules and regulations under Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989 as amended in 1994 and 2000. Prior approvals from Chief Inspectorate of Factories, Chief Controller of Explosives, Fire Safety Inspectorate etc. must be obtained.

-The rules and regulations under the Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989 and as amended in 1994 and 2000 are adhered to. Approvals from Chief Inspectorate of Factories, Chief Controller of Explosives etc as applicable for the proposed unit have been obtained.

- vii. The project authorities must strictly comply with the rules and regulations with regard to handling and disposal of hazardous wastes in accordance with the Hazardous Wastes (Management and Handling) Rules, 2003. Authorization from the State Pollution Control Board must be obtained for collection/treatment/storage/disposal of hazardous wastes.

-The rules and regulations with regard to handling and disposal of hazardous wastes in accordance with the Hazardous Wastes (Management, handling & Transboundary Movement) Rules, 2008 are adhered to. In regard to the same, authorization for collection/treatment/storage and disposal of hazardous wastes has been obtained from the PCB, Assam.



viii. The project authorities will provide adequate funds both recurring and non-recurring to implement the conditions stipulated by the Ministry of Environment & Forests as well as the State Government along with the implementation schedule for all the conditions stipulated herein. The funds so provided should not be diverted for any other purposes.

- *Adequate fund has been provided for implementing the conditions stipulated by the MOEFCC and the State Govt and not diverted for any other purpose.*

ix. The stipulated conditions will be monitored by the Regional Office of this Ministry at Shillong / Central Pollution Control Board/The State Pollution Control Board. A six monthly compliance report and the monitored data should be submitted to them regularly.

- *A six monthly compliance report on the Environmental Clearance conditions and NOC conditions of Numaligarh Refinery including the compliance status on the environmental Clearance for MS Plant being submitted six monthly regularly to the MoE&F Regional Office, CPCB, Shillong and the SPCB, Regional Office, Golaghat, Assam.*

x. The Project Proponent should inform the public that the project has been accorded environmental clearance by the Ministry and copies of the clearance letter are available with the State Pollution Control Board / Committee and may also be seen at Website of the Ministry of Environment & Forests at <http://envfor.nic.in>. This should be advertised within seven days from the date of issue of the clearance letter, at least in two local newspapers that are widely circulated in the region of which one shall be in the vernacular language of the locality concerned and a copy of the same should be forwarded to the Regional office.

The same has been complied. Advertisement regarding the environmental clearance for the Euro III MS Project was published in two local newspapers, The Assam Tribune (in English) and The Pratidin (in Assamese) on 18th Feb'04 and copies of both were forwarded to the MoE&F Regional Office, Shillong vide letter no NRL/NG/ENV/2.1/11 dated 20th Feb'04.

xi. The Project Authorities should inform the Regional Office as well as the Ministry, the date of financial closure and final approval of the project by the concerned authorities and the date of commencing the land development work.

-The same has been complied.

3.0 The Ministry may revoke or suspend the clearance, if implementation of any of the above conditions is not satisfactory.

- Noted.



4.0 The Ministry reserves the right to stipulate additional conditions if found necessary. The Company in a time bound manner will implement these conditions.

- *Noted.*

5.0 The above conditions will be enforced, inter-alia under the provisions of the Water (Prevention & Control of Pollution) Act, 1974, the Air (Prevention & Control of Pollution) Act, 1981, the Environment (Protection) Act, 1986, Hazardous Waste (Management, Handling & Transboundary Movement) Rules, 2008 and the Public Liability Insurance Act, 1991 along with their amendments and rules.

- *Noted.*

A handwritten signature in blue ink, appearing to be 'S. S. S.', with a horizontal line underneath it.

COMPLIANCE STATUS ON THE CONDITIONS OF ENVIRONMENTAL CLEARANCE FOR THE COKE CALCINATION UNIT OBTAINED VIDE LETTER NO. J-11011/203/2003 –IA II (I) DATED MARCH 22, 2004 FROM MOEF, NEW DELHI

A. SPECIFIC CONDITIONS:

- i. The company shall ensure strict implementation / compliance of the terms and conditions mentioned vide Ministry's letter No.J-11011/16/90-IA.II dated 31.05.1991 and letter no. J-11011/92/2003- IA.II (I) dated 13th February 2004.

- Complied.

- ii. The company shall ensure that the total sulphur emission from the Assam refinery (including Coke Calcination Unit) shall not exceed the existing level of 128 kg/hr as sulphur (256 kg/hr as SO₂).

-The average SO₂ emission during the period is avg. 86 kg/hr which is well below the limit.

- iii. The company should take adequate measures for control of fugitive emissions from the Coke handling system by installation of Bin vent filters and coke handling through closed conveyor system. Multiple cyclone separators should be installed for recovering coke particles from the Rotary Cooler Exhausts and bag filters to control suspended particulate matter from the waste heat recovery boiler exhaust gas.

-To control the fugitive emission from the Coke Calcination Unit, the following measures have been taken -

a)Bin vent filters provided to control even minor fugitive emissions from coke handling system.

b)The major portion of coke handling is done through closed conveyor system.

c)Cyclone separator provided for recovering coke particles from rotary cooler exhaust.

d)Bag filters with automatic pneumatic back flushing system to control SPM from waste heat boiler at exhaust gas has been provided.

e)The finished product of CPC has been packed in an automatic bagging machines, thus controls the fugitive emissions.

f)A 100 m wide green belt all along refinery boundary wall has been developed.



- iv. Water requirement of 15 m³/hr should be met from the recycling of coke cutting water from Delayed Coker Unit. There should be no additional drawl of water for the CCU from the river Dhansiri.

-Coke cutting water from DCU is regularly used for quenching in CCU. There is no additional drawl of water beyond the permissible limit from the river Dhansiri for CCU.

- v. The Company should install continuous stack monitoring system for online measurement for SPM, SO₂ and NO_x.

-Continuous stack monitoring systems for online measurement of SPM, SO₂ NO_x and CO have been provided in the CCU stack.

- vi. The solid waste generated should be disposed off in the secured landfill site within the plant premises. The ground water quality around the secured landfill site should be monitored regularly and data submitted to the Ministry /CPCB/SPCB.

-Normally the solid waste generated in the CCU is recycled back with the feed. There is no such solid waste generated at present, however any small quantity which is not possible to recycle back will be disposed off in the Secure Land Fill Facility.

Ground water around the secured landfill is monitored and results are submitted to MOE&F / CPCB & PCBA regularly.

Analysis report of ground water around Secured Land Fill is enclosed as Annexure -I.

B. GENERAL CONDITIONS:

- i. The project authorities must strictly adhere to the stipulations made by the Assam Pollution Control Board and the State Government.

- The stipulations made by the Pollution Control Board of Assam and the State Government are strictly adhered to. A copy is enclosed as Annexure B.

- ii. No further expansion or modernization in the plant should be carried out without prior approval of the Ministry of Environment and Forests.

- Any expansion or modernization in the plant will be taken up only with prior approval of the Ministry of Environment & Forests.

- iii. The Company shall implement all recommendations made in the EMP and Risk Analysis reports.

- The recommendations made in the EMP of the Comprehensive Environmental Impact Assessment and the Risk Assessment reports have

been implemented for the Numaligarh Refinery, which includes CCU also as an integral part of the refinery.

- iv. At no time, the emissions should go beyond the prescribed standards. In the event of failure of any pollution control system adopted by the units, the respective unit should be immediately put out of operation and should not be restarted until the desired efficiency has been achieved.

- All the emissions parameters are monitored on continuous basis and are well within the prescribed limits. Adequate stack heights are provided in all the furnaces.

- v. The overall noise levels in and around the plant area should be kept well within the standards (85 dBA) by providing noise control measures including acoustic hoods, silencers, enclosures etc. on all sources of noise generation. The ambient noise levels should conform to the standards prescribed under EPA Rules, 1989 viz. 75 dBA (day time) and 70 dBA (night time).

-The major sources of noise generation in the CCU are the BFW pumps and the Air Blowers, having low duty. Strong foundations have been provided to mitigate the noise generation further. The equipments are monitored regularly at a distance of 01 mtr from the source and corrective measures are taken to maintain the noise level below 85 dBA. The ambient noise levels all around the refinery are monitored regularly so as to maintain within the standards, prescribed under EPA Rules, 1989 viz. 75 dBA (day time) and 70 dBA (night time).

- Noise monitoring result carried out in the Refinery recently enclosed as Annexure II

- vi. The project authorities must strictly comply with the rules and regulations under Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989 as amended in 1994 and 2000. Prior approvals from the Chief Inspectorate of Factories, Chief Controller of Explosives, Fire Safety Inspectorate etc. must be obtained.

- The rules and regulations under the Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989 and as amended in 1994, and 2000 are adhered to.

- Approvals from Chief Inspectorate of Factories, Chief Controller of Explosives etc as applicable for the Numaligarh Refinery have been obtained.

- vii. The project authorities must strictly comply with the rules and regulations with regard to handling and disposal of hazardous wastes in accordance with the Hazardous Wastes (Management and Handling) Rules, 2003. Authorization from the State Pollution Control Board must be obtained for collection/treatment/storage/disposal of hazardous wastes.



The rules and regulations with regard to handling and disposal of hazardous wastes in accordance with the Hazardous Wastes (Management, Handling & Transboundary Movement) Rules, 2008 are adhered to. In regard to the same, authorization for collection/treatment/storage and disposal of hazardous wastes through Secured Land Fill has been obtained from the PCB, Assam.

- viii. The project authorities will provide adequate funds both recurring and non-recurring to implement the conditions stipulated by the Ministry of Environment & Forests as well as the State Government along with the implementation schedule for all the conditions stipulated herein. The funds so provided should not be diverted for any other purposes.

-Adequate funds have been provided for implementing the conditions stipulated by MoE&F and the State Govt. and not diverted for any other purpose.

- ix. The stipulated conditions will be monitored by the Regional of this Ministry at Shillong /Central Pollution Control Board/State Pollution Control Board. A six monthly compliance report and the monitored data should be submitted to them regularly.

-A six monthly compliance report on the Environmental Clearance conditions of the Numaligarh Refinery along with the monitored data has been submitted regularly to the MoE&F Regional Office, Shillong. Along with six monthly compliance report, the compliance status on the environmental clearance conditions for the CCU Unit also have been submitted to the MoE&F Regional Office at Guwahati, CPCB, Shillong and the SPCB, Assam.

- x. The Project Proponent should inform the public that the project has been accorded environmental clearance by the Ministry and copies of the clearance letter are available with the State Pollution Control Board / Committee and may also be seen at Website of the Ministry of Environment & Forests at <http://envfor.nic.in>. This should be advertised within seven days from the date of issue of the clearance letter, at least in two local newspapers that are widely circulated in the region of which one shall be in the vernacular language of the locality concerned and a copy of the same should be forwarded to the Regional office.

-The same has been complied. Advertisement regarding the environmental clearance for the Coke Calcination Unit was published in two local newspapers namely, The Assam Tribune (in English) and The Pratidin (Assamese) on the 26th March'04 and copies of both advertisements were forwarded to the MoEF Regional Office, Shillong vide letter no. NRL/TS/ENV/2.1/14 dated 27.03.04.

- xi. The Project Authorities should inform the Regional Office as well as the Ministry, the date of financial closure and final approval of the project by the



concerned authorities and the date of commencing the land development work.

-The same has been complied.

- 3.0. The Ministry may revoke or suspend the clearance, if implementation of any of the above conditions is not satisfactory.

- Noted.

- 4.0. The Ministry reserves the right to stipulate additional conditions if found necessary. The Company in a time bound manner will implement these conditions.

- Noted.

- 5.0. The above conditions will be enforced, inter-alia under the provisions of the Water (Prevention & Control of Pollution) Act, 1974, the Air (Prevention & Control of Pollution) Act, 1981, the Environment (Protection) Act, 1986, Hazardous Waste (Management, Handling & Transboundary Movement) Rules, 2008 and the Public Liability Insurance Act, 1991 along with their amendments and rules.

- Noted.

A handwritten signature in blue ink, appearing to be 'A. H.', with a horizontal line underneath it.

**COMPLIANCE STATUS ON THE CONDITIONS OF ENVIRONMENTAL
CLEARANCE FOR THE DIESEL QUALITY UPGRADATION PROJECT
(DQUP) OBTAINED VIDES LETTER NO. J-11011/272/2008 -IA II (I)
DATED NOVEMBER 10, 2008 FROM
MOEF, NEW DELHI**

A. SPECIFIC CONDITIONS:

i. The company shall comply with new standards/norms Notified by the Ministry for Oil refineries vide G.S.R. 186(E) dated 18th March 2008.

- *Compliance status of few points are as follows:*

(a) *Secondary seals in IFRT and EFRT tanks -installation of double seals in EFRT, IFRT completed.*

(b) *LDAR-programme: The same is implemented.*

(c) *Implementation of VOC recovery system in ETP: VOC recovery system in ETP has been implemented.*

ii. The company shall comply with all the stipulations of environmental clearances issued vide letter No. J-11011/92/2003-IA.II(I) dated 13th February 2004 and J-11011/203/2003-IA.II(I) dated 22nd March, 2004.

- *Complied.*

iii. The process emissions (SO₂, NO_x, HC, VOCs and Benzene) from various units shall conform to the standards prescribed by the Assam State Pollution Control Board from time to time. At no time, the emission levels shall go beyond the stipulated standards. In the event of failure of pollution control system(s) adopted by the unit, the unit shall be immediately put out of operation and shall not be restarted until the desired efficiency has been achieved.

- *Presently being practiced and complied*

iv. The Diesel Quality Up-gradation Project (DQUP) shall be through Hydrocracker from 1.1 to 1.45 MMTPA, Hydrogen Unit from 38,000 to 48150 TPA, CDU/VDU modification of CDU without any feed change to take out additional 0.35 MMTPA diesel for Hydrocracker, Sulphur unit 14.7 to 19.5 TPD and associated modifications for the utilities, offsite and flare facilities.

- *Complied.*

v. Quarterly monitoring of fugitive emissions shall be carried out as per the guidelines of CPCB by fugitive emission detectors (GMI Leak Surveyor) and reports shall be submitted to the Ministry's regional office at Shillong.

- Presently being practiced and complied. **Fugitive emission data attached.**

- vi. For control of fugitive emission, all unsaturated hydro carbon will be routed to the flare system and the flare system shall be designed for smoke less burning.

- Taken care during the preparation of DFR and BEDP.

- vii. The company shall strictly follow all the recommendation mentioned in the charter on corporate responsibility for environmental protection (CREP).

- Complied.

- viii. Occupational health surveillance of worker shall be done on a regular basis and records maintained as per the Factory Act.

- Presently being practiced and complied.

- ix. Greenbelt shall be developed to mitigate the effect of fugitive emission all around the plant in a minimum 30% plant area in consultation with DFO as per CPCB guidelines.

- Initially, as per Environmental Clearance granted for the Numaligarh Refinery Project, Ministry of Environment & Forest had stipulated a 500 mtrs wide green belt all around the refinery based on the EIA of Numaligarh Refinery carried out by NEERI.

On request from Numaligarh Refinery, the width of the Green Belt was later reduced from the suggested width of 500 mtrs to 100 mtrs because of the reason that almost all the surrounding areas are having tea garden with shade trees (Sirish trees). A wide natural green belt already existed all around the refinery.

Accordingly, a Green Belt covering a total area of around 60 hectares of land and around 100 mtrs width around the refinery and around 25 mtrs width around the NRMT has been developed as per the Green Belt Development Plan. (The Green Belt Development Plan has been submitted to MoEF along with the Half Yearly Report to MOEF on the 15th October, 2001).

Massive Plantation have been carried out in the Green Belt so that it can provide a natural barrier for attenuation of noise and air pollution. No. of local variety have been planted including some fruit bearing samplings in & all around Green Belt.

Further, it has been planned to increase the density by planting more saplings in the Green Belt in the days ahead.



- x. The Company shall make the suitable arrangement for disposal of catalyst waste and other wastes. The report of waste disposal shall be submitted to Ministry's Regional Office at Shillong.

- Spent catalysts are disposed off through CPCB approved recyclers. Other wastes are being disposed off as per Hazardous Waste Management, Handling, Disposal (Trans Boundary Movement), 2008 with latest amendments and the reports are being sent to Pollution Control Board.

-The annual report of waste disposal (2020-21) is attached.

- xi. The Company shall take necessary measures to prevent fire hazards, containing oil spill and soil remediation as needed. At place of ground flaring, the overhead flaring stack with knockout drums shall be installed to minimize gaseous emissions during flaring.

- Knockout drums are installed in the flare systems.

- xii. To prevent fire and explosion at Oil and Gas facility, potential ignition sources should be kept to a minimum and adequate separation distance between potential ignition sources and flammable material shall be in place.

- Complied.

- xiii. Provision shall be made for the housing of construction labour within the site with all necessary infrastructure and facilities such as fuel for cooking, mobile toilets, mobile STP, Safe drinking water, medical health care, crèche etc. The housing may be in the form of temporary structures to be removed after the completion of the project.

- Complied.



B. GENERAL CONDITIONS:

- i. The project authorities must strictly adhere to the stipulations made by the concerned State Pollution Control Board (SPCB) and the State Government and any other statutory body.

- The stipulations made by the Pollution Control Board of Assam and the State Government are strictly adhered to. A copy is enclosed as Annexure B.

- ii. No further expansion or modification in the project shall be carried without prior approval of the Ministry of Environment and Forests. In case of deviations or alternations in the project proposal from those submitted to the Ministry for clearance, a fresh reference shall be made to the Ministry.

- Any expansion or modernization in the plant will be taken up only with prior approval of the Ministry of Environment & Forests.

- iii. At no time, the emissions should go beyond the prescribed standards. In the event of failure of any pollution control system, the respective well site should be immediately put out of operation and should not be restarted until the desired efficiency has been achieved. Provision of adequate height of stack attached to DG sets & flare is to be done.

- All the emissions parameters are monitored on continuous basis and are well within the prescribed limits. Adequate stack heights are provided in all the furnaces.

- iv. Wastewater shall be properly collected and treated so as to conform to the standards prescribed under EP Act & Rules and mentioned in the Consents provided by the relevant SPCB.

- Wastewater generated is very minimal in quantity and is routed through the existing ETP for proper treatment. The effluent generated from refinery and township is totally reused after treatment.

- v. The overall noise levels in and around the premises shall be limited within the prescribed standards (75 dBA) by providing noise control measures including acoustic hoods, silencers, enclosures etc. on all sources of noise generation. The ambient noise levels should conform to the standards prescribed under EPA Rules, 1989 viz. 75 dBA (day time) and 70 dBA (night time).

- Few noise generation sources in the project are the BFW pumps and the Air Blowers. Strong foundations are provided to mitigate the noise generation and the equipment are monitored regularly at a distance of 01 mtr from the source. The noise levels all around the refinery is being monitored regularly so as to maintain within the standards, prescribed under EPA Rules, 1989 viz. 75 dBA (day time) and 70 dBA (night time). Noise monitoring report during the period is enclosed in Annexure-II.



- Measures taken towards noise control:

- Ensuring PPE use in high noise areas of the plant.

vi. The project authorities must strictly comply with the provisions made in Manufacture, Storage and Import of Hazardous Chemicals Rules 1989 as amended in 2000 for handling of hazardous chemicals etc. Necessary approvals from Chief Controller of Explosives must be obtained before commission of the expansion project, if required. Requisite On-site and Off-site Disaster Management Plans will be prepared and implemented.

- The rules and regulations under the Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989 and as amended in 2000 are adhered to.

Approvals from Chief Inspectorate of Factories, Chief Controller of Explosives etc as applicable for the Numaligarh Refinery have been obtained.

vii. Disposal of hazardous wastes shall be as per the Hazardous Wastes (Management and Handling) Rules, 2003. Authorization from the State Pollution Control Board must be obtained for collections/treatment/storage/disposal of hazardous wastes.

- The rules and regulations with regard to handling and disposal of hazardous wastes in accordance with the Hazardous Wastes (Management, Handling & Trans Boundary Movement) Rules, 2008 as per latest amendments are adhered to.

viii. The project authorities will provide adequate funds as non-recurring and recurring expenditure to implement the conditions stipulated by the Ministry of Environment and Forests as well as the State Government along with the implementation schedule for all the conditions stipulated herein. The funds so provided should not be diverted for any other purposes.

- Adequate funds have been provided for implementing the conditions stipulated by MoEF and the State Govt. and not diverted for any other purpose.

ix. The company shall develop rain water harvesting structures to harvest the run off water for recharge of ground water.

- Storm water reuse system to refinery fire water network scheme commissioned.

x. The stipulated conditions will be monitored by the concerned Regional Office of this Ministry /Central Pollution Control Board/State Pollution Control Board. A six monthly compliance report and the monitored



data should be submitted to them regularly. It will also be displayed on the Website of the Company.

- A six monthly compliance report on the Environmental Clearance conditions of the Numaligarh Refinery along with the monitored data is being submitted regularly to the MoE&F Regional Office. The same is being displayed in the company's website also.

- xi. The Project Proponent should inform the public that the project has been accorded environmental clearance by the Ministry and copies of the clearance letter are available with the State Pollution Control Board/ Committee and may also be seen at Website of the Ministry of Environment and Forests at <http://www.envfor.nic.in>. This should be advertised within seven days from the date of issue of the clearance letter at least in two local newspapers that are widely circulated in the region of which one shall be in the vernacular language of the locality concerned and a copy of the same should be forwarded to the concerned Regional office of this Ministry.

- The same has been complied. Advertisement regarding the environmental clearance for the Diesel Quality Upgradation Project (DQUP) was published in two local newspapers namely, The North East Times (in English) and The Amar Asom (Assamese) on the 16th November'08 and copies of both advertisements were forwarded to the MoE&F Regional Office, Shillong vide letter no. NRL/TS/ENV/2.3/07 dated 17.11.08.

- xii. A separate environment management cell with full-fledged laboratory facilities to carry out various management and monitoring functions shall be set up under the control of a Senior Executive.

- A fully functional, dedicated environment management cell manned by qualified engineers/officers and headed by a Chief General Manager (Technical) has been continuously working for constant improvement, monitoring, safeguarding and reporting of environmental activities of the refinery. Also, a multidisciplinary Apex-level Committee on Environment which includes senior level officers from various departments as members under the chairmanship of Director (Technical) constantly guides the Environment Cell regarding all the environmental issues in the refinery. The Apex Committee that convenes quarterly discusses the unresolved issues if any and monitors the regular environmental activities.

- xiii. The project authorities shall inform the Regional Office as well as the Ministry, the date of financial closure and final approval of the project by the concerned authorities and the date of start of the project.

- The same has been complied.



COMPLIANCE STATUS ON THE CONDITIONS OF ENVIRONMENTAL CLEARANCE FOR NAPHTHA SPLITTER PROJECT OBTAINED VIDE LETTER NO. J-11011/534/2009 -IA II (I) DATED SEPTEMBER 12, 2012 FROM

MOEF, NEW DELHI

SPECIFIC CONDITIONS:

- i. Compliance to all the environmental conditions stipulated in the environmental clearance letter nos J011011/16/90-IA.II dated 31st May, 1991, J011011/92/2003-IA.II dated 13th February, 2004, J011011/272/2008-IA.II (I) dated 10th November, 2008 shall be satisfactorily implemented and monitoring reports submitted to the Ministry's Regional Office at Shillong.
 - *Complied. Half yearly compliance report of all ECs regularly being sent to MoEF,RO.*
- ii. Environmental clearance is subject to their obtaining prior clearance from Wildlife angle due to location of Kaziranga National Park (KNP) nearby including clearance from the Standing Committee of the National Board for Wildlife as applicable.
 - *The proposed project will be constructed within the existing refinery premises, hence it does not require any additional land. As such, the requirement of approval from wild life is not envisaged.*
- iii. No heavy equipments shall be routed through Kaziranga National Park, for which only the route identified earlier shall be used.
 - *Complied.*
- iv. M/s Numaligarh Refinery Limited shall comply with new standards/norms for oil Refinery Industry notified under the Environment (Protection) Rules, 1986 vide GSR 186 (E) dated 18th March, 2008.
 - *Complied.*
- v. Continuous online stack monitoring for SO₂ and SPM of all the stacks shall be carried out. SO₂ on-line analysers shall be installed in all the furnace stacks. Low NO_x burners shall be installed with online analysers to monitor NO_x emissions shall be provided.
 - *Online stack analysers have been provided in all the major stacks for continuous monitoring of SO₂, NO_x, CO and SPM. Further manual stack monitoring is being carried out bi-monthly as per latest MOEF notification. Monitoring reports of stack emissions are regularly submitted to the PCBA Regional Office, Golaghat in every month.*
- vi. The process emissions [SO₂, NO_x, HC (Methane & Non-methane)], VOCs and Benzene from various units shall conform to the standards prescribed



under the Environment (Protection) Act, 2008. At no time, the emission levels shall go beyond the stipulated standards. In the event of failure of pollution control systems(s) adopted by the unit, the unit shall be immediately put out of operation and shall not be restarted until the desired efficiency has been achieved.

- Presently being practiced and complied.

- vii. Ambient air quality monitoring stations [SPM, SO₂, NO_x, H₂S, Mercaptan, non-methane-HC, and benzene] shall be set up in the complex in consultation with Assam State Pollution Control Board, based on occurrence of maximum ground level concentration and down-wind direction of wind. The monitoring network must be decided based on modeling exercise to represent short term GLCs. Ambient air quality shall also be carried out in one location at Kaziranga National Park for SO_x, NO_x, SPM, CO & HC.

-As an action of compliance, five (5) nos. of ambient air quality monitoring stations have been set up at the following locations:

- SS 1 : Inside the refinery (Near WT No.5).*
- SS 2 : At the Eco-Park in NRL Township.*
- SS 3 : At the Raw Water Intake.*
- SS 4 : Near the NH-39 bypass.*
- SS 5 : Near the Kaziranga Wildlife Sanctuary at Agartoli.*

-Ambient Air Quality monitoring at the above locations is being carried out in line with NAAQS-2009 in totality. The Ambient Air Quality Monitoring reports are regularly submitted to the PCBA HQ Guwahati, PCBA Regional Office, Golaghat in every month. Further, real time continuous ambient air quality data and online stack analyser data being transmitted to CPCB server since Sept'11.

NRL has installed one Continuous Ambient Air Monitoring System inside the refinery premises and realtime emission data has been transmitted to CPCB server on continuous basis. One additional continuous Ambient Air Monitoring System inside the refinery premises as recommended by MoEFCC based on occurrence of maximum ground level concentration and down-wind direction of wind installed.

-Ambient air quality for the period April'21 to Sept'21is enclosed as Annexure –IV.

- viii. Ambient air quality data shall be collected as per NAAQMS notified by the Ministry on 16th September, 2009 and trend analysis wrt. past monitoring results shall also be carried out. Adequate measures based on the trend analysis shall be taken to improve the ambient air quality in the project area.

- Ambient air quality data is monitored in line with NAAQMS, 2009 in totality and trend analysis is carried out.



- ix. Monitoring of fugitive emissions shall be carried out as per the guidelines of CPCB by fugitive emission detectors and reports shall be submitted to the Ministry's Regional Office at Shillong. For control of fugitive emissions, all unsaturated hydrocarbon will be routed to the flare system and the flare system shall be designed for smoke less burning.

- Presently being practiced as per the requirement. Regular monitoring of fugitive emission has been carried out using GMI. The GMI survey has been carried on all gas/vapour valves, light liquid valves, hydrogen valves, light liquid pump seals, hydrocarbon compressor seals, hydrogen compressor seals, safety relief valves, flanges, connections, open-ended lines, drains, tankages, and furnaces etc. as per the guidelines. In case of any leak observed, the same is attended immediately in line with the requirement.
Fugitive emission data attached.

- x. Fugitive emissions of HC from product storage tank yards etc. must be regularly monitored. Sensors for detecting HC leakage shall also be provided at strategic locations. The company shall use low Sulphur fuel to minimize SO₂ emissions. Sulphur recovery units shall be installed for control of H₂S emissions. Leak detection and Repair programme shall be implemented to control HC/VOC emissions. Work zone monitoring shall be carried out near the storage tanks besides monitoring of HCs/VOCs in the work zone.

-Regular fugitive emission survey is being carried out with the help of GMI Gaskoseeker as a part of monitoring and control of fugitive emission. The GMI survey has been carried in all gas/vapour valves, light liquid valves, hydrogen valves, light liquid pump seals, hydrocarbon compressor seals, hydrogen compressor seals, safety relief valves, flanges, connections, open-ended lines, drains, tankages, furnaces etc. It is being practiced in all the Process Units, Tankage areas, Marketing Terminal, and other important locations. Low sulphur fuels is being used in all the furnaces to minimize SO₂ emissions and will be implemented in future projects if required, a SRU is already installed during the commissioning of the refinery. Monitoring of fugitive emissions is carried out near the storage tanks.

- xi. As proposed, record of sulphur balance shall be maintained at the Refinery as a part of the environmental data on regular basis. The basis component of sulphur balance includes sulphur input through feed (sulphur content in crude oil), sulphur output from Refinery through products, byproduct (elemental sulphur), and atmospheric emissions.etc.

-The total sulphur emission from the refinery including NSU Spirit Project being maintained below 128 kg/hr as Sulphur (256 kg/hr as SO₂).

-Regular sulphur balance of the refinery is maintained and the average SO₂ emission from the refinery during this period is well below the limit.



- xii. The total water requirement shall not exceed 11907 m³/day and prior permission shall be obtained from the competent authority. The wastewater shall be treated in the waste water treatment plant and the treated effluent shall meet the prescribed standards. Treated effluent shall be recycled/reused within the factory premises. Domestic sewage shall be treated in sewage treatment plant (STP).

- Complied. NRL has already obtained consent from State Government for drawl of max. 1200 m³/hr of water. Additional water requirement and treated effluent discharged is maintained within the limits. The treated effluent quality is maintained within the prescribed standards and no treated effluent is discharged from the refinery into River Dhansiri since October,2006. Further no treated effluent from township is discharged since April, 2007 which means the effluent is totally recycled.

- xiii. No effluent shall be discharged outside the factory premises and “zero water concept” shall be adopted.

Zero discharge of treated waste water has already been achieved since 2006 and Ministry’s Regional Office is kept informed.

- xiv. Oil catchers/oil traps shall be provided at all possible locations in rain/storm water drainage system inside the factory premises.

Complied. Oil catchers/oil traps are installed in various locations in the storm water channel to avoid any oil carry over to the open channel. Construction of 6 nos additional oil catcher completed. Additionally NRL has installed a series of hay fliters in the storm water channel and used oil adsorbent booms as precautionary measures. As a step towards conservation of water, construction of a holding pond near the storm water channel is completed.

- xv. Oily sludge shall be disposed off into Coker. Annual Oily Sludge generation and disposal data shall be submitted to the Ministry’s Regional Office and CPCB.

- NRL produces Anode grade coke which is further processed in Coke Calcination Unit (CCU) to get high value Calcined Petroleum coke (CPC). Trial run for processing of sludge in Delayed Coker Unit (DCU) was carried out on an experimental basis. However, the process led to the deterioration of the CPC quality to a great extent and the experiment had to be called off. Instead, NRL follows a robust sludge handling process for disposal wherein oily sludge is suitably disposed in bioremediation or is being sold to CPCB authorized recyclers.

To waive this condition NRL submitted one application to MoEF, Delhi on 29.01.19.

The annual report of waste disposal (2020-21) is attached.

- xvi. The project authorities must strictly comply with the rules and regulation with regard to handling and disposal of Hazardous Waste (Management, Handling and Tran boundary Movement) Rules, 2008 wherever applicable.



Authorization from the State Pollution Control Board must be obtained for collection/treatment/storage/disposal of hazardous wastes.

- The rules and regulations under the Hazardous Waste (Management, handling and Trans-boundary Movement) Rules, 2008 as amended in 2009 are adhered to.

Approvals from State Pollution Control Board for authorization (management, handling & disposal) of hazardous waste as per the requirement) has been obtained. Hazardous waste Authorisation certificate valid upto April, 2026.

- xvii. Proper oil spillage prevention management plan shall be prepared to avoid spillage/leakage of oil/petroleum products and ensure regular monitoring.

- Complied.

- Oil from various units is routed through OWS (Oily Water Sewer) & CRWS (Contaminated rain Water Sewer) to ETP. The oily water from various units, OM&S and NRMT go through the CRWS and OWS systems to ETP for necessary oil removal and treatment in various sections. The slop oil is recovered in ETP and sent to OM&S for needful reprocessing in various units.

-The Storm Water Channel from various plans are connected and channel through Oil Catchers. There are several oil catchers in the final outlet of Storm Water channel. The final outlet of storm water channel is made closed immediately in case of any accidental oil carryover and is trapped in the oil catcher for necessary removal. The accumulated oil from the oil catchers is lifted with the help of MOSRU (Mobile Oil Spill Recovery Unit).

- xviii. The company shall strictly follow all the recommendation mentioned on the Charter on corporate Responsibility for Environmental protection (CREP).

- Complied.

- xix. The Company shall take necessary measures to prevent fire hazards, containing oil spill and soil remediation as needed. At place of ground flaring, the overhead flaring stack with knockout drums shall be installed to minimize gaseous emissions during flaring.

- Knockout drums are installed in the flare systems.

- xx. To prevent fire and explosion at oil and gas facility, potential ignition sources shall be kept to a minimum and adequate separation distance between potential ignition sources and flammable material shall be in place.

- Complied.



- xxi. Green belt shall be developed at least in 33% of the plant area in and around plant premises to mitigate the effects of fugitive emissions all around the plant as per the CPCB guidelines in consultation with DFO. Thick greenbelt with suitable plant species shall be developed around unit. Selection of plant species shall be as per the CPCB guidelines.

- Initially, as per Environmental Clearance granted for the Numaligarh Refinery Project, Ministry of Environment & Forest had stipulated a 500 mtrs wide green belt all around the refinery based on the EIA of Numaligarh Refinery carried out by NEERI.

On request from Numaligarh Refinery, the width of the Green Belt was later reduced from the suggested width of 500 mtrs to 100 mtrs because of the reason that almost all the surrounding areas are having tea garden with shade trees (Sirish trees). A wide natural green belt already existed all around the refinery.

Accordingly, a Green Belt covering a total area of around 60 hectares of land and around 100 mtrs width around the refinery and around 25 mtrs width around the NRMT has been developed as per the Green Belt Development Plan. (The Green Belt Development Plan has been submitted to MoEF along with the Half Yearly Report to MOEF on the 15th October, 2001).

Massive Plantation have been carried out in the Green Belt so that it can provide a natural barrier for attenuation of noise and air pollution. No. of local variety have been planted including some fruit bearing samplings in & all around Green Belt. Again it has been planned to increase the density by planting more saplings in the Green Belt in the days ahead.

- xxii. Company shall prepare project specific environmental manual and a copy shall be made available at the project site for the compliance.

- Complied.

- xxiii. All the recommendations mentioned in the rapid risk assessment report, disaster management plan and safety guidelines shall be implemented.

- Complied.

- xxiv. All the issue raised in the public hearing/consultation meeting held on 14th July, 2011 shall be satisfactorily implemented.

- Complied.

- xxv. Company shall adopt Corporate Environment Policy as per the Ministry's O.M No. J-11013/41/2006-IA.II (I) dated 26th April, 2011 and implemented.

- NRL has already adopted a Env. policy as per the requirement of Environment Management ISO 14001.



xxvi. Provision shall be made for the housing of construction labour within the site with all necessary infrastructure and facilities such as fuel for cooking, mobile toilets, mobile STP, Safe drinking water, medical health care, crèche etc. The housing may be in the form of temporary structure to be removed after completion of the project.

- *Complied.*

B. GENERAL CONDITIONS:

i. The project authorities must strictly adhere to the stipulations by the State Pollution Control Board (SPCB), State Government and any other statutory authority.

- *The stipulations made by the Pollution Control Board of Assam and the State Government are strictly adhered to.*

ii. No further expansion or modification in the project shall be carried out without prior approval of the Ministry of Environment & Forests. In case of deviations or alterations in the project proposal from those submitted to this Ministry for clearance, a fresh reference shall be made to the Ministry to assess the adequacy of conditions imposed and to add additional environmental protection measures required, if any.

- *Any expansion or modernization in the plant will be taken up only with prior approval of the Ministry of Environment & Forests.*

iii. The project authorities must strictly comply with the rules and regulations under Manufacturer, Storage and Import of Hazardous Chemicals Rules, 2000 as amended subsequently. Prior approvals from Chief Inspector of Factories, Chief Controller of Explosives, Fire Safety Inspectors etc. must be obtained, whenever applicable.

- *The rules and regulations under the Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989 and as amended in 2000 are adhered to.*

- *Approvals from Chief Inspectorate of Factories, Chief Controller of Explosives etc as applicable for the Numaligarh Refinery have been obtained.*

iv. The overall noise levels in and around the plant area shall be kept well within the standards by providing noise control measures including acoustics hoods, silencers, enclosures etc. on all sources of noise generation. The ambient noise levels shall conform to the standards prescribed under EPA Rules, 1989 viz. 75 dBA (daytime) and 70 dBA (nighttime).



- The major sources of noise generation in the proposed project are the pumps and the Air coolers. Strong foundations have been provided to mitigate the noise generation further. The equipment are monitored regularly and the ambient noise levels all around the refinery is being monitored regularly so as to maintain within the standards, prescribed under EPA Rules, 1989 viz. 75 dBA (day time) and 70 dBA (night time).

- v. A separate Environmental Management Cell equipped with full-fledged laboratory facilities must be set up to carry out the environment management and monitoring functions.

- A fully functional, dedicated environment management cell manned by qualified engineers/officers and headed by a Chief General Manager (Technical) has been continuously working for constant improvement, monitoring, safe guarding and reporting of environmental activities of the refinery. Also, a multidisciplinary Apex-level Committee on Environment which includes senior level officers from various departments as members under the chairmanship of Director (Technical) constantly guides the Environment Cell regarding all the environmental issues in the refinery. The Apex Committee that convenes quarterly discusses the unresolved issues if any, regarding the environment and monitors the regular environmental activities.

- vi. Adequate funds shall be earmarked towards capital cost and recurring cost/annum for environment protection control measures and shall be used to implement the conditions stipulated by the Ministry of Environment and Forests as well as the State Government along with the implementation schedule for all the conditions stipulated herein. The funds so provided shall not be diverted for any other purposes.

- Adequate funds have been provided for implementing the conditions stipulated by MoEF and the State Govt. and shall not be diverted for any other purpose.

- vii. The Regional Office of this Ministry/Central Pollution Control board/State Pollution Control Board will monitor the stipulated conditions. A six monthly compliance report and the monitored data along with statistical interpretation shall be submitted to them regularly.

- Six monthly compliance report is being sent to the Regional Office of this Ministry/Central Pollution Control Board/State Pollution Control Board as per the requirement.

- viii. A copy of the clearance letter shall be sent by the proponent to concerned Panchayat, Zila Parishad/Municipal Corporation, Urban Local Body and the local NGO, if any, from whom suggestion/ representation, if any, were received while processing the proposal. The clearance letter shall also be put on the web site of the company by the proponent.



- Copy of the clearance letter sent to concerned Panchayat/ Zila Parishad/ Circle Office.

- ix. The project proponent shall upload the status of compliance of the stipulated environment clearance conditions, including results of monitored data on their website and shall update the same periodically. It shall simultaneously be sent to the Regional Office of the MOEF, the respective Zonal Office of CPCB and the SPCB. The criteria pollutant levels namely; SPM, RSPM, SO₂, NO_x, HC (Methane & Non-methane), VOCs (ambient levels as well as stack emission) or critical sectoral parameters, indicated for the projects shall be monitored and displayed at a convenient location near the main gate of the company in the public domain.

- The same is complied.

- x. The project proponent shall also submit six monthly reports on the status of the compliance of the stipulated environmental conditions including results of monitored data (both in hard copies as well as by e-mail) to the Regional Office of MOEF, the respective Zonal Office of CPCB and the SPCB. The Regional Office of this Ministry/ CPCB/ SPCB/ shall monitor the stipulated conditions.

- A six monthly compliance report on the Environmental Clearance conditions of the Numaligarh Refinery along with the monitoring data is being submitted regularly to the MoE&F Regional Office.

The same is being displayed in the company's website also.

- xi. The environmental statement for each financial year ending 31st March in Form-V as is mandated to be submitted by the project proponent to the concerned State Pollution Control Board as prescribed under the Environment (Protection) Rules, 1986. As amended subsequently, shall also be put on the website of the company along with the status of compliance of environmental conditions and shall also be sent to the respective Regional Offices of the MOEF by e-mail.

- Environmental Statement for each financial year ending 31st March, in form-V is being sent to SPCB every year as per the requirements.

- The same is being displayed in the company's website also.

*- **The environmental statement for financial year, 2020-21 is attached.***

- xii. The project proponent shall inform the public that the project has been accorded environmental clearance by the Ministry and copies of the clearance letter are available with the SPCB and may also be seen at Website of the Ministry of Environment and Forests at <http://envfor.nic.in>. This shall be advertised within seven days from the date of issue of the clearance letter, at least in two local newspapers that are widely circulated in the region of which one shall be in the vernacular

language of the locally concerned and a copy of the same shall be forwarded to the Regional Office.

- The same has been complied. Advertisement regarding the environmental clearance for the Naphtha Splitter Unit (NSU) was published in two local newspapers namely, The Assam Tribune (in English) and The Dainik Janambhumi (in Assamese (on the 21st September'12 and copies of both the advertisements were forwarded to the MOEF Regional Office, Shillong.

- xiii. Project authorities shall inform the Regional Office as well as the Ministry , the date of financial closure and final approval of the project by the concerned authorities and the date of commencing the land development work.

- Complied.



**COMPLIANCE STATUS ON THE CONDITIONS OF ENVIRONMENTAL
CLEARANCE FOR THE WAX PROJECT OBTAINED VIDES LETTER NO. J-
110011/113/2009-IA II (I) dated 5th Sep,12 FROM
MOEF, NEW DELHI**

A. SPECIFIC CONDITIONS:

i Compliance to all the environmental conditions stipulated in the environmental clearance letter nos. J011011/16/90-1A.II dated 31st May, 1991, J011011/92/2003-1A.II (I) dated 13th February, 2004, J011011/203/2003-IA. II (I) dated 22nd March, 2004, J011011/272/2008-IA. II (I) dated 10nd November, 2008 shall be satisfactorily implemented and monitoring reports submitted to the Ministry's Regional Office at Shillong.

- *Complied. Half yearly compliance report of all ECs regulary being sent to MoEF,RO .*

ii. M/s Numaligarh Refinery Limited shall comply with new standards/norms for oil Refinery Industry and petrochemical industry notified under the Environment (protection)-Rules 1986.

-*The same is being complied as per the requirement.*

iii. Environmental clearance is subject to their obtaining prior clearance from wildlife angle due to nearby location of Kaziranga National Park (KNP) and clearance from the Standing Committee of the National Board for Wildlife as applicable.

- *The matter has been discussed with Chief Wildlife Warden of Assam and Director, Kaziranga National Park. As the proposed project has been constructed within the existing refinery premises, it does not require any additional land. As such, the requirement of approval from wild life is not envisaged.*

iv. No heavy equipments shall be routed through Kaziranga National Park, for which only the route identified earlier shall be used.

-*Complied.*

v. Adequate stack height shall be provided to fuel gas fired heaters as per CPCB/Assam pollution Control Board (APCB) guidelines to disperse waste heat into atmosphere. Low NOx burners shall be installed with on-line analyzers. Low sulfur fuels shall be used in boiler.

-*All the stacks are provided with adequate stack heights (min. 60 & 77 meters against the requirement of 30 meters). Low NOX burners are installed in all the stacks. Online SOx ,NOx, CO,SPM analysers are installed in all the stacks. NRL is using low sulfur fuels in the boilers.*



- vi. Continuous on-lines stack monitoring equipment shall be installed for the measurement of particulate matter, VOCs, SO₂, NO_x, non-methanated Hydrocarbons (Benzene, Xylene and Toluene).

- PM analysers installed in all the stacks. For continuous monitoring of VOCs, Non-methanated hydrocarbon (Benzene, Xylene and Toluene), online analysers are available with the existing CAAQMS.

- vii. Fugitive emissions from HVGO, MVGO and MIBK shall be recovered and controlled. Fugitive emissionis in the work environment from product raw material storage area etc. shall be regularly monitored. The emissions shall conform to the limits imposed by Assam Pollution Control Board.

-Fugitive emission survey for HVGO and MVGO is being carried out with the help of GMI Gaskoseeker as a part of monitoring and control of fugitive emission. The GMI survey has been carried in all gas/vapour valves, light liquid valves, hydrogen valves, light liquid pump seals, hydrocarbon compressor seals, hydrogen compressor seals, safety relief valves, flanges, connections, open-ended lines, drains, tankages, furnaces etc. In case of any leak observed, the same is attended immediately in line with the requirement.

- viii. The process emissions [SO₂, NO_x, HC (Methane& Non-methane)] VOCs and Benzene from various units shall conform to the standards prescribed under the Environment Protection Act. At no time, the emission levels shall go beyond the stipulated standards. In the event of failure of pollution control systems adopted by the unit, the unit shall be immediately put out of operation and shall not be restarted until the desired efficiency has been achieved.

- Complied.

- ix. Ambient air quality monitoring stations [,SPM, SO₂, NO_x, H₂S, mercaptan, non-methane-HC, and Benzene shall be set up in the complex in consultation with Assam Pollution Control Board, based on occurrence of maximum ground level concentration and down-wind direction of wind. The monitoring network must be decided based on modeling exercise to represent short term GLCS. Ambient air quality shall also be carried in one location at Kazirang National Park for SO₂, NO_x, SPM, CO and HC.

-As an action of compliance, five (5) nos. of ambient air quality monitoring stations have been set up at the following locations:

- SS 1 : Inside the refinery (Near WT No.5).
SS 2 : At the Eco-Park in NRL Township.
SS 3 : At the Raw Water Intake.
SS 4 : Near the NH-39 bypass.
SS 5 : Near the Kaziranga Wildlife Sanctuary at Agartoli.

-Ambient Air Quality monitoring at the above locations is being carried out in line with NAAQS-2009 in totality. The Ambient Air Quality Monitoring



reports are regularly submitted to the PCBA HQ Guwahati, PCBA Regional Office, Golaghat and CPCB Regional Office, Shillong in every month.

- Further, continuous ambient air quality data and online stack analyser data have been made accessible to CPCB from NRL's company's website since Sept'11.

- NRL has installed one Continuous Ambient Air Monitoring System inside the refinery premises and realtime emission data has been transmitted to CPCB server on continuous basis.

-Further, action initiated to install one additional continuous Ambient Air Monitoring System inside the refinery premises as recommended by MoEFCC based on occurrence of maximum ground level concentration and down-wind direction of wind. To be installed by Mar'19.

Ambient air quality for the period April'21 to Sept'21 is enclosed as Annexure-IV.

- x. Ambient air quality data shall be collected as per NAAQMSs standard notified by the Ministry on 16th September, 2009 and trend analysis w.r.t past monitoring results shall also be carried out. Adequate measures based on the trend analysis shall be taken to improve the ambient air quality in the project area.

-Being practiced.

- xi. Monitoring of fugitive emission shall be carried out as per the guidelines of CPCB by fugitive emission detectors and reports shall be submitted to the Ministry's regional office at Shillong. For control of fugitive emissions all unsaturated hydrocarbon will be routed to the flare system and the flares system shall be designed for smoke less burning.

*The same has been noted. Regular monitoring of fugitive emission has been carried out using GMI. The GMI survey has been carried on all gas/vapour valves, light liquid valves, hydrogen valves, light liquid pump seals, hydrocarbon compressor seals, hydrogen compressor seals, safety relief valves, flanges, connections, open-ended lines, drains, tankages, and furnaces etc. as per the guidelines. In case of any leak observed, the same is attended immediately in line with the requirement. **Fugitive emission data attached.***

- xii. A proper Leak Detection and Repair (LDAR) Program shall be prepared and implemented. Focus shall be given for prevention of fugitive emissions for which preventive maintenance of pumps, valves, pipelines are required. Proper maintenance of mechanical seals of pumps and valves shall be given. A preventive maintenance schedule for each unit shall be prepared and adhered to.

- Presently being practiced in line with MoEF notification, 2008.



- xiii. Methyl Iso Butyl Ketone (MIBK) solvent should be handled as per the standard procedure and guidelines issued time to time. MIBK solvents should be stored in cool and dry place, recovered from process through solvent recovery unit and reused in the system.

- The system is designed to strictly follow standard procedure & statutory guidelines for handling & storage of MIBK solvent, and is adequate. Also a highly efficient solvent recovery unit has been implemented to recover and re-use MIBK solvent from foots oil & wax.

- xiv. Total fresh water requirement from River Dhansiri for the proposed unit shall not exceed 60 m³/hr. and prior permission shall be obtained from the competent authority. The industrial effluent generation shall not exceed 5 m³/hr. The industrial effluents shall be treated in the ETP and the treated effluent shall meet the prescribed standards. Treated effluents shall be recycled/reused within the factory premises. Domestic sewages shall be treated in sewage treatment plant(STP).

-Scheme for reuse of storm water as cooling tower/FW makeup implemented. Treated effluent is fully recycled.

- xv. No effluent shall be discharged outside the factory premises and Zero Water Concept shall be adopted.

-Total recycle of treated effluent has been ensured. Since October, 2006 no effluent from refinery has been discharged outside the refinery and since April, 2007 township effluent also routed to the refinery, so no effluent from refinery & township is discharged outside and the total effluent is recycled within the Refinery.

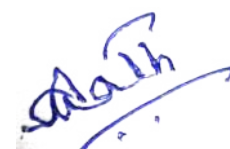
Treated effluent quality for the period April'21 to September'21 is enclosed as annexure-V.

- xvi. Oil catchers/oil traps shall be provided at all possible locations in rain/ storm water drainage system inside the factory premises.

Oil catchers/oil traps are installed in various locations in the storm water channel to avoid any oil carry over to the open channel. Insignificant quantities of emulsified oil generated if any has been recovered and reused with the help of MOSRU (Mobile Oil Spill Recovery Unit). Six new oil catcher has been installed.

- xvii. Methyl-Iso-Butyl Ketone (MIBK) shall not be allowed to mix with the effluents as well as with storm water and ground water.

Due consideration has been taken in the unit design to avoid MIBK carryover along with effluent and avoid ground water Contamination. Moreover, a dedicated MIBK close blow-down facility along with recovery system has been incorporated to avoid intermixing of MIBK with other streams.



- xviii. Oily sludge shall be disposed off into coker. Annual oily sludge generation and shall be submitted to the Ministry's Regional Office and CPCB.

- NRL produces Anode grade coke which is further processed in Coke Calcination Unit (CCU) to get high value Calcined Petroleum coke (CPC). Trial run for processing of sludge in Delayed Coker Unit (DCU) was carried out on an experimental basis. However, the process led to the deterioration of the CPC quality to a great extent and the experiment had to be called off. Instead, NRL follows a robust sludge handling process for disposal wherein oily sludge is suitably disposed in bioremediation or is being sold to CPCB authorized recyclers.

*To waive this condition NRL submitted one application to MoEF, Delhi on 29.01.19. **The annual report of waste disposal** (2020-21) is attached.*

- xix. The Company should strictly comply with the rules and guidelines under Manufacture, and import of Hazardous storage chemical Rules, 1989 as amended in october,1994 and January, 2000. Hazardous waste should be disposed of as per Hazardous Waste (Management, Handling and Transboundary Movement) Rules 2008 and amended time to time.

- The rules and regulations under the Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989 and as amended in 2000 are adhered to.

-Approvals from Chief Inspectorate of Factories, Chief Controller of Explosives etc as applicable for the Numaligarh Refinery have been obtained.

- xx. The membership of common TSDF should be obtained for the disposal of hazardous waste. Otherwise, secured land fill should be created at the site as per the guidelines of CPCB and obtain authorization from the SPCB. Copy of authorization or membership of TSDF should be submitted to Ministry's Regional office at Shillong.

NRL has constructed a Secured Landfill Facility as recommended by NEERI in 2004 for a safe and systematic dipsal of hazardous materials and authorization is accorded from the concerned authorities and renewed as per the requirement. NRL has installed another SLF of capacity 6000 m3 as per CPCB recommendation.

- xxi. Proper oil spillage prevention management plan shall be prepared to avoid spillage/leakage of oil/petroleum products of and ensure regular monitoring.

- Complied. Proper oil spill prevention management in place. Alternately, a MOSROU is used in case of emergency situation if any. Nos. of Oil catchers and Hay filters installed in various locations. Oil adsorbent boom is also placed in many locations. Further, OWS & CRWS systems are very effectively constructed to divert the spilled material to ETP for further treatment.

- xxii. The company shall strictly follow all the recommendation mentioned in the charter of Corporate Responsibility for Environmental Protection (CREP).

-The same is being complied.

- xxiii. The company shall take necessary measures to prevent fire hazards containing oil spill and soil remediation as needed. At place of ground flaring, the overhead flaring stack with knockout drums shall be installed to minimize gaseous emissions during flaring.

- Knockout drums are installed in the flare system.

- xxiv. To prevent fire and explosion at oil and gas facility, potential ignition sources shall be minimum and kept to a adequate separation distance between potential ignition sources and flammable material shall be in place.

-Complied.

- xxv. Green belt shall be developed at least in 33% of the total plant area in and around the plant premises to mitigate the effects of fugitive emissions all around the plant as per CPCB guidelines in consultation with DFO. Thick greenbelt with suitable plant species shall be developed around units. Selection of plant species as per the CPCB guidelines.

- Initially, as per Environmental Clearance granted for the Numaligarh Refinery Project, Ministry of Environment & Forest had stipulated a 500 mtrs wide green belt all around the refinery based on the EIA of Numaligarh Refinery carried out by NEERI.

On request from Numaligarh Refinery, the width of the Green Belt was later reduced from the suggested width of 500 mtrs to 100 mtrs because of the reason that almost all the surrounding areas are having tea garden with shade trees (Sirish trees). A wide natural green belt already existed all around the refinery.

Accordingly, a Green Belt covering a total area of around 60 hectares of land and around 100 mtrs width around the refinery and around 25 mtrs width around the NRMT has been developed as per the Green Belt Development Plan. (The Green Belt Development Plan has been submitted to MoEF along with the Half Yearly Report to MOEF on the 15th October, 2001).

Massive Plantation has been carried out in the Green Belt so that it can provide a natural barrier for attenuation of noise and air pollution. No. of local variety have been planted including some fruit bearing samplings in & all around Green Belt. Again it has been planned to increase the density by planting more saplings in the Green Belt in the days ahead.



xxvi. Company shall prepare project specific environmental manual and a copy should be made available at the project site for the compliance.

-Complied.

xxvii. All the recommendations mentioned in the rapid risk assessment report, disaster management plan and safety guidelines shall be implemented.

-Complied.

xxviii. All the issues raised and committed made during the public hearing/consultation meeting held on 14th July, 2011 shall be satisfactorily implemented. Accordingly, provision of budget to be kept.

-Complied.

xxix. Company shall adopt Corporate Environment policy as per the Ministry's O M. No. J- 11013/41/2O06-IA(1) dated 26th April, 2011 and implemented.

- NRL has already adopted a Env. policy as per the requirement of Environment Management ISO 14001.

xxx. Provision shall be made for the housing of construction labour within the site with infrastructure and all necessary facilities such as fuel for cooking, mobile toilets, mobile STP, safe drinking water, medical health care, crèche etc. The housing may be in the form of temporary structures to be removed after the completion of the project.

-Complied.

B. GENERACL ONDITIONS:

i. The project authorities must strictly adhere to the stipulations made by the State pollution Control Board (SPCB) State Government and any other statutory authority.

- The stipulations made by the Pollution Control Board of Assam and the State Government are strictly adhered to.

ii. No further expansion or modification in the project shall be carried out without prior approval from the Ministry of Environment & Forests. In case of deviations or alterations in the project proposal from those submitted to this Ministry for clearance a, fresh reference shall be made to the Ministry to assess the adequacy of conditions imposed and to add additional environment protection measures required if any.

- Any expansion or modernization in the plant will be taken up only with prior approval of the Ministry of Environment & Forests.



- iii. The project authorities to strictly comply with the rules and regulations under Manufacture, Storage and Import of Hazardous Chemicals Rules, 2008 as amended subsequently. Prior approvals from Chief Inspector of Factories Chief Controller of Explosives Fire Safety Inspector must be obtained wherever applicable.

- The rules and regulations under the Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989 and as amended in 2000 are adhered to.

Approvals from Chief Inspectorate of Factories, Chief Controller of Explosives etc as applicable for the Numaligarh Refinery have been obtained.

- iv. The overall noise levels in and around the plant area shall be kept well within the standards by providing noise control measures including acoustic hoods, silencers, enclosures etc. on all sources of noise generation. The ambient noise levels shall conform to the standards prescribed under PAR ules,1 989v iz.75 dBA(day time) and 70 dBA(nighttime).

- The major sources of noise generation in the proposed project are the pumps and the blowers. Strong foundations provided to mitigate the noise generation further. The equipment being monitored regularly at a distance of 01 mtr from the source and corrective measure being taken to maintain the noise level below 85 dBA. The ambient noise levels all around the refinery is being monitored regularly so as to maintain within the standards, prescribed under EPA Rules, 1989 viz. 75 dBA (day time) and 70 dBA (night time).

- v. A separate Environmental Management Cell equipped with full fledged laboratory facilities must be setup to carry out the environmental management on monitoring functions.

- A fully functional, dedicated environment management cell manned by qualified engineers/officers and headed by Chief General Manager (Technical) has been continuously working for constant improvement, monitoring, safeguarding and reporting of environmental activities of the refinery. Also, a multidisciplinary Apex-level Committee on Environment which includes senior level officers from various departments as members under the chairmanship of Director (Technical) constantly guides the Environment Cell regarding all the environmental issues in the refinery. The Apex Committee that convenes quarterly discusses the unresolved issues if any, regarding the environment and monitors the regular environmental activities.

- vi. Adequate funds shall be earmarked towards capital cost and recurring cost/ annum for environment pollution control measures and shall be used to implement the conditions stipulated by the Ministry of Environment and Forests as well as the State Government along with the



implementation schedule for all the conditions stipulated herein. The funds so provided shall not be diverted for any other purposes.

- Adequate funds have been provided for implementing the conditions stipulated by MoEF and the State Govt. and not diverted for any other purpose.

- vii. The Regional office of this Ministry/Central Pollution Control Board//State Pollution Control Board will monitor the stipulated conditions. A six-monthly compliance report and the monitored data along with statistical interpretations shall be submitted to them regularly.

- Six monthly compliance report is being sent to the Regional Office of this Ministry/Central Pollution Control board/State Pollution Control Board as per the requirement.

- viii. A copy of clearance letter shall be sent by the proponent to concerned Panchayat/ Zila Parishad/ Municipal Corporation/ Urban Local Body and the local NGO if any, from whom suggestion/representation if, any, were received while processing the proposal. The clearance letter shall also be put on the web site of the company by the proponent.

- Copy of the clearance letter sent to concerned Panchayat/ Zila Parishad/ Circle Office.

- ix. The project proponent shall upload the status of compliance of the stipulated environment clearance conditions including results of monitored data on their website and shall update the same periodically. It shall simultaneously be sent to the Regional Office of the MoEF, the respective Zonal Office of CPCB and the SPCB. The criteria pollutant levels namely SPM, RSPM, SO₂, NO_x, HC (Methane & Non-methane), VOCs (ambient levels as well as stack emissions) or critical sectoral parameters indicated for the projects shall be monitored and displayed at a convenient location near the main gate of the company in the public domain.

-Complied.

- x. The project proponent shall also submit six monthly reports on the status of the compliance of the stipulated environmental conditions including results of monitored data (both in hard copies as well as by e-mail) to the Regional Office of MoEF, the respective Zonal Office of CPCB and the SPCB. The Regional office of this Ministry/ CPCB/ SPCB shall monitor the stipulated conditions.

-The same is being complied.

The same is being displayed in the company's website also.



- xi. The environmental statement for each financial year ending 31st March, in form-IV as is mandated to be submitted by the project proponent to the concerned state pollution control board as prescribed under the Environment (Protection) Rules 1986 as amended subsequently shall also be put in the website of the company alongwith the status of compliance of environmental conditions and shall also be sent to the respective Regional offices of the MoEF by e-mail.

-The same is being complied. Environmental Statement for each financial year ending 31st March, in form-IV is being sent to SPCB every year as per the requirements. The environmental statement for financial year, 2020-21 is attached.

- xii. The Project Proponent shall inform the public that the project has been accorded environmental clearance by Ministry and copies of the clearance letter area available with the SPCB and may also be seen at website of the Ministry of Environment & Forests at [http:// envfor.nic.in](http://envfor.nic.in). this shall be advertised within seven days from the date of issue of the clearance letter at least in two local newspapers that are widely circulated in the region of which one shall be in the vernacular language of the locally concerned and a copy of the same shall be forwarded to the Regional Office.

- The same has been complied. Advertisement regarding the environmental clearance was published in two local newspapers namely, The Assam Tribune (in English) dated 13.09.2012 and The Amar Axom (Assamese) dated 12.09.2012. Copies of both advertisements were forwarded to the MoEF Regional Office.

- xiii. Project authorities shall inform the Regional Office as well as the Ministry, the date of financial closure and final approval of the project by the concerned authorities and the date of commencing the land development work.

-Complied.

- 8.0 The Ministry may revoke or suspend the clearance, if implementation of any of the above Conditions is not satisfactory.

-The same has been noted.

- 9.0. The Ministry reserves the right to stipulate additional conditions if found necessary. Company in a time bound manner shall implement these conditions.

-The same has been noted.

10. The above conditions will be enforced inter-alia under the provisions of Water (Prevention & Control of pollution) Act 1974, Air (Prevention & control of Pollution) Act' 1981' the Environment (Protection) Act 1986, Hazardous Waste (Management Handling and Transboundary Movement) Rules 2008 and the Public Liability Insurance Act 1991 alongwith their amendments and rules.

-The same has been noted.

COMPLIANCE STATUS ON THE CONDITIONS OF ENVIRONMENTAL CLEARANCE FOR COMPLETE EURO-IV HSD PROJECT ALONGWITH INSTALLTION OF LPG MOUNDED BULLET AND MODIFICATION OF EXISTING LPG BOTTLING FACILITY OBTAINED VIDES LETTER NO. J-110011/150/2015-IA II (I) dated 9th Dec,16 FROM MOEFCC, NEW DELHI

A. SPECIFIC CONDITIONS:

i NRL shall comply with new standards/norms for Oil Refinery Industry notified under the Environment (Protection) Rules, 1986 vide G.S.R. 186(E) dated 18th March, 2008.

- *Compliance status of few points are as follows:*

(a) *Secondary seals in IFRT and EFRT tanks -installation of double seals in EFRT, IFRT tanks completed.*

(b) *LDAR-programme: The same is implemented.*

(c) *Implementation of VOC recovery system in ETP: VOC recovery system in ETP has been implemented.*

ii. Compliance to all the environmental conditions stipulated in the environmental clearance letter nos. J011011/16/90-1A.II dated 31.05.1991, J011014/2/1991-1A (I) dated 18.01.1994, J011011/92/2003-1A.II (I) dated 13.02.2004, J011011/203/2003-IA. II (I) dated 22.03.2004, J011011/272/2008-IA. II (I) dated 10.11.2008, J011011/113/2009-IA. II (I) dated 05.09.2012, J011011/534/2009-IA. II (I) dated 12.09.2012 shall be satisfactorily implemented and monitoring reports submitted to the Ministry's Regional Office at Shillong.

- *Being complied. Half yearly compliance report of all ECs regulary being submitted to MoEF,RO .*

iii. Continuous on-line stack monitoring for SO₂, NO_x and CO of all the stacks shall be carried out. Low NO_x burners shall be installed

- *Online Sox, NOx, CO and SPM analyser installed in all the stacks. Low NOx burners installed in all the stacks*

iv. The process emissions [SO₂, NO_x, HC (Methane & Non-methane)], VOCs and Benzene from various units shall conform to the standards prescribed under the Environment (Protection) Act. In the event of failure of pollution control system(s) adopted bythe unit, the unit shall be immediately put out of operation and shall not be restarted until the desired efficiency of the pollution control device has been achieved.

- *complied.*



- v. Leak Detection and Repair programme shall be prepared and implemented to control HC/VOC emissions. Focus shall be given to prevent fugitive emissions for which preventive maintenance of pumps, valves, pipelines are required. Proper maintenance of mechanical seals of pumps and valves shall be given. A preventive maintenance schedule for each unit shall be prepared and adhered to. Fugitive emissions of HC from product storage tank yards etc. must be regularly monitored. Sensors for detecting HC leakage shall be provided at strategic locations.

- *LDAR program implemented for DHT in line with the existing practice carried out in various units.*

- vi. SO₂ emissions after expansion from the plant shall not exceed 256 kg/hr and further efforts shall be made for reduction of SO₂ load through use of low sulphur fuel. Sulphur recovery unit with tail gas treating facilities having 99.9 % efficiency shall be provided.

- SO₂ emission within limit. TGTU being implemented.

- vii. As proposed, record of sulphur balance shall be maintained at the Refinery as part of the environmental data on regular basis. The basic component of sulphur balance include sulphur input through feed (sulphur content in crude oil), sulphur output from Refinery through products, byproduct (elemental sulphur), atmospheric emissions etc.

- *Complied. Regular Sulphur balance for the refinery is carried out and record maintained. Also, sulfur balance post DHDT prepared.*


- viii. Ambient air quality monitoring stations, [PM₁₀, PM_{2.5}, SO₂, NO_x, H₂S, mercaptan, non-methane-HC and Benzene] shall be set up in the complex in consultation with Maharashtra Pollution Control Board, based on occurrence of maximum ground level concentration and down-wind direction of wind

- *Monitoring of ambient air quality parameter is being complied as per NAAQM, 2009. New additional CAAQMS alongwith analyser inside the refinery premises based on occurrence of maximum ground level concentration and down-wind direction of wind installed.*

- ix. The gaseous emissions from DG set shall be dispersed through adequate stack height as per CPCB standards. Acoustic enclosure shall be provided to the DG sets to mitigate the noise pollution.

- *Complied as per CPCB standard.*

- x. Fresh water requirement from Dhansiri River shall not exceed 688 m³/hr after expansion and prior permission shall be obtained from the competent authority. Industrial effluent generation will be 130 m³/hr and treated in the Effluent Treatment Plant. Treated effluent shall be fully reused/recycled as make-up water for raw water cooling towers.



- *Treated effluent is being fully recycled .*
- xi. No effluent shall be discharged outside the plant premises and „Zero“ effluent discharge concept shall be followed.
 - *The same has been complied.*
- xii. Comprehensive water audit to be conducted on annual basis and report to the concerned Regional Office of MEF&CC. Outcome from the report to be implemented for conservation scheme
 - *Water audit completed.*
- xiii. Automatic /online monitoring system (24 x 7 monitoring devices) for flow measurement and relevant pollutants in the treatment system to be installed. The data to be made available to the respective SPCB, Regional Office of MoEFCC and in the Company's website.
 - Flowmeter in the treated effluent line installed in Nov' 18. For pollutant level measurement pH & TOC (for measurement of COD & BOD) analyser is already exist. TSS analyser installaed in November' 18.
- xiv. Oil catchers/oil traps shall be provided at all possible locations in rain/ storm water drainage system inside the factory premises.
 - *Oil catchers/oil traps are installed in various locations in the storm water channel to avoid any oil carry over to the open channel. Insignificant quantities of emulsified oil generated if any has been recovered and reused with the help of MOSRU (Mobile Oil Spill Recovery Unit). **Construction of 6 nos new oil catcher Near CDU,HCU,OMS north, near ETP, near PH-3, near storm water final O/L completed , So, complied . Also storm water recycle system to FW/CW has been commissioned.***
- xv. Oily sludge shall be disposed off into Coker. Annual Oily sludge generation and disposal data shall be submitted to the Ministry's Regional Office and CPCB.
 - *NRL produces Anode grade coke which is further processed in Coke Calcination Unit (CCU) to get high value Calcined Petroleum coke (CPC). Trial run for processing of sludge in Delayed Coker Unit (DCU) was carried out on an experimental basis. However, the process led to the deterioration of the CPC quality to a great extent and the experiment had to be called off. Instead, NRL follows a robust sludge handling process for disposal wherein oily sludge is suitably disposed in bioremediation or is being sold to CPCB authorized recyclers. To waive this condition NRL submitted one application to MoEF, Delhi on 29.01.19.*
 - The annual report of waste disposal (2020-21) is attached.*



- xvi. The Company should strictly comply with the rules and guidelines under Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989 as amended in October, 1994 and January, 2000. Hazardous waste should be disposed of as per Hazardous Waste (Management, Handling and Trans-boundary Movement) Rules, 2008 and amended time to time.

-The rules and regulations under the Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989 and as amended in 2000 are adhered to. Hazardous waste authorization is valid till April,2026.

- xvii. The membership of common TSDF should be obtained for the disposal of hazardous waste. Copy of authorization or membership of TSDF should be submitted to Ministry's Regional Office at Shillong. Chemical/inorganic sludge shall be sent to treatment storage disposal facility (TSDF) for hazardous waste. Spent catalyst shall be sent to authorized recyclers/re-processors.

- NRL has its own SLF for disposal of oily sludge. NRL has constructed a Secured Landfill Facility as recommended by NEERI in 2004 for a safe and systematic disposal of hazardous materials and authorization is accorded from the concerned authorities and renewed as per the requirement. Installation of another SLF as per CPCB recommendation has been completed.

- xviii. Proper oil spillage prevention management plan shall be prepared to avoid spillage/leakage of oil/petroleum products and ensure regular monitoring

- Proper oil spill prevention management in place. Alternately, a MOSROU is used in case of emergency situation if any. 6 Nos. of additional Oil catchers and Hay filters installed in various locations. Oil adsorbent boom is also placed in many locations. Further, OWS & CRWS systems are very effectively constructed to divert the spilled material to ETP for further treatment

- xix. Acoustic enclosure /silencer shall be installed wherever it is possible

- Complied.

- xx. Occupational Health Surveillance of the workers should be done on a regular basis and records maintained as per the Factories Act

- Complied.

- xxi. The company should make the arrangement for protection of possible fire and explosion hazards during construction and operation phase.

- Complied.



xxii. The company shall strictly follow all the recommendation mentioned in the charter of Corporate Responsibility for Environmental Protection (CREP).

- *Complied.*

xxiii. Thick greenbelt with suitable plant species shall be developed around unit. Selection of plant species shall be as per the CPCB guidelines.

- *Initially, as per Environmental Clearance granted for the Numaligarh Refinery Project, Ministry of Environment & Forest had stipulated a 500 mtrs wide green belt all around the refinery based on the EIA of Numaligarh Refinery carried out by NEERI.*

On request from Numaligarh Refinery, the width of the Green Belt was later reduced from the suggested width of 500 mtrs to 100 mtrs because of the reason that almost all the surrounding areas are having tea garden with shade trees (Sirish trees). A wide natural green belt already existed all around the refinery.

Accordingly, a Green Belt covering a total area of around 60 hectares of land and around 100 mtrs width around the refinery and around 25 mtrs width around the NRMT has been developed as per the Green Belt Development Plan. (The Green Belt Development Plan has been submitted to MoEF along with the Half Yearly Report to MOEF on the 15th October, 2001).

Massive Plantation have been carried out in the Green Belt so that it can provide a natural barrier for attenuation of noise and air pollution. No. of local variety have been planted including some fruit bearing samplings in & all around Green Belt. Again it has been planned to increase the density by planting more saplings in the Green Belt in the days ahead.

xxiv. All the recommendations mentioned in the rapid risk assessment report, disaster management plan and safety guidelines shall be implemented.

-*The same has been noted & being implemented. QRA by M/s Ifluids completed.*

xxv. At least 2.5 % of the total cost of the project shall be earmarked towards the Enterprise Social Commitment (ESC) based on local needs and action plan with financial and physical breakup/details shall be prepared and submitted to the Ministry's Regional Office at Shillong. Implementation of such program shall be ensured accordingly in a time bound manner. Detailed action plan to be submitted to MOEFCC Regional Office, Shillong.

Comprehensive plan prepared. Many activities under the plan are being executed. Action plan with financial and physical breakup/details with time line submitted to the Ministry's Regional Office at Shillong earlier.



B. GENERAL CONDITIONS:

- i. The project authorities must strictly adhere to the stipulations made by the State pollution Control Board (SPCB) State Government and any other statutory authority.

- The stipulations made by the Pollution Control Board of Assam and the State Government are strictly adhered to.

- ii. No further expansion or modification in the project shall be carried out without prior approval from the Ministry of Environment & Forests. In case of deviations or alterations in the project proposal from those submitted to this Ministry for clearance, a fresh reference shall be made to the Ministry to assess the adequacy of conditions imposed and to add additional environment protection measures required if any.

- Any expansion or modernization in the plant will be taken up only with prior approval of the Ministry of Environment & Forests.

- iii. The project authorities to strictly comply with the rules and regulations under Manufacture, Storage and Import of Hazardous Chemicals Rules, 2008 as amended subsequently. Prior approvals from Chief Inspector of Factories Chief Controller of Explosives Fire Safety Inspector must be obtained wherever applicable.

- The rules and regulations under the Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989 and as amended in 2000 are adhered to.

Approvals from Chief Inspectorate of Factories, Chief Controller of Explosives etc as applicable for the Numaligarh Refinery have been obtained.

- iv. The overall noise levels in and around the plant area shall be kept well within the standards by providing noise control measures including acoustic hoods, silencers, enclosures etc. on all sources of noise generation. The ambient noise levels shall conform to the standards prescribed under PAR rules, 1989 viz. 75 dBA (day time) and 70 dBA (nighttime).

- The major sources of noise generation in the proposed project are the pumps and the blowers. Strong foundations shall be provided to mitigate the noise generation further. The equipment shall be monitored regularly at a distance of 01 mtr from the source and corrective measure shall be taken to maintain the noise level below 85 dBA. The ambient noise levels all around the refinery is being monitored regularly so as to maintain within the standards, prescribed under EPA Rules, 1989 viz. 75 dBA (day time) and 70 dBA (night time).



- v. A separate Environmental Management Cell equipped with full fledged laboratory facilities must be setup to carry out the environmental management on monitoring functions.

- A fully functional, dedicated environment management cell manned by qualified engineers/officers and headed by Chief General Manager (Technical) has been continuously working for constant improvement, monitoring, safe guarding and reporting of environmental activities of the refinery. Also, a multidisciplinary Apex-level Committee on Environment which includes senior level officers from various departments as members under the chairmanship of Director (Technical) constantly guides the Environment Cell regarding all the environmental issues in the refinery. The Apex Committee that convenes quarterly discusses the unresolved issues if any, regarding the environment and monitors the regular environmental activities.

- vi. Adequate funds shall be earmarked towards capital cost and recurring cost/ annum for environment pollution control measures and shall be used to implement the conditions stipulated by the Ministry of Environment and Forests as well as the State Government along with the implementation schedule for all the conditions stipulated herein. The funds so provided shall not be diverted for any other purposes.

- Adequate funds have been provided for implementing the conditions stipulated by MoEF and the State Govt. and shall not be diverted for any other purpose.

- vii. The Regional office of this Ministry/Central Pollution Control Board//State Pollution Control Board will monitor the stipulated conditions. A six monthly compliance report and the monitored data along with statistical interpretations shall be submitted to them regularly.

- Six monthly compliance report is being sent to the Regional Office of this Ministry/Central Pollution Control board/State Pollution Control Board as per the requirement.

- viii. A copy of clearance letter shall be sent by the proponent to concerned Panchayat/ Zila Parishad/ Municipal Corporation/ Urban Local Body and the local NGO if any, from whom suggestion/representation if, any, were received while processing the proposal. The clearance letter shall also be put on the web site of the company by the proponent.

-The same has been noted. Copy of the clearance letter sent to concerned Panchayat/ Zila Parishad/ Circle Office.

- ix. The project proponent shall upload the status of compliance of the stipulated environment clearance conditions including results of monitored data on their website and shall update the same periodically. It shall simultaneously be sent to the Regional Office of the MoEF, the respective Zonal Office of CPCB and the SPCB. The criteria pollutant levels namely SPM, RSPM, SO₂, NO_x, HC (Methane& Non-

methane), VOCs (ambient levels as well as stack emissions) or critical sectoral parameters indicated for the projects shall be monitored and displayed at a convenient location near the main gate of the company in the public domain.

-Complied.

- x. The project proponent shall also submit six monthly reports on the status of the compliance of the stipulated environmental conditions including results of monitored data (both in hard copies as well as by e-mail) to the Regional Office of MOEF, the respective Zonal Office of CPCB and the SPCB. The Regional Office of this Ministry/ CPCB/ SPCB/ shall monitor the stipulated conditions.

- A six monthly compliance report on the Environmental Clearance conditions of the Numaligarh Refinery along with the monitored data is being submitted regularly to the MoEFCC Regional Office.

The same is being displayed in the company's website also.

- xi. The environmental statement for each financial year ending 31st March in Form-V as is mandated to be submitted by the project proponent to the concerned State Pollution Control Board as prescribed under the Environment (Protection) Rules, 1986. As amended subsequently, shall also be put on the website of the company along with the status of compliance of environmental conditions and shall also be sent to the respective Regional Offices of the MOEF by e-mail.

*- The same is being complied. The reports as mentioned being uploaded in NRL website. **The environmental statement for financial year, 2020-21 is attached.***

- xii. The project proponent shall inform the public that the project has been accorded environmental clearance by the Ministry and copies of the clearance letter are available with the SPCB and may also be seen at Website of the Ministry of Environment and Forests at <http://envfor.nic.in>. This shall be advertised within seven days from the date of issue of the clearance letter, at least in two local newspapers that are widely circulated in the region of which one shall be in the vernacular language of the locally concerned and a copy of the same shall be forwarded to the Regional Office.

- The same has been complied. Advertisement regarding the environmental clearance for the DHDT Unit was published in two local newspapers namely, The Assam Tribune (in English) and The Dainik Janambhumi (in Assamese (on the 26th December, 2016 of both the advertisements were forwarded to the MOEF Regional Office, Shillong.

- xiii. Project authorities shall inform the Regional Office as well as the Ministry, the date of financial closure and final approval of the project by



the concerned authorities and the date of commencing the land development work.

- Complied.

- 8.0 The Ministry may revoke or suspend the clearance, if implementation of any of the above Conditions is not satisfactory.

-The same has been noted.

- 9.0. The Ministry reserves the right to stipulate additional conditions if found necessary. Company in a time bound manner shall implement these conditions.

-The same has been noted.

10. The above conditions will be enforced inter-alia under the provisions of Water (Prevention & Control of pollution) Act 1974, Air (Prevention & control of Pollution) Act' 1981' the Environment (Protection) Act 1986, Hazardous Waste (Management Handling and Transboundary Movement) Rules 2008 and the Public Liability Insurance Act 1991 alongwith their amendments and rules.

-The same has been noted.



COMPLIANCE STATUS ON THE CONDITIONS OF ENVIRONMENTAL CLEARANCE FOR THE EXPANSION OF THE REFINERY FROM 3 MMTPA TO 9 MMTPA OBTAINED VIDES LETTER NO. J-11011/274/2015 –IA II (I) DATED JULY 27, 2020 FROM MOEF & CC, NEW DELHI

Sl No	Conditions	Compliance status
13(i)	The EC granted to the project/ activity is strictly under the provisions of the EIA Notification 2006 and its amendments. It does not tantamount / construe to approvals/ consent/ permissions etc. required to be obtained or standards/ conditions to be followed under any other acts/ Rules/ Subordinate legislations, etc., as may be applicable to the project.	Noted.
13(ii)	The effluent shall be treated and recycled/ reused to meet the requirement of different industrial operations and Zero Liquid Discharge shall be achieved. The treated effluent of 300 cum/hr, if discharged to Dhansiri river through pipeline (to downstream only), shall conform to the standards prescribed under the Environment (protection) Rules, 1986. If Zero Liquid Discharge is not followed, the Project Proponent shall submit plan for achieving Zero Liquid Discharge with its techno-economic feasibility within 3 months before the EAC/Ministry.	<p>A Zero Liquid Discharge techno-economic feasibility study has been carried out through M/s EIL. The feasibility report with recommendations submitted to MoEF, Delhi on 02.11.2020.</p> <p>Recommendation of feasibility report are-</p> <p>Although Zero Liquid Discharge is better option in terms of water recovery and no wastewater disposal to the Dhansiri River, however, disposal of RO-DM plant reject/ wastewater is proposed in view of the following considerations:</p> <ul style="list-style-type: none"> • Insignificant impact on the river water quality (~0.3 ppm TDS during wet weather and ~12 ppm TDS during dry weather) due to disposal of RO-DM plant reject water. • Less consumption of input energy (steam, power, etc.) required for disposal of RO-DM plant reject water (as compared to ZLD plant option). • Less fuel requirement for additional power requirement (as compared to ZLD plant option wherein more fuel shall be required for generation of power and steam) and lesser



		<p>emissions.</p> <ul style="list-style-type: none"> • No requirement of secured landfill for disposal of significant quantity (30 TPD) of salt generation as in case of ZLD plant option. • No possibility of ground water contamination in the areas nearby secured landfill site as in case of ZLD plant option. • Lower CAPEX and OPEX involved in plant installation and operation (as compared to ZLD plant option). • Very little maintenance or operator's attention requirement (as compared to ZLD plants which are more prone to downtime). <p>As advised by MoEF, NRL applied online for EC amendment on 04.03.2021. The proposal was appraised by EAC committee(I-2) in the ministry in its meeting held on 18 th March'2021. The EAC after deliberations, recommended the amendment in EC as proposed by NRL. Based on the recommendation MoEF accords approval to the proposed amendment on 06.05.2021 as stated below-</p> <p><i>The effluent shall be treated and recycled/reused to meet the requirement of different industrial operations. The RO-DM reject of 300 cum/hr to be discharged to Dhansiri River through pipeline (to downstream only), shall conform to the CPCB guidelines.</i></p>
13(iii)	<p>The project proponent shall finalize and submit the details of sites to be utilized for associated activities of the refinery in the NDZ area within six months. Preference shall be given to the sites which is adjoining / adjacent to the refinery area. The project proponent shall submit MoU/commitment from the stakeholders regarding transfer of the land.</p>	<p>Noted for compliance.</p> <p>The outright purchase/ lease rent deal with the landowners could not be finalized yet due to commercial reasons. Accordingly, NRL has initiated another effort to procure land parcels in and around Refinery premises for the purpose. Accordingly, EOI was published in newspapers and a few offers are received out of which some plots are within the NDZ and some are outside of it. Evaluation/scrutiny of the offers is going on and shall require some more time to conclude the exercise. NRL will approach MoEF&CC with fresh proposal seeking prior</p>

		<p>permission of any land selected within the NDZ area as per the stipulation of NDZ Notification.</p> <p>In view of above NRL requested to extend the period of compliance of Clause 13(iii) of the EC for a period of three months and allow to submit a consolidated proposal after finalization with the stakeholders/land owners. A letter in this regard submitted to MoEF&CC office on 21.01.2021. A copy is forwarded to MoEF,RO, Ghy on 28.01.2021.</p>
13(iv)	The National Emission Standards for Petroleum Oil refinery issued by the Ministry vide G.S.R. 186 (E) dated 18 th March, 2008 and G.S.R. 595(E) dated 21 st August, 2009 as amended from time to time, shall be followed.	Noted for compliance.
13(v)	Volatile organic compounds (VOCs)/ Fugitive emissions shall be controlled at 99.997% with effective chillers/ modern technology. For emission control and management, use of FG/NG in heater & boiler, continuous stack monitoring, Sulphur recovery plant, etc. shall be installed / ensured.	Noted for compliance.
13(vi)	Total fresh water requirement after expansion shall not exceed 2508 cum/hr to be met from Dhansiri river. Fresh water requirement shall be reduced by recycling/reuse of water. Necessary permission for freshwater procurement shall be obtained from the concerned regulatory authority.	Noted for compliance.
13(vii)	Process effluent/ any wastewater shall not be allowed to mix with storm water. Storm water drain shall be passed through guard pond.	Noted for compliance.
13(viii)	Hazardous chemicals shall be stored in tanks, tank farms, drums, carboys etc. Flame arrested shall be provided on tank farm, and solvent transfer to be done through pumps.	Noted for compliance.
13(ix)	Process organic residue and spent carbon, if any, shall be sent to cement industries. ETP sludge, process inorganic & evaporation salt shall be disposed off to the TSDF.	Noted for compliance.
13(x)	Fly ash should be stored separately as per CPCB guidelines so	Noted for compliance.



	that it should not adversely affect the air quality, becoming air borne by wind or water regime during rainy season by flowing along with the storm water. Direct exposure of workers to fly ash & dust should be avoided. The ash from boiler shall be sold to brick manufacturers / cement industry.	
13(xi)	The company shall undertake waste minimization measures as below:- a) Metering and control of quantities of active ingredients to minimize waste. b) Reuse if by-products from the process as raw materials or as raw material substitutes in other processes. c) Use of automated filling to minimize spillage. d) Use of Close Feed system in to batch reactors. e) Venting equipment through vapour system f) Use of high pressure hoses for equipment cleaning to reduce waste water generation.	Noted for compliance.
13(xii)	The green belt of 5-10m width shall be developed in the total project area, mainly along the plant periphery, in downwards wind direction, and along road sides etc. The project proponent shall ensure 40% greenbelt area vis-à-vis the project area through afforestation in the degraded area. The selection of plant species shall be as per the CPCB guidelines in consultant with the State Forest Department.	-Noted for compliance. - An MoU was signed on 14.09.2020 between NRL and Golaghat Social Forestry Division, Govt. of Assam for compensatory afforestation of 40 Hectares of land in Nak-Kati Chapori, Khumtai Revenue Circle, Golaghat for plantation of 1 lakh tree saplings. -Another MoU was signed between NRL and Nagaon Forest Division for Compensatory afforestation drive in 35 Ha land in Kondoli PRF on 23.08.2021.
13(xiii)	As proposed, at least Rs. 36.51 crore shall be allocated towards Corporate Environment Responsibility (CER). As proposed, the CER allocation shall be spent mainly for addressing the issue raised during public consultation/ hearing including assistance/ infrastructure for transport facility, drinking water, social/ environmental activities, education & skill development, etc.	Noted for compliance.



13(xiv)	For the DG sets, emission limits and the stack height shall be in conformity with the extant regulations and the CPCB guidelines. Acoustic enclosure shall be provided to DG set for controlling the noise pollution.	Noted for compliance.
13(xv)	The unit shall make the arrangement for protection of possible fire hazards during manufacturing process in material handling. Firefighting system shall be as per the norms.	Noted for compliance.
13(xvi)	Continuous online (24X7) monitoring system for stack emissions shall be installed for measurement of flue gas discharge and the pollutants concentration, and the data to be transmitted to the CPCB and SPCB serve. For online continues monitoring of effluent, the unit shall installed web camera with night vision capability and flow meters in the channel/drain carrying effluent within the premises. In case of the treated effluent to be utilized for irrigation/gardening, real time monitoring system shall be installed at the ETP outlet.	Noted for compliance.
13(xvii)	Process safety and risk assessment studies shall be further carried out using advanced models, and the mitigating measures shall be undertaken/implemented accordingly.	Noted for compliance.
13(xviii)	The project proponent shall implement the Site-Specific Conservation Plan for conservation of Schedule I Species in the study area and obtain approval from the State Chief Wildlife Warden of the Department. The recommendations of the approved Site-Specific Conservation Plan shall be implemented in consultation with the State Wildlife Department. The implementation report shall be furnished along with the six-monthly compliance report.	Noted for compliance.
13(xix)	The PP should improved the efficiency of ETP Plant and the water discharge should be as per prescribed CPCB Norms. They should also install 24X7 hours monitoring system (of the discharge) and the same should be connected to the server of SPCB/CPCB.	Noted for compliance.
13(xx)	Fly Ash Brick making plant shall be installed for proper	Noted for compliance.



	disposal of fly ash.	
General Conditions		
13.1(i)	No further expansion or modifications in the plant, other than mentioned in the EIA Notification, 2006 and its amendments, shall be carried out without prior approval of the Ministry of Environment, Forest and Climate Change. In case of deviations or alterations in the project proposal from those submitted to this Ministry for clearance, a fresh reference shall be made to the Ministry to assess the adequacy of conditions imposed and to add additional environmental protection measures required, if any.	Noted for compliance.
13.1 (ii)	The energy source for lighting purpose shall be preferably LED based, or advance having preference in energy conservation and environment betterment.	Noted for compliance.
13.1 (iii)	The locations of ambient air quality monitoring stations shall be decided in consultation with the State Pollution Control Board)SPCB) and it shall be ensured that at least one station each is installed in the upwind and downwind direction as well as where maximum ground level concentrations are anticipated.	Noted for compliance.
13.1 (iv)	The National Ambient Air Quality Emission Standards issued by the Ministry vide GSR No. 826(E) dated 16 th November, 2009 shall be followed.	Noted for compliance.
13.1 (v)	The overall noise levels in and around the plant area shall be kept well within the standards by providing noise control measures including acoustic hoods, silencers, enclosures etc. on all sources of noise generation. The ambient noise levels shall conform to the standards prescribed under Environment (Protection) Act, 1986 Rules, 1989 viz 75dBA (day time) and 70 DBA (night time).	Noted for compliance.



13.1 (vi)	The company shall harvest rainwater from the roof tops of the buildings and storm water drains to recharge the ground water and to utilize the same for process requirements.	Noted for compliance.
13.1 (vii)	Training shall be imparted to all employees on safety and health aspects of chemicals handling. Pre- employment and routine periodical medical examinations for all employees shall be undertaken on regular basis. Training to all employees on handling of chemicals shall be imparted.	Noted for compliance.
13.1(viii)	The company shall also comply with all the environmental protection measures and safeguards proposed in the documents submitted to the Ministry. All the recommendations made in the EIA/EMP in respect of environmental managements, and risk mitigation measures relating to the project shall be implemented.	Noted for compliance.
13.1 (ix)	The company shall undertake all relevant measures for improving the socio-economic conditions of the surrounding area. CER activities shall be undertaken by involving local villages and administration and shall be implemented.	Noted for compliance.
13.1 (x)	The company shall undertake eco-development measures including community welfare measures in the project area for the overall improvement of the environment.	Noted for compliance.
13.1 (xi)	A separate Environmental Management Cell having qualified person with Environmental Science/ Environmental Engineering / specialization in the project area) equipped with full fledged laboratory facilities shall be set up to carry out the Environmental Management and Monitoring functions.	Noted for compliance. Environmental management cell already exist.
13.1 (xii)	The company shall earmark sufficient funds towards capital cost and recurring cost per annum to implement the conditions stipulated by the Ministry of Environment, Forest and Climate Change as well as the State Government along with the implementation schedule for all the conditions stipulated herein. The funds so diverted for any other purpose.	Noted for compliance.

13.1(xiii)	A copy of the clearance letter shall be sent by the project proponent to concern Panchayat, Zilla Parishad/ Municipal Corporation, urban local body and the local NGO, if any, from whom suggestions/ representations, if any, were received while processing the proposal.	Copy of clearance letter submitted to Letekujan Gaon Panchyat, Rongbong Gaon Panchyat, Ponka Gaon Panchyat, Morongi Circle Office on 19.08.2020
13.1(xiv)	The project proponent shall also submit six monthly report on the status of compliance of the stipulated Environmental Clearance conditions including results of monitored date (both in hard copies we well as by e-mail) to the respective Regional Office of MoEF & CC, the respective Zonal Office of CPCB and SPCB. A copy of Environmental Clearance and six Monthly compliance status report shall be posted on the website of the company.	-Noted for compliance. -EC compliance status as on 1 st June'21 submitted.
13.1 (xv)	The environmental statement for each financial year ending 31 st March in form-V as is mandated shall be submitted to the concerned State Pollution Control Board as prescribed under the Environment (Protection) Rules, 1986, as amended subsequently, shall also be put on the website of the company along with the status of compliance of environmental clearance conditions and shall also be sent to the respective Regional Offices of MoEF & CC by e-mail.	-Noted for compliance. -EC compliance status as on 1 st June'21 submitted.
13.1(xvi)	The project proponent shall inform the public that the project has been accorded environmental clearance by the Ministry and copies of the clearance letter are available with the SPCB/Committee and may also be seen at Website of the Ministry and at https://parivesh.nic.in/ . this shall be advertised within seven days from the date of issue of the clearance letter, at least in two local newspapers that are widely circulated in the region of which on shall be in the vernacular language of the locality concerned and a copy of the same shall be forwarded to the concerned Regional Office of the Ministry.	The advertisement of granting of EC grant broadly published in widely circulated local newspapers - Amar Asom, Pratidin, Dainik Asom, Asomia Khobor, Dainik Agradoot, Dainik Janambhumi, Niyamia Barta (Assamese) and The Assam Tribune and The Sentinel (English) on 30 th July, 2020 for information to public. The copy of EC letter and paper advertise sent to MoEF,RO on 06.08.2020



13.1(xvii)	The project authorities shall inform the Regional Office as well as the Ministry, the date of Financial closure and final approval of the project by the concerned authorities and the date of start of the project.	Noted for compliance
13.1(xviii)	This Environmental clearance is granted subject to final outcome of Hon'ble Supreme Court of India. Hon'ble High Court, Hon'ble NGT and any other Court of Law, if any, as may be applicable to this project.	Noted



Annexure VI

ENVIRONMENTAL EXPENDITURE FOR APRIL'21-SEPT'21
(FY-2021-22)

SI No	Name of the Facilities	Expenditure
1	Effluent Treatment plant	3,86,48,147.33
2	Sulphur Recovery Unit	8,21,36,849.88
3	Pollution & Environmental Expenses	99,091.00
4	Environmental Cell	47,16,051.96
5	R & M Contract Services	83,92,849.36
	Grand total (Rs)	13,39,92,989.53




NOISE MONITORING REPORT
(Day timing- 8.30 AM to 4.30 PM and Night timing –10.00 PM to 6.00 AM)



Client: **NRL** Work Order No. : **4300058771-BOR/12.04.2019**

For The Month of : **July 2021** ETS/NRL/NOISE/02/21

NOISE LEVEL IN dB(A)					
AREA	SI NO.	CENTRAL LOCATION	Observed value dB(A)		Standard dB(A)
			Day	Night	
CDU/ VDU	1	Field Cabin (inside)	62.1	59.6	92 for 6 hrs
	2	Crude Booster Pump (A)	95.6	94.2	
	3	Crude Booster Pump (B)	94.7	93.1	
DCU	4	Field Cabin	54.2	57.4	90 for 8 hrs
	5	LPG Compressor	94.4	93.2	
HCU	6	Field Cabin(Inside)	62.5	60.3	
	7	Near RGC Area	73.2	72.3	
H2U	8	Field Cabin (Inside)	58.3	57.6	
	9	PSA AREA	97.7	95.2	
SRB	10	Field Cabin(Inside)	58.2	56.1	
	11	Control Room	57.7	55.5	
PH#1	12	Field Cabin (Inside)	61.3	60.2	
PH#3	13	Field Cabin (Inside)	62.1	59.9	
CPP(1)	14	Control Room	60.3	58.1	
	15	Field Cabin (Inside)	63.1	60.2	
	16	Instrumentation Room	65.8	62.1	
	17	Air Compressor (Utility)	88.8	87.2	
CPP(2)	18	Cabin(2)	64.3	61.3	
	19	Sound Prone Zone	87.6	85.1	
CPP(3)	20	Cooling Tower (North Side)	88.8	86.1	
	21	Cooling Tower (South Side)	89.3	87.2	
DM Plant	22	Field Cabin (Inside)	63.4	60.2	
WHFU	23	Field Cabin	62.6	59.9	
	24	Office Cabin	61.5	58.6	
FWPH	25	Control Room	62.3	59.2	
ETP	26	Disposal Pump House	61.6	58.8	
	27	Control Room	61.7	56.2	
CCU	28	Control Room	63.3	61.2	
	29	Near BFW	87.7	86.2	
	30	Near Air Blower	84.4	82.8	
MSP	31	Field Cabin	59.7	58.3	
	32	Near Compressor House	94.6	93.3	
	33	Near Furnace Area	83.2	82.6	
N2 PLANT/ Compressor	34	Control Room	64.1	62.3	
	35	Compressor House	93.7	93.2	
N2 PLANT	36	LP Compressor (2A)	90.8	89.8	
	37	LP Compressor (2B)	89.3	88.5	
WAX(ASPI)	38	Compressor (304A)	88.6	87.3	

WAX(SDU)	39	Compressor (304B)	87.3	85.1		
WAX(SDU)	40	Office Cabin	59.6	57.3		
	41	Field Cabin	61.1	58.2		
LPG Bottling Plant	42	Casual Area	68.6	66.1		
	43	Unloading Area	103.9	103.2		
	44	Cylinder Filling Area	106.2	105.5		
	45	Loading Area	106.6	105.8		
AREA	SI NO.	LOCATION	Observed value dB(A)		Standard dB(A)	
			Day	Night		
Lab	46	Outside Lab Building	68.3	66.1	75	
	47	Near Laboratory	58.8	56.3		
IT DEPT	48	Server Room	53.4	51.1		
ADM Building	49	Near AC Room	62.3	59.8		
	50	Near ADM Building	63.6	60		
Control Room	51	Infront of CCR	57.7	55.5		
Flare Area	52	Near Flare Area	60.3	59.1		
VKNRL Hospital	53	Hospital Premises	58.2	56.2		
DPS	54	DPS Premises	60.2	57.1		
Watch Tower	55	Near W.T No.1	59.8	57.6		
<i>for ETS</i>						
						


Signature

NOISE MONITORING REPORT
(Day timing- 8.30 AM to 4.30 PM and Night timing –10.00 PM to 6.00 AM)



Client: NRL *Work Order No. : 4300058771-BOR/12.04.2019*
For The Month of : May 2021 *ETS/NRL/NOISE/01/21*

NOISE LEVEL IN dB(A)					
AREA	SI NO.	CENTRAL LOCATION	Observed value dB(A)		Standard dB(A)
			Day	Night	
CDU/ VDU	1	Field Cabin (inside)	65.2	63.5	92 for 6 hrs
	2	Crude Booster Pump (A)	92.6	91.8	
	3	Crude Booster Pump (B)	93.7	91.2	
DCU	4	Field Cabin	60.3	59.2	90 for 8 hrs
	5	LPG Compressor	92.3	91	
HCU	6	Field Cabin(Inside)	60.2	58.2	
	7	Near RGC Area	71.3	70.4	
H2U	8	Field Cabin (Inside)	57.8	56.6	
	9	PSA AREA	98.2	96.6	
SRB	10	Field Cabin(Inside)	56.8	55.5	
	11	Control Room	55.6	54.4	
PH#1	12	Field Cabin (Inside)	59.9	57.7	
PH#3	13	Field Cabin (Inside)	60.3	58.8	
CPP(1)	14	Control Room	59.8	59.2	
	15	Field Cabin (Inside)	67.2	64.1	
	16	Instrumentation Room	67.6	65.3	
	17	Air Compressor (Utility)	86.3	84.1	
CPP(2)	18	Cabin(2)	65.5	63	
	19	Sound Prone Zone	88.6	87.1	
CPP(3)	20	Cooling Tower (North Side)	89.2	88.3	
	21	Cooling Tower (South Side)	90.1	88.6	
DM Plant	22	Field Cabin (Inside)	65.3	63.1	
WHFU	23	Field Cabin	61.1	60.3	
	24	Office Cabin	63.5	61.6	
FWPH	25	Control Room	59.2	58.3	
ETP	26	Disposal Pump House	62.3	60.1	
	27	Control Room	58.5	56.2	
CCU	28	Control Room	63.3	61.2	
	29	Near BFW	86.2	85.6	
	30	Near Air Blower	82.2	81.9	
MSP	31	Field Cabin	60.2	58.1	
	32	Near Compressor House	92.8	91.9	
	33	Near Furnace Area	81.5	80.6	
N2 PLANT/ Compressor	34	Control Room	66.2	63.1	
	35	Compressor House	94.1	93.6	
N2 PLANT	36	LP Compressor (2A)	90.3	90.1	
	37	LP Compressor (2B)	90.2	88.1	
WAX (ASPI)	38	Compressor (304A)	89.8	87.1	

WAX(SDU)	39	Compressor (304B)	58.6	56.3		
WAX(SDU)	40	Office Cabin	62.1	59.9		
	41	Field Cabin	63.2	60.1		
LPG Bottling Plant	42	Casual Area	104.2	103.3		
	43	Unloading Area	105.1	104.1		
	44	Cylinder Filling Area	106.2	105.3		
	45	Loading Area	106.2	104.1		
AREA	SI NO.	LOCATION	Observed value dB(A)		Standard dB(A)	
			Day	Night		
Lab	46	Outside Lab Building	71.1	68.2	75	
	47	Near Laboratory	61.2	58.3		
IT DEPT	48	Server Room	55.2	53.1		
ADM Building	49	Near AC Room	59.9	55.5		
	50	Near ADM Building	60.4	58.6		
Control Room	51	Infront of CCR	56.2	54.1		
Flare Area	52	Near Flare Area	58.2	56.3		
VKNRL Hospital	53	Hospital Premises	56.7	55.6		
DPS	54	DPS Premises	58.2	56.2		
Watch Tower	55	Near W.T No.1	62.3	59.4		
<i>for ETS</i>						
						

Signature

Annexure-III

QUARTERLY PERFORMANCE REPORT W.R.T ENVIRONMENTAL ASPECT.

DURING QUARTER I (APRIL-JUNE,21),2021-22

Online Stack Analyser data

UNIT	FURNACE STACK	PARAMETER	OBSERVED VALUE		Limiting Concentration in mg/Nm ³	Remarks Limit conc. calculated using fuel type & quan. used during the period
			CONC. (In mg/Nm ³)			
			MAX.	MIN.		
CDU/VDU	FF-01/02	SO ₂	389.99	62.38	525	Stack with dual firing (FG:FO=71:29)
		NOX	132.23	11.4	379	
		CO (FFI&II)	8.7	2.75	164	
DCU	FF-01	SO ₂	254.25	11.70	756	Stack with dual firing (FG:FO=57:43)
		NOX	236.55	49.68	393	
HCU	FF-01/02	SO ₂	19.54	3.1	50	Stack with Gas firing
		NOX	35.56	12.13	350	
HCU	FF-03	SO ₂	203.25	13.77	216	Stack with dual firing (FG:FO=90:10)
		NOX	112.30	6.6	360	
H2U	FF-01	SO ₂	48.8	16.61	50	Stack with Gas firing
		NOX	44.02	16.22	350	
MSP	FF-01	SO ₂	39.84	16.56	50	Stack with Gas firing
		NOX	90.13	4.80	350	
CPP HRSG		SO ₂	41.47	9.16	50	Stack with dual firing (FG:NAP=100:00)
		NOX	35.52	1.27	350	
CPP UTILITY BOILER		SO ₂	46.83	10.14	50	Stack with Dual firing (FG:FO=100:0)
		NOX	112.9	6.57	350	
DHDT		SO ₂	12.30	3.49	50	Stack with Gas firing
		NOX	27.5	7.80	350	

* Limiting concentration of emission calculated as per MOEF new notification on standard vide GSR- 186 (E) dated 18th March, 2008. Emission level for all the stacks are found to be within limit



Annexure-III

QUARTERLY PERFORMANCE REPORT W.R.T ENVIRONMENTAL ASPECT.

DURING QUARTER II(JULY-SEPT'21),2021-22

Online Stack Analyser data

UNIT	FURNACE STACK	PARAMETER	OBSERVED VALUE		Limiting Concentration in mg/Nm ³	Remarks Limit conc. calculated using fuel type& quan. used during the period
			CONC. (In mg/Nm ³)			
			MAX.	MIN.		
CDU/VDU	FF-01/02	SO ₂	292.81	65.15	610	Stack with dual firing (FG:FO=66:34)
		NOX	210.00	5.4	384	
		CO (FFI&II)	9.4	3.50	167	
DCU	FF-01	SO ₂	235.00	11.43	795	Stack with dual firing (FG:FO=55:45)
		NOX	163.87	9.03	395	
HCU	FF-01/02	SO ₂	47.12	1.4	50	Stack with Gas firing
		NOX	41.47	8.86	350	
HCU	FF-03	SO ₂	84.80	7.80	86	Stack with dual firing (FG:FO=98:2)
		NOX	188.80	2.7	352	
H2U	FF-01	SO ₂	48.8	4.00	50	Stack with Gas firing
		NOX	47.16	4.57	350	
MSP	FF-01	SO ₂	40.33	7.75	50	Stack with Gas firing
		NOX	71.65	34.08	350	
CPP HRSG		SO ₂	21.55	9.25	50	Stack with dual firing (FG:NAP=100:00)
		NOX	43.12	11.03	350	
CPP UTILITY BOILER		SO ₂	42.86	10.63	50	Stack with Dual firing (FG:FO=100:0)
		NOX	82.9	17.05	350	
DHDT		SO ₂	34.60	4.26	50	Stack with Gas firing
		NOX	51.9	11.10	350	

* Limiting concentration of emission calculated as per MOEF new notification on standard vide GSR- 186 (E) dated 18th March, 2008. Emission level for all the stacks are found to be within limit

Annexure-IV

NUMALIGARH REFINERY LIMITED
QUARTERLY PERFORMANCE WITH RESPECT TO ENVIRONMENTAL ASPECTS
DURING QUARTER I (APRIL-JUNE 21), 2021-22

Ambient Air Quality Data						
STATION	PARAMETER	STD NAAQS-2009	Unit	OBSERVATIONS		
				MAX	MIN	AVG
REFINERY (WATCH TOWER NO. 6)	SO ₂	80 (24 hr avg.)	µg/m ³	14.1	8.10	11.1
	NO ₂	80 (24 hr avg.)	µg/m ³	19.0	10.2	14.6
	O ₃	100 (8 hr avg.)	µg/m ³	36.6	13.7	24.1
	CO	2.000 (8 hr.avg.)	mg/m ³	1.040	0.52	0.880
	NH ₃	400 (24 hr.avg.)	µg/m ³	33.8	15.7	24.18
	PM 10	100 (24 hr.avg.)	µg/m ³	65.5	38.1	53.2
	PM 2.5	60 (24 hr.avg.)	µg/m ³	33.9	17.8	25.3
	Benzene	05 (Annual)	µg/m ³	3.10	1.50	2.38
	HC		mg/m ³	1.21	0.56	0.90
	BaP	01 (Annual)	ng/m ³	<0.5	<0.5	<0.5
	Pb	1.0 (24 hr.avg.)	µg/m ³	0.41	0.14	0.29
	As	06 (Annual)	ng/m ³	1.00	1.00	1.00
	Ni	20 (Annual)	ng/m ³	4.10	1.30	2.44
ECO-PARK IN NRL TOWNSHIP	SO ₂	80 (24 hr avg.)	µg/m ³	13.40	8.40	10.6
	NO ₂	80 (24 hr avg.)	µg/m ³	18.60	11.00	13.9
	O ₃	100 (8 hr avg.)	µg/m ³	33.8	12.50	21.8
	CO	2.000 (8 hr.avg.)	mg/m ³	0.970	0.540	0.750
	NH ₃	400 (24 hr.avg.)	µg/m ³	32.5	12.50	21.3
	PM 10	100 (24 hr.avg.)	µg/m ³	61.1	36.9	49.2
	PM 2.5	60 (24 hr.avg.)	µg/m ³	33.0	14.8	23.0



	Benzene	05 (Annual)	µg/m3	3.10	0.90	2.0
	HC		mg/m3	1.51	0.55	0.9
	BaP	1.0 (Annual)	ng/m3	<0.5	<0.5	<0.5
	Pb	1.0 (24 hr.avg.)	µg/m3	0.38	0.17	0.260
	As	6.0 (Annual)	ng/m3	1.00	1.00	1.00
	Ni	20 (Annual)	ng/m3	3.90	1.20	2.44
RAW WATER INTAKE	SO2	80 (24 hr avg.)	µg/m3	12.7	7.6	9.6
	NO2	80 (24 hr avg.)	µg/m3	17.0	9.3	12.6
	O3	100 (8 hr avg.)	µg/m3	34.1	14.5	22.7
	CO	2.000 (8 hr.avg.)	mg/m3	0.84	0.57	0.71
	NH3	400 (24 hr.avg.)	µg/m3	29.20	12.80	21.66
	PM 10	100 (24 hr.avg.)	µg/m3	88.2	36.3	47.8
	PM 2.5	60 (24 hr.avg.)	µg/m3	28.6	13.5	21.7
	Benzene	05 (Annual)	µg/m3	3.20	0.90	2.0
	HC		mg/m3	1.10	0.56	0.8
	BaP	01 (Annual)	ng/m3	<0.5	<0.5	<0.5
	Pb	1.0 (24 hr.avg.)	µg/m3	0.380	0.14	0.26
	As	06 (Annual)	ng/m3	1.00	1.00	1.00
	Ni	20 (Annual)	ng/m3	3.70	1.40	2.15
	NH-39 BYPASS	SO2	80 (24 hr avg.)	µg/m3	16.0	8.7
NO2		80 (24 hr avg.)	µg/m3	21.9	10.9	16.5
O3		100 (8 hr avg.)	µg/m3	45.1	18.1	30.4
CO		2.000 (8 hr.avg.)	mg/m3	1.180	0.660	0.970
NH3		400 (24 hr.avg.)	µg/m3	40.1	16.1	28.6
PM 10		100 (24 hr.avg.)	µg/m3	74.1	43.6	60.3
PM 2.5		60 (24 hr.avg.)	µg/m3	39.9	20.8	27.7

	Benzene	05 (Annual)	µg/m3	4.00	1.50	2.56
	HC	-	mg/m3	1.39	0.64	1.07
	BaP	1	ng/m3	<0.5	<0.5	<0.5
	Pb	1.0 (24 hr.avg.)	µg/m3	0.50	0.17	0.337
	As	6	ng/m3	1.00	1.00	1.00
	Ni	20 (Annual)	ng/m3	4.60	1.30	3.06
KAZIRANGA WILDLIFE SANCTUARY AT AGARTOLI	SO2	80 (24 hr avg.)	µg/m3	12.00	6.70	9.62
	NO2	80 (24 hr avg.)	µg/m3	15.7	8.4	12.6
	O3	100 (8 hr avg.)	µg/m3	31.9	14.40	20.6
	CO	2.000 (8 hr.avg.)	mg/m3	0.840	0.480	0.7
	NH3	400 (24 hr.avg.)	µg/m3	28.30	10.90	19.5
	PM 10	100 (24 hr.avg.)	µg/m3	54.0	32.6	43.1
	PM 2.5	60 (24 hr.avg.)	µg/m3	25.6	11.7	20.0
	Benzene	05 (Annual)	µg/m3	2.90	0.90	2.0
	HC	-	mg/m3	0.52	0.22	0.7
	BaP	1.0	ng/m3	<0.5	<0.5	<0.5
	Pb	1.0 (24 hr.avg.)	µg/m3	0.37	0.13	0.24
	As	6.0	ng/m3	1.00	1.00	1.00
	Ni	20 (Annual)	ng/m3	3.40	1.10	2.2

BDL:Below Detection Level, All the parameters are found to be within limit

Annexure-IV

NUMALIGARH REFINERY LIMITED
QUARTERLY PERFORMANCE WITH RESPECT TO ENVIRONMENTAL ASPECTS
DURING QUARTER II (JULY-SEPT'21), 2021-22

Ambient Air Quality Data						
STATION	PARAMETER	STD	Unit	OBSERVATIONS		
		NAAQS-2009		MAX	MIN	AVG
REFINERY (WATCH TOWER NO. 6)	SO ₂	80 (24 hr avg.)	µg/m ³	11.9	7.40	9.8
	NO ₂	80 (24 hr avg.)	µg/m ³	16.2	9.3	13.0
	O ₃	100 (8 hr avg.)	µg/m ³	31.8	14.9	22.6
	CO	2.000 (8 hr.avg.)	mg/m ³	0.860	0.55	0.733
	NH ₃	400 (24 hr.avg.)	µg/m ³	28.1	12.9	21.06
	PM 10	100 (24 hr.avg.)	µg/m ³	54.1	43.4	46.3
	PM 2.5	60 (24 hr.avg.)	µg/m ³	29.1	17.2	21.0
	Benzene	05 (Annual)	µg/m ³	3.00	1.10	1.98
	HC		mg/m ³	1.00	0.58	0.79
	BaP	01 (Annual)	ng/m ³	<0.5	<0.5	<0.5
	Pb	1.0 (24 hr.avg.)	µg/m ³	0.37	0.14	0.25
	As	06 (Annual)	ng/m ³	1.00	1.00	1.00
	Ni	20 (Annual)	ng/m ³	3.30	1.10	2.13
ECO-PARK IN NRL TOWNSHIP	SO ₂	80 (24 hr avg.)	µg/m ³	11.40	7.20	9.6
	NO ₂	80 (24 hr avg.)	µg/m ³	15.60	9.30	12.7
	O ₃	100 (8 hr avg.)	µg/m ³	27.5	12.60	20.5
	CO	2.000 (8 hr.avg.)	mg/m ³	0.800	0.540	0.650
	NH ₃	400 (24 hr.avg.)	µg/m ³	27.5	13.90	20.6
	PM 10	100 (24 hr.avg.)	µg/m ³	50.4	36.0	44.0
	PM 2.5	60 (24 hr.avg.)	µg/m ³	25.2	15.6	19.9



	Benzene	05 (Annual)	µg/m3	2.50	1.00	1.7
	HC		mg/m3	0.97	0.54	0.8
	BaP	1.0 (Annual)	ng/m3	<0.5	<0.5	<0.5
	Pb	1.0 (24 hr.avg.)	µg/m3	0.32	0.15	0.227
	As	6.0 (Annual)	ng/m3	1.00	1.00	1.00
	Ni	20 (Annual)	ng/m3	2.90	1.20	2.08
RAW WATER INTAKE	SO2	80 (24 hr avg.)	µg/m3	10.4	6.9	8.7
	NO2	80 (24 hr avg.)	µg/m3	14.4	9.0	11.5
	O3	100 (8 hr avg.)	µg/m3	27.3	12.2	19.5
	CO	2.000 (8 hr.avg.)	mg/m3	0.77	0.51	0.65
	NH3	400 (24 hr.avg.)	µg/m3	25.70	12.20	18.91
	PM 10	100 (24 hr.avg.)	µg/m3	48.8	34.5	41.9
	PM 2.5	60 (24 hr.avg.)	µg/m3	26.5	15.6	17.1
	Benzene	05 (Annual)	µg/m3	2.50	0.90	1.8
	HC		mg/m3	0.91	0.51	0.7
	BaP	01 (Annual)	ng/m3	<0.5	<0.5	<0.5
	Pb	1.0 (24 hr.avg.)	µg/m3	0.330	0.12	0.23
	As	06 (Annual)	ng/m3	1.00	1.00	1.00
	Ni	20 (Annual)	ng/m3	3.00	1.00	2.02
	NH-39 BYPASS	SO2	80 (24 hr avg.)	µg/m3	13.7	8.6
NO2		80 (24 hr avg.)	µg/m3	18.6	11.5	15.0
O3		100 (8 hr avg.)	µg/m3	36.0	15.3	25.6
CO		2.000 (8 hr.avg.)	mg/m3	0.980	0.530	0.777
NH3		400 (24 hr.avg.)	µg/m3	32.6	15.9	24.5
PM 10		100 (24 hr.avg.)	µg/m3	62.3	43.3	54.4
PM 2.5		60 (24 hr.avg.)	µg/m3	33.9	17.4	24.5

KAZIRANGA WILDLIFE SANCTUARY AT AGARTOLI	Benzene	05 (Annual)	µg/m ³	3.40	1.10	2.32
	HC	-	mg/m ³	1.11	0.69	0.88
	BaP	1	ng/m ³	<0.5	<0.5	<0.5
	Pb	1.0 (24 hr.avg.)	µg/m ³	0.41	0.16	0.280
	As	6	ng/m ³	1.00	1.00	1.00
	Ni	20 (Annual)	ng/m ³	3.70	1.40	2.65
	SO ₂	80 (24 hr avg.)	µg/m ³	10.10	7.10	7.85
	NO ₂	80 (24 hr avg.)	µg/m ³	14.0	8.1	10.3
	O ₃	100 (8 hr avg.)	µg/m ³	26.7	11.00	19.1
	CO	2.000 (8 hr.avg.)	mg/m ³	0.720	0.500	0.6
	NH ₃	400 (24 hr.avg.)	µg/m ³	24.70	11.30	19.1
	PM 10	100 (24 hr.avg.)	µg/m ³	45.9	36.3	39.8
	PM 2.5	60 (24 hr.avg.)	µg/m ³	22.6	13.0	18.3
	Benzene	05 (Annual)	µg/m ³	2.50	0.10	1.8
	HC	-	mg/m ³	0.86	0.53	0.7
	BaP	1.0	ng/m ³	<0.5	<0.5	<0.5
	Pb	1.0 (24 hr.avg.)	µg/m ³	0.29	0.12	0.20
	As	6.0	ng/m ³	1.00	1.00	1.00
	Ni	20 (Annual)	ng/m ³	2.90	1.10	1.9

BDL:Below Detection Level, All the parameters are found to be within limit

Annexure-V

**QUARTERLY PERFORMANCE REPORT W.R.T ENVIRONMENTAL ASPECT
DURING QR. I (APRIL -JUNE , 21) 2021 -22**

TABLE-1 LIQUID EFFLUENT POLLUTANT LEVEL -								
MONITORED VALUES in mg/lit.except pH								
SL. NO	PARAMETERS	NO. OF OBS	MAX.	MIN.	AVG.	Limiting value for conc. (mg/l except for pH)	Quantum limit in Kg / 1000 MT of crude processed	
							Actual	Standard
1	pH	91	7.8	7.0	7.4	6-8.5	-	-
2	OIL & GRE	91	5.0	1.9	3.48	5	1.80	2.0
3	SULPHIDE	91	<0.1	<0.1	<0.1	0.5	0.05	0.2
4	PHENOL	91	0.34	0.10	0.20	0.35	0.10	0.14
5	S. SOLID	91	20.0	10.0	15.13	20.0	7.80	8.0
6	COD	91	123.0	43.00	73.8	125.0	38.1	50.0
7	BOD3	91	15.0	8.0	10.33	15.0	5.33	6.0
8	CN	91	<0.02	<0.02	<0.02	0.2	0.01	0.08
9	Ammonia as N	3	13.0		10.57	15.0	5.45	6.0
10	Cr (Hexavalent)	3	0		0.00	0.1	0.00	0.04
11	Cr (Total)	3	0.01		0.012	2.0	0.01	0.8
12	Pb	3	0.02		0.0117	0.1	0.006	0.04
13	Zn	3	0.07		0.077	5.0	0.04	2.0
14	Ni	3	0.05		0.020	1.0	0.01	0.4
15	Cu	3	0.06		0.027	1.0	0.014	0.4
16	Benzene	3	0.07		0.054	0.1	0.028	0.04
17	Benzo (a)-Pyrene	3	0.083		0.063	0.2	0.032	0.08
18	Hg	3	0.005		0.0043	0.01	0.00	0.004
19	V	3	0.098		0.08	0.2	0.0	0.8
20	TKN	3	21.4		18.9	40.0	9.73	16.0
21	P	3	1.3		1.21	3.0	0.63	1.2

Limiting concentration of effluent is as per MoEF notification on standard vide GSR-186 (E)dated 18th March, 2008.

*** BDL- Detectable Limit : 0.1 microgram/Litre**

Annexure-V

DURING QR. II (JULY -SEPT'21) 2021 -22

TABLE-1 LIQUID EFFLUENT POLLUTANT LEVEL -								
MONITORED VALUES in mg/lit.except pH								
SL. NO	PARAMETERS	NO. OF OBS	MAX.	MIN.	AVG.	Limiting value for conc. (mg/l except for pH)	Quantum limit in Kg / 1000 MT of crude processed	
							Actual	Standard
1	pH	91	7.5	6.0	7.1	6-8.5	-	-
2	OIL & GRE	91	4.9	1.6	3.17	5	1.48	2.0
3	SULPHIDE	91	<0.1	<0.1	<0.1	0.5	0.05	0.2
4	PHENOL	91	0.32	0.10	0.17	0.35	0.08	0.14
5	S. SOLID	91	20.0	10.0	14.51	20.0	6.79	8.0
6	COD	91	103.0	35.20	62.2	125.0	29.1	50.0
7	BOD3	91	14.0	6.0	10.00	15.0	4.68	6.0
8	CN	91	<0.02	<0.02	<0.02	0.2	0.01	0.08
9	Ammonia as N	3	12.2		11.00	15.0	5.15	6.0
10	Cr (Hexavalent)	3	0		0.00	0.1	0.00	0.04
11	Cr (Total)	3	0.003		0.002	2.0	0.00	0.8
12	Pb	3	0.001		0.0003	0.1	0.000	0.04
13	Zn	3	0.017		0.011	5.0	0.01	2.0
14	Ni	3	0.002		0.001	1.0	0.00	0.4
15	Cu	3	0.009		0.006	1.0	0.003	0.4
16	Benzene	3	0.044		0.038	0.1	0.018	0.04
17	Benzo (a)-Pyrene	3	0.055		0.047	0.2	0.022	0.08
18	Hg	3	0.005		0.0037	0.01	0.00	0.004
19	V	3	0.072		0.04	0.2	0.0	0.8
20	TKN	3	20.5		18.2	40.0	8.53	16.0
21	P	3	1.34		1.21	3.0	0.57	1.2

Limiting concentration of effluent is as per MoEF notification on standard vide GSR-186 (E)dated 18th March, 2008.

*** BDL- Detectable Limit : 0.1 microgram/Litre**

*** Parameters from 9 to 21 are monitored once in a month as per CPCB norms**

NRL/ENV/PCBA/21/10

Dated: 24th June, 2021.

CIN- U11202AS1993GOI003893

To,

The Member Secretary,
Pollution Control Board, Assam
Bamunimaidam,
Guwahati-781021

Sub : Submission of Annual Return on Hazardous Waste (Management & Handling) as per the provision of "Hazardous and other Waste (Management & Trans boundary Movement) Rules, 2016" in Form- 4 for the year 2020-21

Dear Sir,

We are submitting herewith the **Annual Return on Hazardous Waste (Management & Handling)** as per the provision of **Hazardous and other Waste (Management & Trans boundary Movement) Rule 2016 in Form 4** along with other enclosures for the year 2020-21.

Hope, the same shall meet the requirement.

Thanking you.

Yours' faithfully,



(Alok Nayan Nath)
CM (TS-ENV)

CC: Regional Office, MoEF & CC, Guwahati

FORM - 4

[See rules 6(5), 13(8), 16(6) and 20 (2)]

FORM FOR FILING ANNUAL RETURNS

[To be submitted to State Pollution Control Board by 30th day of June of every year for the preceding period **April, 2020 to March, 2021**

1. Name and address of facility : Numaligarh Refinery Limited,
P.O. NRP -785699
Golaghat, Assam.

2. Authorization No. and Date of issue: NO : WB/OTWA/HW-353/20-21/191/01
Date : 20th April, 2021 (for five years)

3. Name of the authorized person and : Mr. Bimlesh Kumar Gupta, CGM(TS)
full address with telephone, fax : Technical Services Department.
number and e-mail: 2nd Floor, Administrative Building,
Numaligarh Refinery Limited.
PO: NRP 785699, Golaghat, Assam
E mail: bimlesh.gupta@nrf.co.in

4. Production during the year (product wise), wherever applicable: N/A

Part A. To be filled by hazardous waste generators

1. Total quantity of waste generated category wise : Year : 2020-21

i) Chem & Oily Sludge from ETP : 70 MT
(schedule -1, Category -4.1)

ii) Tank Bottom sludge : 45 MT
(schedule-1, Category -4.1)

iii) Slop Oil from Process Unit : 32574
(schedule-1, Category-4.3)

iv) Spent Catalyst : Nil

2. Quantity dispatched/disposed -

(i) to disposal facility-

A) Secured Land Fill -

Chem. & Oily Sludge : 70 MT

B) Bioremediation -

Tank Bottom sludge : 545 MT (with previous stock 500MT)

C) Reprocessing -

Slop Oil : 25756 MT (Reprocessed in CDU/VDU)

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- (ii) to recycler or co-processors or pre-processor :
- | | |
|-------------------------|-------|
| Chem. & Oily Sludge | : Nil |
| Tank Bottom Oily sludge | : Nil |
| Slop Oil | : Nil |
| Spent Catalyst | : Nil |
- (iii) others : Nil
3. Quantity utilized in-house, if any) : Nil
4. Quantity in storage at end of the year (31.03.2021) :
- | | |
|-------------------------|--|
| Chem. & Oily Sludge | : Nil |
| Tank Bottom Oily sludge | : 504 MT |
| Slop Oil | : 65322 MT |
| Spent Catalyst | : 380 MT(Kept in sealed drum for selling) |

Part B. To be filled by Treatment, storage and disposal facility operators


1. Total quantity received during 2020 -2021 : As per Part -A
2. Quantity in stock at beginning of year (on 01.04.2020) :
- | | |
|-------------------------|--------------|
| Chem. & Oily Sludge | : Nil |
| Tank Bottom Oily sludge | : 1004.0 MT |
| Spent Catalyst | : 380.0 MT |
| Slop Oil | : 58504.0 MT |
3. Quantity treated - : Nil
4. Quantity disposed in Landfills as such and after treatment (During 2020-21):
- | | |
|-------------------------------|---------|
| Chem &Oily sludge (from ETP) | : 70 MT |
|-------------------------------|---------|
5. Quantity incinerated (if applicable) - : N / A
6. Quantity processed other than specified above - : N / A
7. Quantity in storage at the end of the year (on 31.03.2021):
- | | |
|-------------------------|--|
| Tank Bottom Oily sludge | : 504 MT (kept in sealed drum for Bioremediation) |
| Spent Catalyst | : 380 MT (kept in sealed drum for selling to CPCB Approved Recycler) |
| Slop Oil | : 65322 MT |

ETD/2021

Part C. To be filled by recyclers or co-processors or other users : N/A

1. Quantity of waste received during the year –
 - (i) domestic sources
 - (ii) imported (if applicable)
2. Quantity in stock at the beginning of the year -
3. Quantity recycled or co-processed or used –
4. Quantity of products dispatched (wherever applicable) –
5. Quantity of waste generated -
6. Quantity of waste disposed -
7. Quantity re-exported (wherever applicable)-
8. Quantity in storage at the end of the year –

Date : 24.06.2021
Place : NRL, Golaghat, Assam


Signature of the Occupier or
Operator of the disposal facility

Format –A 1 for submission of Annual Inventory on Hazardous Waste Management by Occupiers: **N/A**

Name of SPCB/PCC:

Year.....

A1 Details on Hazardous Waste Generation

Sl	Name of the District	Number of HW Generating Industry	Authorized Quantity of Hazardous Waste (Metric Ton)				Quantity of Hazardous Waste generated as per Annual Return within the State/Ut (Metric ton)				Qty of HW imported during the year (Metric ton)	Qty of HW Exported during the year (Metric ton)
			Land fillable	Incinerable	Recyclable	Utilizable	Land fillable	Incinerable	Recyclable	Utilizable		

- This shall also include Hazardous waste generated during recycling/ utilization of hazardous waste imported from other countries as well as received from other state/ UTs, However, it shall be reported only in Metric tonne.

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Format A2: Details on Interstate movement of Hazardous Waste for recycling/ Utilization/ disposal: **N/A**

SI No	Hazardous Waste	Hazardous Waste Received from other State/UT		Hazardous Waste sent to other State/UT	
		Name of State/UT from which waste received	Quantity Received (MT)	Name of State/UT where waste sent	Quantity sent(MT)
			12		13
1	For disposal at common secured landfill				
2	For disposal at common incinerator				
3	For Recycling by Schedule IV recyclers				
4	For utilization in Co processing (cement plants)				
5	For utilization under rule 9 (Other than co processing)				

N/A

A3 Details on Hazardous waste Recycled and Utilized: N/A

Sl No	Name of the District	Recycling/Utilization of Hazardous Waste (Generated within the State/UT)			Recycling/Utilization of Hazardous Waste (Received from other State/UT)				
		Quantity of Waste recycled (listed under schedule IV Hazardous waste) MT	Quantity Utilize (MT)			Quantity of Waste recycled (listed under schedule IV Hazardous waste) MT	Quantity Utilize (MT)		
			Co Processing in Cement in Kiln	Other Than Co Processing	Captive Utilization (other than Column 15 & 16)		Co Processing in Cement in Kiln	Under Rule 9 Other Than Co Processing	Captive Utilization (other than Column 19 & 20)

A4 Details on Hazardous waste Disposed: N/A

Sl No	Name of the District	Recycling/Utilization of Hazardous Waste (Generated within the State/UT)				Recycling/Utilization of Hazardous Waste (Received from other State/UT)			
		Quantity disposed in secured landfill (MT)		Quantity disposed Through Incinerator (MT)		Quantity disposed in secured landfill (MT)		Quantity disposed Through Incinerator (MT)	
		Common	Captive	Common	Captive	Common	Captive	Common	Captive

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A5 Details on Hazardous waste stored at occupier premises: **N/A**

Sl No	Name of the District	Total quantity of HW stored at occupier premises at the beginning of the financial year ie-01.04.17 (MT)				Total quantity of HW stored at occupier premises during the financial year ie- 1 st Apr 17 to 31 st March 2018 (MT)			
		landfillable	Incinerable	Recyclable	Utilizable	landfillable	Incinerable	Recyclable	Utilizable

The Quantity of land fillable hazardous waste generated quantity in stock at the beginning of year and quantity transported from other state shall be equal to quantity disposed in common and captive secured landfill including transported to other state, quantity sent to other state and quantity stored at occupier premises at the end of financial year (i.e. Column no 6+ column no 30+ net value of column no 12 at s no 1 of Table A2)=[column no 22+ column no 23+ column no 26+ column no 27+ net value of column no 13 at s. no 1 of table A2+ column no 34]

Similarly in case of incinerable hazardous waste (i.e, column no 7+ column no 31+ net value of column no 12 at s. no 2 of table A2)=[Column no 24+ column no 25+ column no28+ column no 29+ net value of column no 13 at s no 1 of table A2+ column no 34]

For recycle hazardous waste (Schedule IV item) (i.e. column no 8+ column no 32+ net value of column no 12 at s.no 3 of table A2)=[column no 14+ column no 18 net value of column no 13 at s no 3 of Table A2+ column no36]

For utilizable hazardous waste (i.e.[column no 9+ column no 33+ Net value of column no 12 at s. no 4 &5 of table A2]=[column no 15+ column no16+ column no17+ column no19+ column no 20+ column no 21+ net value of column no 13 at s no 4&5 of table A2+ column no 37])

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Format B: Annual Inventory on recycling / Utilization / CO-Processing of Hazardous Waste: **N/A**

Name of SPCB/PCC:.....

Year:.....

S. No	Type of Recycling Facilities	No of facilities authorized for recycling/ utilization/ Co- processing of HW	Total Authorized capacity (MTA)	Quantity recycled/ utilized/ co-Processed (MT) during the year
A	Company Recyclable HW			
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				

et al

Format C: Annual Inventory on recycling / Utilization / Co-Processing of Hazardous Waste: **N/A**

Name of SPCB/PCC:.....

Year:.....

S. No	Name and address of the Facility	Type of Hazardous waste authorized for recycling	Authorized Recycling/ Utilization/ Co Processing Capacity (MTA)	Quantity Recycled Utilized/ Co processed (MT)

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Format-D1 Annual Inventory w.r.t Common TDS (s): N/A

Name of SPCB/ PCC

Year:.....

Sl No	Name & Address of the TSD	Quantity in stock at the beginning of the year (MT)		Quantity of Hazardous Waste Received (MT)			Quantity of Hazardous Waste Disposed (MT)			Quantity preprocessed for Utilization (MT)	Quantity in Stock at the end of the year		Cumulative HW disposed in self by the end of financial year (MT)	Capacity			
		Landfillable	Incinerable	For direct Landfillable	For Landfillable after treatment	For Incineration	Quantity Landfilled directly	Quantity Landfillable after treatment	Quantity Incinerated		Landfillable	Incinerable		Incinerator	Incinerator	Landfill	

Format-D1 Annual Inventory w.r.t Common TDS (s): N/A

Name of SPCB/ PCC

Year:.....

Sl No	Name & Address of Captive Facility	Type of Facility (Landfillable/ Incinerable / both)	Incinerator (T/H)	Landfill (MTA)	HW disposed during the year	Cumulative HW disposed till the end of financial year

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[FORM - VI]
(See rule 14)

NUMALIGARH REFINERY LIMITED

ENVIRONMENTAL STATEMENT
for the financial year - 2020-2021

PART - A

- (i) Name and address of the owner/occupier:
of the industry operation or process. Numaligarh Refinery Limited
P.O. Numaligarh Refinery Project
Golaghat -785699, Assam
- Co-ordination Office: Tolstoy House, 6th Floor
15-17 Tolstoy Marg
New Delhi-110001
- Registered Office : 122A, G.S.Road
Christianbusti
Guwahati-781005
- (ii) Industry category Primary ----(STC code) : Primary
Secondary----(SIC Code)
- (iii) Production capacity (Crude T'put) : 3.0 MMTPA
- (iv) Year of establishment : 22nd April, 1993
- (v) Date of the last environmental statement submitted : 26th Sept, 2020

PART - B

Water and River Material Consumption

- (1) Water consumption m³/d:
- | | | |
|----------|---|---------|
| Process | : | 3344.24 |
| Cooling | : | 4154.30 |
| Domestic | : | 3510.00 |

Name of Products : Process water consumption in m³ per MT of raw material
Crude Oil

	2019-2020	2020-2021
	0.416	0.450

As all the products are obtained from the same raw material i.e Crude Oil, Process Water Consumption shown above has been indicated as M³ per MT of crude processed.

- ii) Raw Material Consumption
- | | | |
|-------------------------------|-----------|-----------|
| Raw material: Crude Oil | 2019-2020 | 2020-2021 |
| T'put during the year (in MT) | 2383338 | 2707353 |
- (Design Capacity: 3.0 MMTPA)

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PART - C

Pollution discharged to environment/unit of output (Parameter as specified in the consent issued)

a) a) Effluent Water: 2020-2021

Pollutants	CPCB Standard (mg/l)	Concn. of pollutants in discharges(av.) (mg/l)	Quantity of pollutants discharged (kg/yr, exc. pH)	Qty of pollutants in kg/1000 MT of Crude		Percentage of variation from STD. with reasons
				STD(mg/l)	Actual(mg/l)	
pH	6-8.5	7.4	-	-	-	All parameters are within prescribed limit/stds.
Oil & G	5.0	4.03	4919.2	2.0	1.8	
TSS	20	13.87	15709.76	8.0	5.8	
Phenol	0.35	0.22	268.54	0.14	0.09	
Sulphide	0.5	<0.1	122.0	0.2	0.045	
COD	125	69.93	85360.0	50	31.50	
BOD ₅	15	10.5	12816.8	6.0	4.72	
CN	<0.02	<0.02	24.41	0.08	0.009	
Ammonia as N	15	9.1	11107.9	6.0	4.10	
TKN	40	14.13	17247.78	16.0	6.37	
P	3.0	0.72	878.86	1.2	0.32	
Cr (Hex.)	0.1	Nil	00.0	0.04	0.00	
Cr (Total)	2.0	0.010	12.20	0.8	0.00451	
Pb	0.1	0.015	12.21	0.04	0.00454	
Hg	0.01	0.00	0.00	0.004	0.000	
Zn	5.0	0.038	36.62	2.0	0.0136	
Ni	1.0	0.030	36.61	0.4	0.0135	
Cu	1.0	0.08	80.0	0.4	0.0295	
V	0.2	0.04	48.82	0.8	0.018	
Benzene	0.1	0.06	73.23	0.04	0.027	
Benzo(a)-Pyrene	0.2	0.05	61.0	0.08	0.0225	

(b) AIR

Average Sulphur Dioxide emission from the refinery during - 2020-21 :

SO ₂ Emission, Kg/hr	During April, 2020 to Mar,2021
	94.9 kg/hr

As per NOC of PCB, Assam max. allowable limit is 256 kg/hr as SO₂

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AMBIENT AIR QUALITY MONITORING DATA

During April, 2020 to Mar,2021

STATION	PARAMETER	STD NAAQS-2009	Unit	OBSERVATIONS		
				MAX	MIN	AVG.
REFINERY (WATCH OWER NO. 6)	SO2	80 (24 hr avg.)	µg/m ³	21.20	8.40	12.52
	NO2	80 (24 hr avg.)	µg/m ³	22.40	11.90	16.20
	O3	100(8 hr avg.)	µg/m ³	38.30	12.20	23.90
	CO	2(8 hr.avg.)	mg/m ³	1.100	0.580	0.820
	NH3	400(24 hr.avg.)	µg/m ³	32.4	14.8	23.01
	PM 10	100(24 hr.avg.)	µg/m ³	71.6	44.4	56.26
	PM 2.5	60(24 hr.avg.)	µg/m ³	68.2	18.7	28.85
	Benzene	5.0(Annual)	µg/m ³	3.50	1.30	2.12
	BaP	1.0(Annual)	ng/m ³	0.5	0.5	0.38
	Pb	1.0(24 hr.avg.)	µg/m ³	0.44	0.02	0.16
	As	6.0(Annual)	ng/m ³	1.25	1.00	0.75
	Ni	20(Annual)	ng/m ³	8.5	1.5	2.83
ECO-PARK IN NRL TOWNSHIP	SO2	80 (24 hr avg.)	µg/m ³	18.10	8.4	11.28
	NO2	80 (24 hr avg.)	µg/m ³	19.00	9.90	14.43
	O3	100(8 hr avg.)	µg/m ³	34.5	10.8	21.7
	CO	2(8 hr.avg.)	mg/m ³	0.910	0.550	0.498
	NH3	400(24 hr.avg.)	µg/m ³	30.9	10.20	20.25
	PM 10	100(24 hr.avg.)	µg/m ³	68.1	17.4	50.13
	PM 2.5	60(24 hr.avg.)	µg/m ³	56.1	16.1	30.25

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	Benzene	5.0(Annual)	µg/m ³	3.20	1.10	2.175
	BaP	1.0(Annual)	ng/m ³	0.50	0.5	0.38
	Pb	1.0(24 hr.avg.)	µg/m ³	0.41	0.16	0.20
	As	6.0(Annual)	ng/m ³	1.00	1.00	0.75
	Ni	20(Annual)	ng/m ³	7.25	0.53	2.475
W WATER INTAKE	SO ₂	80 (24 hr avg.)	µg/m ³	14.20	8.0	10.42
	NO ₂	80 (24 hr avg.)	µg/m ³	18.80	9.10	13.63
	O ₃	100(8 hr avg.)	µg/m ³	32.9	10.6	20.20
	CO	2(8 hr.avg.)	mg/m ³	0.900	0.110	0.670
	NH ₃	400(24 hr.avg.)	µg/m ³	30.0	10.20	19.09
	PM 10	100(24 hr.avg.)	µg/m ³	66.1	40.10	61.00
	PM 2.5	60(24 hr.avg.)	µg/m ³	39.2	16.9	25.3
	Benzene	5.0(Annual)	µg/m ³	3.00	1.10	2.05
	BaP	1.0(Annual)	ng/m ³	0.5	0.50	0.38
	Pb	1.0(24 hr.avg.)	µg/m ³	0.41	0.15	0.19
	As	6.0(Annual)	ng/m ³	1.00	1.00	0.75
	Ni	20(Annual)	ng/m ³	2.70	1.20	2.24
-39 BYPASS	SO ₂	80 (24 hr. avg.)	µg/m ³	20.8	8.2	12.9
	NO ₂	80 (24 hr avg.)	µg/m ³	22.6	9.9	16.78
	O ₃	100(8 hr avg.)	µg/m ³	41.6	11.8	24.63

sd 22/24

CO	2(8 hr.avg.)	mg/m ³	1.20	0.59	0.78
NH ₃	400(24 hr.avg.)	µg/m ³	39.1	10.2	23.15
PM 10	100(24 hr.avg.)	µg/m ³	74.9	45.7	60.98
PM 2.5	60(24 hr.avg.)	µg/m ³	66.4	19.5	30.3
Benzene	5.0(Annual)	µg/m ³	4.1	1.000	2.32
BaP	1.0(Annual)	ng/m ³	0.50	0.50	0.5
Pb	1.0(24 hr.avg.)	µg/m ³	0.5	0.02	0.21
As	6.0(Annual)	ng/m ³	1.00	1.00	0.75
Ni	20(Annual)	ng/m ³	8.5	1.0	2.94
SO ₂	80 (24 hr avg.)	µg/m ³	13.9	7.6	9.8
NO ₂	80 (24 hr avg.)	µg/m ³	17.8	9.1	12.9
O ₃	100(8 hr avg.)	µg/m ³	30.9	10.00	20
CO	2 (8 hr.avg.)	mg/m ³	0.870	0.100	0.65
NH ₃	400(24 hr.avg.)	µg/m ³	30.0	10.00	17.63
PM 10	100(24 hr.avg.)	µg/m ³	61.4	39.1	48.60
PM 2.5	60(24 hr.avg.)	µg/m ³	34.2	15.6	22.7
Benzene	5.0(Annual)	µg/m ³	3.10	1.0	3.5
BaP	1.0(Annual)	ng/m ³	0.5	0.5	0.5
Pb	1.0(24 hr.avg.)	µg/m ³	0.41	0.02	0.2
As	6.0(Annual)	ng/m ³	1.00	1.00	1.00
Ni	20(Annual)	ng/m ³	3.40	1.20	2.20

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SANCTUARY
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(All the parameters are found to be within limit)

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PART - D
Hazardous Wastes

(As specified under Hazardous Waste Management and Handling Rules, 1989 as amended up to date)

Hazardous Wastes(Generated/disposed)	Total Quantity (In MT)	
	During the previous Financial Year (2019-20)	During the current Financial year -2020-2021
a) From Process		
i) Spent Catalyst	Generated: 380 MT (under process of selling)	Nil
ii) Spent Adsorbents	Generation: Nil	Nil
iii) Tank Bottom (oily Sludge/waste)	Generation: Nil Closing stock as on 31.03.20: 1004 MT	Generated: 45.0 MT Disposed: 545 MT (bioremediation under progress) Stock as on 31.03.21: 504 MT, kept in sealed drum for bioremediation.
iv) Slop Oil	Generated:79652 MT Disposed: 26046 MT, Processed in CDU/VDU. Closing stock as on 31.03.20: 58504 MT	Generated: 32574 MT Disposed: 25756 MT, Processed in CDU/VDU. Stock as on 31.03.21: 65322 MT
b) From Pollution Control Facilities		
Chemical & Oily Sludge	Generated: 23.66 MT (disposed off in the SLF)	Generated:70.0 MT (disposed off in the SLF)

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Part - E
Solid Wastes

Solid Wastes generated /disposed	Total Quantity (in M3)	
	During the previous financial Year (2019-20)	During the current financial year 2020-21
(a) From Process Generation of Incinerable substances -	1955m3	3500m3
(b) From pollution control facilities Generation at ETP Bio sludge -	230.15MT	450MT
(c) (1) Quantity recycled or reutilized within the unit	Nil	Nil
(2) Sold	Nil	Nil
(3) Disposal - Incinerable substances - Bio sludge -	Entire quantity disposed through incineration Entire Quantity disposed off into SLF	Entire quantity disposed through incineration Entire Quantity disposed off into SLF

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Part - F

Please specify the characteristics (in terms of concentration and quantum) of hazardous as well as solid waste and indicate disposal practice adopted for both these categories of wastes.

A typical laboratory analysis report of the Chemical & Oily Sludge is given hereunder :

Date of result	SAMPLE SOURCE	PARAMETERS	RESULTS %,wt
04.03.2021	ETP (Ex Chemical & Oily sludge Centrifuge)	Moisture Content	86.53
		Oil Content	3.8
		Organic & Volatile Matter	7.2
		Iron	0.37
		Sodium	0.10
		Sulphide	0.12
		Phenol	0.002
		SiO ₂ & Trace metals	0.037
		Chloride	0.87
		Calcium	0.36
		Magnesium	0.002
		Manganese	0.012
		Nickel	0.0008
		Sulphate	0.56
		Zinc	0.032
		Lead	0.0002
		Copper	0.0016
Co	0.0007		

Disposal practice adopted for both categories of wastes:-

Numaligarh Refinery, popularly known as the "Accord Refinery" has been set up in the district of Golaghat, Assam as the part of fulfillment of the commitment made by the Govt. of India in the historic Assam Accord for providing the thrust towards industrial and economic development of North-East. Environment management initiatives of Numaligarh Refinery is guided by the principle of sustainable development and its corporate vision statement of committing itself to attain the excellence in environment management with a prime focus on management of environment. In its quest for environmental excellence and continual improvement, NRL has been pursuing a focused programme towards environment protection through well defined objectives and has taken up several initiatives that has been implemented in well defined and systematic manner. NRL being an energy efficient &

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environment friendly refinery, committed to control of all kinds of pollution & protection of natural environment.

{ - Numaligarh Refinery was conceptualized as one of the most Environment friendly Refinery in the country. Right from its inception, conscious efforts have been taken at every stage to preserve the environment and to attain the excellency in Environment Management. A fully functional "Environment Cell" is continuously working for improvement, monitoring, safe-guarding and reporting of environmental activities.

A proper solid waste management procedure is in place at Numaligarh Refinery to deal with storage / disposal of the solid wastes (hazardous /non-hazardous) generated due to operation of refinery. As a part of the operation of the refinery, some amount of solid wastes are generated - to manage and to deal with the same, an environment friendly & proper solid waste management system has been prepared and as per the laid down procedure hazardous /non-hazardous solid waste are handled. Considering the activities related to waste management, NRL Management has delineated a solid waste management plan with the following objective -

1. To protect human health and natural environment from the hazards posed by waste disposal.
2. To conserve energy and natural resources through waste recycling and recovery.
3. To reduce /eliminate, as far as possible, the generation of solid wastes including hazardous wastes.
4. To ensure proper management of solid wastes which protect the human health and the environment.

In-built measures had been adopted to minimize, control pollution and generation of waste in all the units with proper collection and disposal system. Adequate segregation, collection and treatment facilities for wastewater for centralized treatment has been provided to meet the stringent standards laid down in the latest MoEF Notification. An environmentally compatible management system for disposal of the ETP hazardous wastes i.e. Chemical & Oily sludge through Secure Land Fill has been developed inside the refinery premises. Types of Hazardous solid waste like - Chemical & Oily sludge which is generated at different sections of Effluent Treatment Plant (ETP) are collected in a sludge thickener through sludge collection system. Floating oil with water from the thickener, is recycled back to the Inlet Receiving Sump (IRS) of ETP for further processing and oil recovery. The thickened sludge from the bottom of the thickener is taken to the centrifuge feed sump for feeding to the specifically designed Chemical & Oily centrifuge for recovering the absorbed oil from it. By using the highly efficient centrifuge, almost total oil is recovered from the sludge and is recycled back to the slop oil system for reprocessing. The oil free cake from the centrifuge was disposed off in the Secured Land Fill (SLF). To cater the needs of future

requirement, a Secured Land Fill with a capacity of 6000m³ has been constructed inside the Refinery Premises and has been used. Tank bottom sludge generally sold to CPCB/PCBA recognized Vendor, if not possible to sell, the same is disposed off through Bio-remediation in a more scientific and efficient manner in the Refinery premises itself. To cater the requirement, two number Bioremediation facility available for bioremediation of Crude Tank cleaning sludge.

Spent catalysts are generally generated after a gap of 3/4 years when the catalyst required to replace in the various units of Refinery. After generation, the spent catalyst is kept in sealed drums at demarcated place for onward selling to CPCB/SPCB approved vendors with due intimation to PCBA and following the stipulated guide lines/procedures. Spent catalyst are sold to CPCB/SPOCB recognized Vendors by following proper guidelines with intimation to SPCB.

Non-hazardous solid waste generated in the Refinery are mainly - incinerable waste, non-incinerable but reusable waste and bio-degradable waste etc. After collecting the wastes from the various sources viz.- process area, various units, admin office and other locations, wastes are segregated and kept in demarcated locations in the Solid waste disposal yard. Non-hazardous solid Waste like- paper, hard boards, packing materials/papers and cartons are incinerated through incineration process and non-hazardous bio-degradable wastes are disposed off by burying at isolated low laying areas within the refinery premises itself.

Part -G

Impact of the pollution abatement measures taken on conservation of natural resources and on the cost of production:-

Numaligarh Refinery Ltd, as a good Corporate Citizen, from the very onset itself has been pursuing a focused program towards environment management by formulating a comprehensive policy towards its commitment for the protection, preservation and development of the environment. Numaligarh Refinery was conceptualized as one of the most Environment friendly and Energy efficient Refinery in the country. Right from its inception, conscious efforts have been taken at every stage to preserve the environment and to attain the Excellency in Environment Management.

- NRL has determined the sources of pollution in various activities focusing on pollution load. Company's management is very careful and proactive regarding the environmental impacts of the new initiatives and products. NRL is conducting the Environmental Impact Assessment study of every project to understand the implications of setting up any new project or unit. Significant contribution made by NRL on the specific contribution on innovative clean technology, sustainability, broader user or target groups on the following fields-

- a) Environment friendly technology adopted for highly polluting industries.
- b) Innovativeness/creativity of clean technology.
- c) Any significant contribution towards the manufacture of environmentally friendly products.
- d) Abatement including reduction reuse, recycling or any beneficial use of waste generated.
- e) Substantial and steady reduction in the effluents and emission in the year.
- f) Success in defining environmental pollution needs meeting pollution prevention goals and overall improvements to the quality of air, water and land.
- g) Reduction of risk to the community living in the vicinity of units handling hazardous chemicals.
- h) Sustainability of the developed environment friendly technology from financial, social and ecological aspects.

As the higher fuel consumption directly contributes to the higher emission of the greenhouse gases affecting natural ecological processes, So, energy conservation efforts have received continuous focus at NRL since conceptualization of the refinery by applying optimum consumption of fuel in furnaces thereby reducing the rate of emission of Green House Gas. It has adopted state of the art energy efficient technology, high efficiency furnaces with glass air pre-heaters, plate type exchangers, installation of captive co-generation power plant using heat recovery system, maximization of waste heat recovery, installation and operation of power recovery turbine in the hydrocracker and other units etc.

NRL has adopted very advance and comprehensive steps towards controlling pollution. Its corporate vision statement commits itself to attain the excellent in environment management. From the very onset, selection of process of technologies and equipment was done with special care for environmental protection.

Additionally, all the furnaces are provided with ultra-low NOx burners. Low noise rotary equipment were considered during the time of equipment selection.

Minimum Generation of waste: -

In-built measures had been adopted to minimize and control of pollution and generation of waste in all the units with proper collection and disposal system.

Adequate segregation and centralized treatment facilities: -

Adequate segregation, collection and treatment facilities for wastewater for centralized treatment has been provided to meet the stringent standards laid down in MoEF notification, 2008.

Effluent Treatment Plant with latest technology:

A centralized modern Effluent Treatment Plant having tertiary treatment facilities has been installed. Also, the ETP includes a three-stage oil recovery system from the wastewater and high efficiency centrifuge for recovering oil from the oily sludge. To avoid hazardous solid waste generation, more environmentally friendly hydrogen peroxide treatment process has been introduced. As a measure of conservation of water, 100 % recycle of the treated effluents in our Effluent Treatment plant inside refinery has been achieved since October 2006. Further, 100% recycle of the effluents from Sewage Treatment Plant has been achieved since April 2007. The treated effluent from Township is diverted to our ETP inside the Refinery by implementing suitable modifications in the disposal line in ETP, where the treated water from township STP is received at aeration tank. The outlet at Numaligarh Jetty in river Dhansiri has been blinded and the discharge from township STP also has been routed to ETP through the same line. So, no treated effluent is discharged to outside environment from the refinery. As a part of ETP modernization VOC recovery system has been implemented.

Green Belt Development:-

An ambitious plan of green belt has been developed around the refinery to serve as a barrier for air pollutants and noise. A 100m wide green belt around the refinery and 25 m wide around the marketing terminal covering 56 Ha of land had been developed. Massive plantation are being carried out every year in the Green Belt to increase the density of trees. Around 15000 saplings have been planted in thinly planted places the Green Belt during 2015-17. Plantation activity for another 15000 saplings has been started since April, 2018 onwards inside the Refinery as well as outside the refinery. Out of 15000 saplings, plantation of 8000 saplings completed, balance quantity shall be planted in phase manner considering weather condition. The meticulously planned and developed green belt all around the refinery has now grown into a rich foliage, rendering a perfectly natural barrier to the industrial noise and minor air pollutants from reaching the immediate surroundings, both human population and the rich flora and fauna. NRL is aggressively pursuing tree plantation in the refinery and nearby area. Plantation of around 10000 saplings have been completed in a sustainable model during 2020-21 which is equivalent to 60 Ton of Carbon absorption. NRL has taken up a flagship initiative for plantation under Afforestation drive. In a significant development for plantation of 1 lakh tree saplings (equivalent to 600 Ton of Carbon absorption), an MoU was signed on 14.09.2020 between NRL and Golaghat Social Forestry Division, Govt. of Assam for compensatory afforestation of 40 Hectares of degraded land in Nak-Kati Chapori, Khumtai Revenue Circle, Golaghat.

Unique Ground Flare System:-

To avoid any adverse impact of the flare on wild animals in the Kaziranga National Park, non-fluorescing ground flare has been incorporated which is first of its kind in the country.

Sulfur Recovery Plant:-

Assam crude is sweet crude (only 0.26 % Sulfur content), in spite of processing low sulfur Assam crude, a Sulfur Recovery Unit (SRU) has been installed to remove sulphur from sour water and sour gas generated during the refining process. Subsequently its capacity has been enhanced from 14.6 Tonnes Per Day to 19.3 Tonnes Per Day in the year 2010 commensurate with the Diesel Quality Upgradation Project. A new SRU with sulphur recovery has commissioned and under operation. NRL is implementing Tail Gas Treating Unit along with with an objective to improve the sulphur recovery efficiency from the existing 96% to 99.9%.

High Stack Height & Strict Emissions Monitoring:-

To reduce the ground level concentration of pollutants, height of stacks at different plants in the refinery is kept at 60 meters. Further, the height of stack at Coke Calcination Unit is kept at 77 meters. Facilities for continuous monitoring of SO_x, NO_x, PM, CO have been provided for all the furnace stacks and low NO_x burners have been used in all the furnaces. Real time online emission data have been transmitting to CPCB sever continuously.

Use of low sulfur fuel for the Refinery furnace:-

Only the sweet fuel gas, after removing sulfur in the Amine Treatment Unit, is used in the refinery furnaces.

Solid Waste Management: -

Chemical and Oily sludge generated at different sections of Effluent Treatment plant are centrifuged in the highly efficient Centrifuge in order to further removal of the oil content. After centrifuge, the oil free cake is kept in sealed drums which are then disposed off in the Secured Land Fill. The Secured Land Fill has been divided into various cells separated by soil mounts for easy handling and operation. The waste is disposed off at these cells and compacted. The compacted waste is then covered by 15 cm soil layer after every day's operation which minimizes the chance of fire hazard, water percolation and odour problem.

NRL has taken up a lot of advance & innovative initiatives in the management of Hazardous Waste Treatment and Disposal Facilities. Cleaning of Tank bottom oily sludge has been done by adopting BLABO/ Mechanized process which is a close loop process and by which nearly 100% recovery of hydrocarbon could be achieved.

Spent Catalyst & Tank Boom Sludge:-

Spent catalysts are generally generated after a gap of 3/4 years when the catalyst is replaced in the various units of Refinery. After generation, the spent catalyst is kept in demarcated place in sealed drums and then the same is sold to CPCB approved vendors with due intimation to PCBA and following the stipulated guide lines. Tank bottom sludge are generally generated after a gap of 10/15 years when the Tanks, particularly Crude Tanks are cleaned. Whatever sludge generated due to cleaning of the tanks, the accumulated sludge either sold to CPCB/SPCB recognized recycler or bio-remediated inside Refinery premises itself.

Implementation of Hydrogen Peroxide Treatment:-

In pursuance of latest development, H₂O₂ treatment process has been introduced for the chemical treatment of wastewater in the ETP by replacing the conventional FeCl₃ process. Introduction of this technique has reduced the solid waste generation drastically.

Installation of oil traps in the Storm Water drains:-

Several numbers of oil traps have been installed and hay filters are placed in the refinery storm water system as a preventive measure to eliminate any possibility of oil carry over to outside environment. A scheme for reusing entire storm water in fire water network and in Cooling Tower as makeup is under operation..

Estimation of Carbon Foot Print: -

As a step towards NRL's commitment for protection of environment and to assess its contribution towards GHG emission leading to global warming, NRL has developed a Carbon Management Strategy for mapping of Green House Gas (GHG) emission /carbon foot print accounting for its activities. NRL commenced the activity for estimation of Green House Gas (GHG) Emission and carbon foot print of the refinery taking 2009-10 as base year, the study was carried out by engaging a reputed consultant. NRL has already estimated the GHG emission data for the FY 2017-18, 2018-19 & 2019-2020 in house and engaged an Agency to verify and validate these data in line with international standards and guidelines as well as certification under ISO 14064. The Agency has completed the activity/study recently. NRL is focusing on energy efficiency, building carbon sink to minimize GHG emission.

CDM Projects:-

NRL installed a 12.0 MW Steam Turbine Generator (STG) to utilize and recover waste (thermal/pressure) energy of HP steam. This project has been registered as a CDM Project and NRL has earned Carbon Emission Reductions (CERs) from UNFCCC.

Fuel switch over:-

NRL has entered into a JV with Oil India Ltd (OIL) and Assam Gas Company Ltd (AGCL) to form Duliajan Numaligarh Pipe Line (DNPL) who laid 192 KM pipeline from Duliajan to Numaligarh to supply Natural Gas (NG) which is currently used at Captive Power Plant (CPP) and Hydrogen Unit of NRL in lieu of Naphtha. This has resulted in reduction of carbon emission.

PART – H

Additional measures/investment proposal for environmental protection including abatement of pollution, prevention of pollution:-

NEW SECURED LAND FILL: -

As per CPCB recommendations with latest technic / scientific design, a new Secured Land Fill of higher capacity of around 6000 m³ has been constructed in the Refinery premises to cater the needs of future requirement for disposal of Chemical & Oil Sludge and now under operation.

Bioremediation facility:-

Construction of an additional new bioremediation facility has been completed to facilitate bioremediation of tank bottom oily sludge (calorific value >2500kcal/kg) in future.

Installation of double mechanical seals in IFRT (Internal Floating Roof Tanks) and EFRT (External Floating Roof Tanks) :-

In line with latest MoEF notification, 2008, relating to Oil Refinery Industry, setting of double mechanical seals in all the IFRT and EFRT tanks have been completed.

Transmission of online real time data:-

Transmission of online real time data with remote alert facility for Sox, NO_x, CO, PM and Ambient Air quality to CPCB Server implemented. As per direction of CPCB online transmission of Treated effluent data for four parameters of i.e. pH, TSS, BOD, COD and flow have been implemented.

Installation of CAAQMS and PM & CO analyzers:

As per recommendation of MoEF and CPCB – installation of one another Continuous Ambient Air Quality Monitoring Station (CAAQMS) at downwind direction has been completed and commissioned. PM and CO analyzers have been fitted with all the stacks.

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PART - I

Any other particulars for improving the quality of the environment:-

As a part of continuous efforts towards reduction of emissions, Numaligarh Refinery produces ultra -low sulphur High Speed Diesel and motor spirit having less than 0.005% sulphur conforming to the Euro-IV Specifications. This contributes in reducing pollution from diesel and petrol vehicle due to the reduction in emission of Sulphur di-oxide in the atmosphere.

NRL has already implemented Diesel Quality Up-gradation Project which has enabled NRL to produce HSD meeting BS-III specification as well as to produce limited quantity of HSD meeting BS-IV specification. To cater to the future needs of high quality environment friendly fuel, NRL is further exploring suitable technology for production of HSD conforming BS-IV specification along with limited quantity of Euro-V HSD at 100% refinery throughput and as an advance step towards environment protection. NRL has commissioned a Wax Plant for producing Micro Cristal Wax and Parafin Wax. **The Wax plant was dedicated to the Nation by Prime Minister Narendra Modi on 5th Feb, 2016.**

NRL has already commissioned Diesel Hydrotreater (DHDT) Plant for producing Euro IV HSD. Numaligarh Refinery Limited (NRL) has recently upgraded its refinery for production of BS-VI HSD to meet product quality requirement as per Auto Fuel Policy of the Government of India by implementation of the Diesel Hydro Treater Project (DHDT), which was commissioned during January, 2018. NRL has also increased the capacity of its MS plant by 50% in 2019 and entire quantity of MS produced meet BS VI standards.

As an advance step towards environment protection, NRL has installed a LPG mounded Bullet which is more environment friendly and safe.

Installation of Bio Refinery -

NRL has already on the process to install one Bio refinery for which EC already obtained. A Joint venture has been formed as 'Assam Bio Refinery Pvt Ltd. Preliminary and construction works has already been started. M/s EIL has been awarded the EPCM consultancy work for the Bio-Refinery.

As Govt of India has proposed a indicative target of 20% blending of ethanol in petrol and 5% blending of biodiesel in diesel by 2030, the alternatives / systems need special attention to make our energy roadmap sustainable. Biofuels like Ethanol, Bio-ethanol, Bio-Butanol, HVO, Bio CNG, etc. are in highest priority in that context. Government has a plan to increase ethanol blending in gasoline from 4.3% now to 8-10 % by 2020-21. In that line, Numaligarh Refinery has embarked into an ambitious project for setting up a bamboo-based bioethanol project as a joint venture project with M/s Chempolis Oy, Finland. Primary products of the bio refinery would be cellulosic Ethanol and platform chemicals namely acetic acid and furfural alcohol and bio coal/stillages. Furfural demand is as such limited in

India but its derivative like furfuryl alcohol and furan resin shows high demand due to growth projection in major end-use industries, including chemical, pharmaceutical and foundry.

Flare Gas Recovery System:

Numaligarh Refinery was originally designed with a twin flare system i.e. the ground flare and the elevated flare to avoid any adverse impact of the illumination of flare on animals and migratory birds in the surrounding wildlife sanctuaries and protected forest including Kaziranga National park. In normal operation, the ground flare is in line and only pilot burner is lit up in the elevated flare. The elevated flare caters to the load during plant emergencies when flare load is very high or during maintenance of the ground flare system.

As a measure for the further protection of environment & conservation of energy, Flare Gas Recovery System has been implemented to recover and reuse the excess gas going to the flare.

Initiative for solar power:

In its pursuit of tapping new and renewable energy sources, a slew of initiatives have been taken up to utilize solar energy in the refinery and in the township premises. 1000KWp Solar PV panel installed in all non-critical building rooftops inside the refinery in 2017-18. Also installed 20KW solar rooftop PV panels in adjacent NRL marketing terminal. NRL has replaced conventional street lights with solar powered lights in several places in its township. NRL extending its solar power initiative for the benefit of the nearby community, solar panel has been installed in nos of nearby schools. In its foray to renewable energy, NRL has taken initiative to install 50 KW Solar power plant on the rooftop of Corporate Office Building in Guwahati. Due to its continual improvements towards various energy conservation measures, NRL has attained the EnMS ISO 50001:2018 Certification on confirming to Energy Management System Standard, the second refinery in India to attain ISO 50001 certification.

Renewable initiative :

To reduce fuel consumption, NRL has started installing solar panel to generate electricity and inject the same in the refinery grid. A 1.025 MW solar plant installed in 2018 to reduce power requirement to the extent of heat generation during the day time. NRL continue to pursue the opportunity for further electricity production through solar resources in extended area.

R&D activities-

As a positive development, Our Company has joined hands with Indian Institute of Guwahati (IITG) to develop Bio-degradable plastics from oil and bio refinery streams. An R&D project with a financial involvement of Rs. 4 Crore has been identified as the first project to be taken up at the 'NRL Centre of Excellence on Sustainable materials' to be set up in IITG.

Earlier, an Memorandum of Understanding (MoU) was signed between NRL and IITG on 13th September 2019 for establishing 'NRL Centre of Excellence on Sustainable Materials - (NCESM)' in Guwahati. The MoU was signed between our Sr. CGM (Corporate Affairs), Mr. Nikunja Borthakur and Director, IITG Prof. Dr. T.G.Sitharam in the presence of officials from NRL and IITG.

NCESM will facilitate further research activities in development of sustainable materials from Oil and Bio-refinery streams, which is in sync with our Company's Environment Management Policy. Further, specific R&D projects would be sponsored by NRL under this MoU for which project specific Memorandum of Agreement (MoAs) will be signed separately. NRL employees will be actively engaged in the R&D projects under NCESM.

Indigenous Isomerisation Catalyst:

The indigenous isomerization catalyst once developed would be manufactured from third party manufacturers in India. Successful implementation of this R&D scheme will lead to increase indigenous capabilities for manufacturing such items which are presently procured from foreign manufacturers. Besides reducing dependency on foreign vendors, this initiative will give fillip to the Make-In-India mission of the Government.

Re-processing of DCU Slop: Re-processing of DCU Slop scheme implemented. DCU internal slop generated now being used as quench oil in DCU itself resulting reduction of slop generation in the refinery.

Other schemes adding to continual benefit are:

1. CDU/VDU column internal modification for yield/energy optimization.
2. Plate type heat exchanger (air pre-heater) in HGU flue gas duct.
3. Replacement of catalyst in RB-02 of Isomerization Unit.
4. Replacement of High Capacity Tray in HCU fractionator.
5. Up-rating of GTG-1&2 for augmentation of capacity (4-5MW).
6. Replacement of metallic blades with E-FRP blades in air fin fan coolers of the Process Units

7. Environment friendly chemical (Hydrazine, phosphate, silica) injection in BFW of CPP and MSP done. This resulted in substantial reduction in Blow down.
8. Steam traps dynamic analysis and monitoring.
9. Regular monitoring of Hydrocarbon passing of all valves connected with flare system by Acoustic Leak Detector and Fugitive emissions from tanks, line flanges etc, throughout the year under LDAR program.
10. Continuous operation of APC in CDU, DCU, HCU and H2U.
11. Conventional light replacement with Energy efficient light
12. Steady operation of 12 MW STG for Captive Power generation by utilizing and recovering waste energy (thermal and pressure) of HP steam, Maximization of NG use for continual improvement in the energy consumption, Increased Reliability with installation of Prognostic Online monitoring system for Off-Gas and Make-up Gas Compressor of HCU. There has been increase in productivity, safety and reduction of unplanned outages & maintenance cost, Replacement of higher heat duty exchanger EE-01 in HCU, etc.

Up-coming Major Projects:

Numaligarh Refinery Expansion Project (NREP):

The project is being implemented to augment capacity of Numaligarh Refinery from 3 to 9 MMTPA. The project also includes laying a cross country crude oil pipeline from Paradip in Odisha to Numaligarh in Assam. The Cabinet Committee on Economic Affairs (CCEA) of the Government of India has accorded investment approval for the project on 16.01.2019, Environmental Clearance for setting up the new train of refinery of 6 million capacity was accorded by the MoEFCC on 27.07.2020. The project is being executed using a mix implementation model comprising EPC, EPCM, PMC and BOO contracts. Process units like CDUVDU, DHDT, MS Block, SRU etc. are planned to be set up through EPC contracts. Few critical and complex units like RPTU and PFCC are planned to be set up in EPCM mode. The Hydrogen Generation Unit (HGU) will be set up in BOO mode. In terms of project progress and achievement of major milestones, process licensors for all the major process units of the new 6 million refinery have been finalized and engineering details are under final stages of completion. With regard to the crude oil pipeline, order worth ₹2,597 Crore has been placed through GeM portal to procure being implemented with Grant-in-aid support of ₹285.24 crore from the Government of India for the Bangladesh portion of the pipeline. For Indian portion of 5.16 KM long pipeline from Siliguri, cost will be ₹91.84 Crore. Pipe Procurement has been completed and Pipeline laying & Terminal construction works are in progress. As on 30th June 2021, overall progress of the project was 73.80%

Indo-Bangladesh Friendship pipeline (IBFPL):

The Company's focus is primarily on three major ongoing projects namely the Refining Capacity Expansion Project, Indo-Bangladesh Friendship pipeline (IBFPL) and Bio Refinery Project, which have gained momentum and recorded definitive progress.

NRL has recently been accorded the Environmental clearance from the Ministry of Environment, Forest & Climate Change for the Refinery Expansion Project on 27th July 2020, which would be the zero date for the Project. M/s SBI Capital Markets Limited, Mumbai has been appointed for Debt syndication of Rs. 15,102 Crore for Refinery Expansion Project. Lining up of Technical Management Consultant for Refinery Expansion Project, EPCM for Pipeline project, licensors for Fluid Catalytic Cracking Gasoline Desulphurisation Unit (FCC-GDS) and Motor Spirit (MS) Block and allocation of 200 acres of land to set up Crude Oil Terminal in Paradip are other significant developments in implementation of the integrated mega refinery expansion project.

The 130 KM Indo-Bangla Friendship Pipeline (IBFPL) for exporting NRL products from the Siliguri Marketing Terminal to Bangladesh is progressing well.

Indradhanush Gas Grid Limited (IGGL):

IGGL is a joint venture company among Numaligarh Refinery Limited (NRL), M/s Oil India Limited (OIL), M/s Oil and Natural Gas Corporation Limited (ONGC), M/s Indian Oil Corporation Limited (IOCL) and M/s GAIL (India) Limited (GAIL) with equity participation of 20% each and was incorporated on 10th August 2018 to implement the North East Gas Grid project envisaged in the Hydrocarbon Vision 2030 for North East of Govt. of India. As on 31st March 2019, the paid up share capital of IGGL is ₹25.00 crore. The registered office of the company is at Guwahati, Assam. NRL had contributed ₹5.00 crore towards equity in this joint venture.

Joint Ventures:

Brahmaputra Cracker and Polymer Limited (BCPL):

BCPL is a joint venture company incorporated on 8th January, 2007 as a Central Public Sector Enterprise under the Department of Chemicals & Petrochemicals, Government of India with an authorized share capital of ₹2,000 Crore to implement the Assam Gas Cracker Project in the district of Dibrugarh, Assam. GAIL (India) Limited is the main promoter having 70% of equity participation while Numaligarh Refinery Limited (NRL), Oil India Ltd (OIL) and Government of Assam are holding 10% share each. The plant was commissioned on 2nd January 2016 and dedicated to the nation by the Hon'ble Prime Minister, on 5th Feb'2016. As on 31st March,

2021, paid up share capital of the Company was ₹1417.67 crore of which NRL's share of contribution was ₹ 141.77 crore. The principal end products of the Company are High Density Polyethylene (HDPE) and Linear Low Density Polyethylene (LLDPE). The other products include Hydrogenated Pyrolysis Gasoline and Pyrolysis Fuel Oil.

Assam Bio Refinery Private Limited (ABRPL):

Country's first 2G bamboo based bio refinery being executed through a JV with Finnish collaborators "Assam Bio Refinery Private Limited" has recorded adequate progress on ground.

Assam Bio Refinery Private Limited was incorporated on 4th June, 2018 as a joint venture company promoted by NRL with 50% equity and balance 50% by Fortum 3.B.V Netherland and Chempolis Oy, Finland for producing ethanol from cellulosic feedstock 'Bamboo' which is available in abundance in North-Eastern (NE) states of India. The authorized and paid up share capital of the Company is ₹300 Crore and ₹247.84 Crore respectively. As on 31st March, 2021, NRL has contributed its 50% share of equity amounting to ₹123.92 crore. The Project envisages using 300 Kilo-Tones Per Annum (KTPA) of dry bamboo (500 KTPA of green bamboo) as raw material and shall produce Cellulosic Ethanol, Acetic Acid, Furfuryl/Furfuryl Alcohol, along with combustible residue in the form of Bio coal and Stillages. The technology being used is based on selective fractionation of biomass and coproduction of multiple products. It shall produce approx. 49,000 Tones Per Annum (TPA) of bio-ethanol, 11,000 TPA of acetic acid and 18,000 TPA of furfural alcohol. Bamboo residue shall be used as fuel to produce steam and electricity. The Project Construction activity at the site was started in late 2018 and is continuing with major civil and structural works going on. Engineers India Limited (EIL) has been appointed as the Engineering, Procurement and Construction Management (EPCM) consultant on August 24, 2018. Civil & Structural works at the site is continuing in full swing and manufacturing works at vendors' locations are also progressing well. Overall physical progress of the project as on 31st March, 2021 was 31.1%. Due to travel restrictions as well as uncertainties for COVID-19 pandemic situation, scheduled engineering activities were delayed and accordingly, the Project schedule has been revised with mechanical completion by June, 2022 and commissioning by September, 2022.

Awards and Recognitions :

NRL was honoured with the several awards in recognition of its accomplishments in various spheres of activities during the 2020-21-

- i) PRSI National Awards 2020-21 in the fields of Social Media for PR & Branding, Best use of Social Media for COVID-19 and Hindi Journal PPRAYAS.



Mr. S K Barua (MD), Mr. N Borthakur, Sr. CGM (Corporate Affairs), & Ms. Madhuchanda Adhikari DGM (Corporate Comm) in Award Ceremony

ii) National Awards for Excellence in Corporate Governance 2020-

21



Mr. S. K. Barua, MD and Mr. H.K. Sharmah, CS and B.J.Saikia, DGM Coordination received the Award.

iii) FAME International Award (Platinum Category) -2020-21 for excellence in Environment Management



Mr. K. Medhi, Senior Manager, TS (ENV) received the Award

FUGITIVE EMISSIONS SURVEY REPORT

[April 2021]



Client : NRL

ETS

Work Order No: 4300058771-BOR/12.04.2019

ETS/NRL/FUGITIVE/012/21

S/N	Component ID	AVERAGE READING LEL %	READING (%NG)	READING (ppm)	EPA Correlation <u>Kg/Hr/Source</u>	Total Emission kg/annum
UNIT : MSP						
Area = 16 Unit						
1	16-PA-CF-0011A Suction line I/V	0	0	0	0.000	0.000
2	16-PA-CF-0011A Suction line I/V	0	0	0	0.000	0.000
3	16-PA-CF-0011A Suction line I/V	0	0	0	0.000	0.000
4	Stainer Flange	0	0	0	0.000	0.000
5	Drain line 1st I/V Gland	0	0	0	0.000	0.000
6	Stainer Flange	0	0	0	0.000	0.000
7	Drain line 2nd I/V Gland	0	0	0	0.000	0.000
8	Suction line flange	0	0	0	0.000	0.000
9	Pump Seal	0	0	0	0.000	0.000
10	Discharge line Flange	0	0	0	0.000	0.000
11	Drain line I/V Gland	0	0	0	0.000	0.000
12	Drain line safety Flange	0	0	0	0.000	0.000
13	Meter line I/V Gland	0	0	0	0.000	0.000
14	NRV U/S Flange	0	0	0	0.000	0.000
15	NRV TOP Flange	0	0	0	0.000	0.000
16	NRV D/S Flange	0	0	0	0.000	0.000
17	Drain line 1st I/V Gland	0	0	0	0.000	0.000
18	Drain line 2nd I/V Gland	0	0	0	0.000	0.000
19	OWS Point	0	0	0	0.000	0.000
20	Suction line Outlet line to 1ST I/V	0	0	0	0.000	0.000
21	Suction line Outlet line to 1ST I/V	0	0	0	0.000	0.000
22	Suction line Outlet line to 1ST I/V	0	0	0	0.000	0.000
23	Drain line I/V Gland	0	0	0	0.000	0.000
24	DRAIN LINE SAFETY FLANGE	0	0	0	0.000	0.000
25	Suction line Outlet line to 2ND I/V	0	0	0	0.000	0.000
26	Suction line Outlet line to 2ND I/V	0	0	0	0.000	0.000
27	Suction line Outlet line to 2ND I/V	0	0	0	0.000	0.000
28	16-PA-CF-0011B Suction line I/V	0	0	0	0.000	0.000
29	16-PA-CF-0011B Suction line I/V	0	0	0	0.000	0.000
30	16-PA-CF-0011B Suction line I/V	0	0	0	0.000	0.000
31	Stainer Top Flange	0	0	0	0.000	0.000
32	Drain line 1st I/V Gland	0	0	0	0.000	0.000
33	Stainer Flange	0	0	0	0.000	0.000
34	Drain line 2nd I/V Gland	0	0	0	0.000	0.000
35	Suction line flange	0	0	0	0.000	0.000
36	Pump Seal	0	0	0	0.000	0.000
37	Discharge line Flange	0	0	0	0.000	0.000
38	Drain line I/V Gland	0	0	0	0.000	0.000
39	Drain line safety Flange	0	0	0	0.000	0.000
40	P.G. Meter I/V Gland	0	0	0	0.000	0.000
41	NRV U/S Flange	0	0	0	0.000	0.000
42	NRV Top Flange	0	0	0	0.000	0.000
43	NRV D/S Flange	0	0	0	0.000	0.000
44	Drain line 1st I/V Gland	0	0	0	0.000	0.000
45	Drain line 2nd I/V Gland	0	0	0	0.000	0.000
46	OWS Point	0	0	0	0.000	0.000
47	Discharge line I/V U/S Flange	0	0	0	0.000	0.000
48	Discharge line I/V Gland	0	0	0	0.000	0.000
49	Discharge line I/V D/S Flange	0	0	0	0.000	0.000
50	Discharge line to Outlet line I/V	0	0	0	0.000	0.000
51	Discharge line to Outlet line To	0	0	0	0.000	0.000
52	Drain line I/V Gland	0	0	0	0.000	0.000
53	Drain line Safety Flange	0	0	0	0.000	0.000
	16-PA-CF-013A	0	0	0	0.000	0.000
54	Suction line I/V U/S Flange	0	0	0	0.000	0.000
55	Suction line I/V Gland	0	0	0	0.000	0.000
56	Suction line I/V D/S Flange	0	0	0	0.000	0.000
57	Stainer Top Flange	0	0	0	0.000	0.000
58	Suction line to outlet line 1st I/V	0	0	0	0.000	0.000
59	Suction line to outlet line 1st I/V	0	0	0	0.000	0.000
60	Suction line to outlet line 1st I/V	0	0	0	0.000	0.000

FUGITIVE EMISSIONS SURVEY REPORT

[April 2021]



Client : NRL

ETS

Work Order No: 4300058771-BOR/12.04.2019

ETS/NRL/FUGITIVE/012/21

S/N	Component ID	AVERAGE READING LEL %	READING (%NG)	READING (ppm)	EPA Correlation <u>Kg/Hr/Source</u>	Total Emission kg/annum
61	Suction line to outlet line 2nd I/V	0	0	0	0.000	0.000
62	Suction line to outlet line 2nd I/V	0	0	0	0.000	0.000
63	Suction line to outlet line 2nd I/V	0	0	0	0.000	0.000
64	Suction line to outlet line 3rd I/V	0	0	0	0.000	0.000
65	Suction line to outlet line 3rd I/V	0	0	0	0.000	0.000
66	Suction line to outlet line 3rd I/V	0	0	0	0.000	0.000
67	OWS Point	0	0	0	0.000	0.000
68	Drain line 1st I/V Gland	0	0	0	0.000	0.000
69	Steamer Flange	0	0	0	0.000	0.000
70	Drain line 2nd I/V Gland	0	0	0	0.000	0.000
71	Suction line flange	0	0	0	0.000	0.000
72	Discharge line Flange	0	0	0	0.000	0.000
73	P.G. Meter I/V Gland	0	0	0	0.000	0.000
74	NRV U/S Flange	0	0	0	0.000	0.000
75	NRV top Flange	0	0	0	0.000	0.000
76	NRV D/S Flange	0	0	0	0.000	0.000
77	Drain line 1st I/V Gland	0	0	0	0.000	0.000
78	Drain line 2nd I/V Gland	0	0	0	0.000	0.000
79	OWS Point	0	0	0	0.000	0.000
80	Discharge line I/V U/S Flange	0	0	0	0.000	0.000
81	Discharge line I/V Gland	0	0	0	0.000	0.000
82	Discharge line I/V D/S Flange	0	0	0	0.000	0.000
	16-PA-CF-013B	0	0	0	0.000	0.000
83	Suction line I/V U/S Flange	0	0	0	0.000	0.000
84	Suction line I/V Gland	0	0	0	0.000	0.000
85	Suction line I/V D/S Flange	0	0	0	0.000	0.000
86	Stainer Top Flange	0	0	0	0.000	0.000
87	Drain line 1st I/V Gland	0	0	0	0.000	0.000
88	Steamer Flange	0	0	0	0.000	0.000
89	Drain line 2nd I/V Gland	0	0	0	0.000	0.000
90	Suction line flange	0	0	0	0.000	0.000
91	Discharge line Flange	0	0	0	0.000	0.000
92	P.G. Meter I/V Gland	0	0	0	0.000	0.000
93	NRV U/S Flange	0	0	0	0.000	0.000
94	NRV Top Flange	0	0	0	0.000	0.000
95	NRV D/S Flange	0	0	0	0.000	0.000
96	Drain line 1st I/V Gland	0	0	0	0.000	0.000
97	Drain line 2nd I/V Gland	0	0	0	0.000	0.000
98	OWS Point	0	0	0	0.000	0.000
99	Discharge line I/V U/S Flange	0	0	0	0.000	0.000
100	Discharge line I/V Gland	0	0	0	0.000	0.000
101	Discharge line I/V D/S Flange	0	0	0	0.000	0.000
102	16-FV-2201 U/S line I/V U/S Flange	0	0	0	0.000	0.000
103	16-FV-2201 U/S line I/V Gland	0	0	0	0.000	0.000
104	16-FV-2201 U/S line I/V U/S Flange	0	0	0	0.000	0.000
105	Drain line I/V Gland	0	0	0	0.000	0.000
106	16-FV-2201 line C/V U/S Flange	0	0	0	0.000	0.000
107	16-FV-2201 line C/V Gland	0	0	0	0.000	0.000
108	16-FV-2201 line C/V D/S Flange	0	0	0	0.000	0.000
109	Drain line I/V Gland	0	0	0	0.000	0.000
110	16-FV-2201 D/S line I/V U/S Flange	0	0	0	0.000	0.000
111	16-FV-2201 D/S line I/V Gland	0	0	0	0.000	0.000
112	16-FV-2201 D/S line I/V D/S Flange	0	0	0	0.000	0.000
113	Bypass line I/V U/S Flange	0	0	0	0.000	0.000
114	Bypass line I/V Gland	0	0	0	0.000	0.000
115	Bypass line I/V D/S Flange	0	0	0	0.000	0.000
116	16-FV-2103 U/S line I/V U/S Flange	0	0	0	0.000	0.000
117	16-FV-2103 U/S line I/V Gland	0	0	0	0.000	0.000
118	16-FV-2103 U/S line I/V D/S Flange	0	0	0	0.000	0.000
119	Drain line I/V Gland	0	0	0	0.000	0.000

FUGITIVE EMISSIONS SURVEY REPORT

[April 2021]



Client : NRL

ETS

Work Order No: 4300058771-BOR/12.04.2019

ETS/NRL/FUGITIVE/012/21

S/N	Component ID	AVERAGE READING LEL %	READING (%NG)	READING (ppm)	EPA Correlation <u>Kg/Hr/Source</u>	Total Emission kg/annum
120	16-FV-2103 line C/V U/S Flange	0	0	0	0.000	0.000
121	16-FV-2103 line C/V Gland	0	0	0	0.000	0.000
122	16-FV-2103 line C/V D/S Flange	0	0	0	0.000	0.000
123	Drain line I/V Gland	0	0	0	0.000	0.000
124	16-FV-2103 D/S line I/V U/S Flange	0	0	0	0.000	0.000
125	16-FV-2103 D/S line I/V Gland	0	0	0	0.000	0.000
126	16-FV-2103 D/S line I/V D/S Flange	0	0	0	0.000	0.000
127	Bypass line I/V U/S Flange	0	0	0	0.000	0.000
128	Bypass line I/V Gland	0	0	0	0.000	0.000
129	Bypass line I/V D/S Flange	0	0	0	0.000	0.000
130	16-FV-2205 U/S line I/V U/S Flange	0	0	0	0.000	0.000
131	16-FV-2205 U/S line I/V Gland	0	0	0	0.000	0.000
132	16-FV-2205 U/S line I/V D/S Flange	0	0	0	0.000	0.000
133	Drain line I/V Gland	0	0	0	0.000	0.000
134	16-FV-2205 line C/V U/S Flange	0	0	0	0.000	0.000
135	16-FV-2205 line C/V Gland	0	0	0	0.000	0.000
136	16-FV-2205 line C/V D/S Flange	0	0	0	0.000	0.000
137	Drain line I/V Gland	0	0	0	0.000	0.000
138	16-FV-2205 D/S line I/V U/S Flange	0	0	0	0.000	0.000
139	16-FV-2205 D/S line I/V Gland	0	0	0	0.000	0.000
140	16-FV-2205 D/S line I/V D/S Flange	0	0	0	0.000	0.000
141	Bypass line I/V U/S Flange	0	0	0	0.000	0.000
142	Bypass line I/V Gland	0	0	0	0.000	0.000
143	Bypass line I/V D/S Flange	0	0	0	0.000	0.000
	16-PA-CF-010A	0	0	0	0.000	0.000
144	Suction line I/V U/S Flange	0	0	0	0.000	0.000
145	Suction line I/V Gland	0	0	0	0.000	0.000
146	Suction line I/V D/S Flange	0	0	0	0.000	0.000
147	Stainer Top Flange	0	0	0	0.000	0.000
148	Suction line to outlet line 1st I/V	0	0	0	0.000	0.000
149	Suction line to outlet line 1st I/V	0	0	0	0.000	0.000
150	Suction line to outlet line 1st I/V	0	0	0	0.000	0.000
151	Suction line to outlet line 2nd I/V	0	0	0	0.000	0.000
152	Suction line to outlet line 2nd I/V	0	0	0	0.000	0.000
153	Suction line to outlet line 2nd I/V	0	0	0	0.000	0.000
154	Suction line to outlet line 3rd I/V	0	0	0	0.000	0.000
155	Suction line to outlet line 3rd I/V	0	0	0	0.000	0.000
156	Suction line to outlet line 3rd I/V	0	0	0	0.000	0.000
157	OWS Point	0	0	0	0.000	0.000
158	Drain line 1st I/V Gland	0	0	0	0.000	0.000
159	Steamer Flange	0	0	0	0.000	0.000
160	Drain line 2nd I/V Gland	0	0	0	0.000	0.000
161	Suction line Flange	0	0	0	0.000	0.000
162	Pump Seal	0	0	0	0.000	0.000
163	Discharge line Flange	0	0	0	0.000	0.000
164	P.G. Meter I/V Gland	0	0	0	0.000	0.000
165	NRV U/S Flange	0	0	0	0.000	0.000
166	NRV Top Flange	0	0	0	0.000	0.000
167	NRV D/S Flange	0	0	0	0.000	0.000
168	Drain line 1st I/V Gland	0	0	0	0.000	0.000
169	Drain line 2nd I/V Gland	0	0	0	0.000	0.000
170	OWS Point	0	0	0	0.000	0.000
171	Discharge line I/V U/S Flange	0	0	0	0.000	0.000
172	Discharge line I/V Gland	0	0	0	0.000	0.000
173	Discharge line I/V D/S Flange	0	0	0	0.000	0.000
	16-PA-CF010B	0	0	0	0.000	0.000
174	Suction line I/V U/S Flange	0	0	0	0.000	0.000
175	Suction line I/V Gland	0	0	0	0.000	0.000
176	Suction line I/V D/S Flange	0	0	0	0.000	0.000
177	Stainer Top Flange	0	0	0	0.000	0.000
178	Drain line 1st I/V Gland	0	0	0	0.000	0.000
179	Steamer Flange	0	0	0	0.000	0.000
180	Drain line 2nd I/V Gland	0	0	0	0.000	0.000

FUGITIVE EMISSIONS SURVEY REPORT

[April 2021]



Client : NRL

ETS

Work Order No: 4300058771-BOR/12.04.2019

ETS/NRL/FUGITIVE/012/21

S/N	Component ID	AVERAGE READING LEL %	READING (%NG)	READING (ppm)	EPA Correlation <u>Kg/Hr/Source</u>	Total Emission kg/annum
181	Suction line Flange	0	0	0	0.000	0.000
182	Pump Seal	0	0	0	0.000	0.000
183	Discharge line Flange	0	0	0	0.000	0.000
184	P.G. Meter 1/V Gland	0	0	0	0.000	0.000
185	NRV U/S Flange	0	0	0	0.000	0.000
186	NRV Top Flange	0	0	0	0.000	0.000
187	NRV D/S Flange	0	0	0	0.000	0.000
188	Drain line 1st 1/V Gland	0	0	0	0.000	0.000
189	Drain line 2nd 1/V Gland	0	0	0	0.000	0.000
190	OWS Point	0	0	0	0.000	0.000
191	Discharge line 1/V U/S Flange	0	0	0	0.000	0.000
192	Discharge line 1/V Gland	0	0	0	0.000	0.000
193	Discharge line 1/V D/S Flange	0	0	0	0.000	0.000
	16-PA-CF-012A	0	0	0	0.000	0.000
194	Suction line 1/V U/S Flange	0	0	0	0.000	0.000
195	Suction line 1/V Gland	0	0	0	0.000	0.000
196	Suction line 1/V D/S Flange	0	0	0	0.000	0.000
197	Stainer Top Flange	0	0	0	0.000	0.000
198	Drain line 1st 1/V Gland	0	0	0	0.000	0.000
199	Steamer Flange	0	0	0	0.000	0.000
200	Drain line 2nd 1/V Gland	0	0	0	0.000	0.000
201	Suction line Flange	0	0	0	0.000	0.000
202	Discharge line Flange	0	0	0	0.000	0.000
203	Meter line 1/V Gland	0	0	0	0.000	0.000
204	Top Flange	0	0	0	0.000	0.000
205	Drain line 1st 1/V Gland	0	0	0	0.000	0.000
206	Drain line 2nd 1/V Gland	0	0	0	0.000	0.000
207	ows Point	0	0	0	0.000	0.000
208	Discharge line 1/V Gland	0	0	0	0.000	0.000
	16-PA-CF-012B	0	0	0	0.000	0.000
209	Suction line 1/V U/S Flange	0	0	0	0.000	0.000
210	Suction line 1/V Gland	0	0	0	0.000	0.000
211	Suction line 1/V D/S Flange	0	0	0	0.000	0.000
212	Stainer Top Flange	0	0	0	0.000	0.000
213	Drain line 1st 1/V Gland	0	0	0	0.000	0.000
214	Steamer Flange	0	0	0	0.000	0.000
215	Drain line 2nd 1/V Gland	0	0	0	0.000	0.000
216	Suction line Flange	0	0	0	0.000	0.000
217	Discharge line Flange	0	0	0	0.000	0.000
218	Meter line 1/V Gland	0	0	0	0.000	0.000
219	Top Flange	0	0	0	0.000	0.000
220	Drain line 1st 1/V Gland	0	0	0	0.000	0.000
221	Drain line 2nd 1/V Gland	0	0	0	0.000	0.000
222	ows Point	0	0	0	0.000	0.000
223	Discharge line 1/V Gland	0	0	0	0.000	0.000
224	16-FV-2204 D/S line 1/V Gland	0	0	0	0.000	0.000
225	Drain line 1st 1/V Gland	0	0	0	0.000	0.000
226	Stainer Flange	0	0	0	0.000	0.000
227	Drain line 2nd 1/V Gland	0	0	0	0.000	0.000
228	16-FV-2204 line C/V U/S Flange	0	0	0	0.000	0.000
229	16-FV-2204 line C/V Gland	0	0	0	0.000	0.000
230	16-FV-2204 line C/V D/S Flange	0	0	0	0.000	0.000
231	Drain line 1/V Gland	0	0	0	0.000	0.000
232	D/S line 1/V Gland	0	0	0	0.000	0.000
233	Bypass line 1/V Gland	0	0	0	0.000	0.000
234	16-FV-2206 U/S line 1/V Gland	0	0	0	0.000	0.000
235	Drain line 1st 1/V Gland	0	0	0	0.000	0.000
236	Stainer Flange	0	0	0	0.000	0.000
237	Drain line 2nd 1/V Gland	0	0	0	0.000	0.000
238	16-FV-2206 C/V U/S Flange	0	0	0	0.000	0.000
239	16-FV-2206 C/V Gland	0	0	0	0.000	0.000
240	16-FV-2206 C/V D/S Flange	0	0	0	0.000	0.000
241	Drain line 1/V Gland	0	0	0	0.000	0.000
242	D/S line 1/V Gland	0	0	0	0.000	0.000

FUGITIVE EMISSIONS SURVEY REPORT

[April 2021]



Client : NRL

ETS

Work Order No: 4300058771-BOR/12.04.2019

ETS/NRL/FUGITIVE/012/21

S/N	Component ID	AVERAGE READING LEL %	READING (%NG)	READING (ppm)	EPA Correlation <u>Kg/Hr/Source</u>	Total Emission kg/annum
243	Bypass line stainer Flange	0	0	0	0.000	0.000
244	Bypass line I/V Gland	0	0	0	0.000	0.000
	16-PF-CF-006A	0	0	0	0.000	0.000
245	Suction line I/V U/S Flange	0	0	0	0.000	0.000
246	Suction line I/V Gland	0	0	0	0.000	0.000
247	Suction line I/V D/S Flange	0	0	0	0.000	0.000
248	Stainer Top Flange	0	0	0	0.000	0.000
249	Drain line 1st I/V Gland	0	0	0	0.000	0.000
250	Steamer Flange	0	0	0	0.000	0.000
251	Drain line 2nd I/V Gland	0	0	0	0.000	0.000
252	Suction line Flange	0	0	0	0.000	0.000
253	Pump Seal	0	0	0	0.000	0.000
254	Discharge line Flange	0	0	0	0.000	0.000
255	Vrain line I/V Gland	0	0	0	0.000	0.000
256	Vrain line safety flange	0	0	0	0.000	0.000
257	Meter line I/V Gland	0	0	0	0.000	0.000
258	NRV U/S Flange	0	0	0	0.000	0.000
259	NRV Top Flange	0	0	0	0.000	0.000
260	NRV D/S Flange	0	0	0	0.000	0.000
261	Drain line 1st I/V Gland	0	0	0	0.000	0.000
262	Drain line 2nd I/V Gland	0	0	0	0.000	0.000
263	OWS Point	0	0	0	0.000	0.000
264	Discharge line I/V U/S Flange	0	0	0	0.000	0.000
265	Discharge line I/V Gland	0	0	0	0.000	0.000
266	Discharge line I/V D/S Flange	0	0	0	0.000	0.000
	16-PA-CF-006B	0	0	0	0.000	0.000
267	Suction line I/V U/S Flange	0	0	0	0.000	0.000
268	Suction line I/V Gland	0	0	0	0.000	0.000
269	Suction line I/V D/S Flange	0	0	0	0.000	0.000
270	Stainer Top Flange	0	0	0	0.000	0.000
271	Drain line 1st I/V Gland	0	0	0	0.000	0.000
272	Steamer Flange	0	0	0	0.000	0.000
273	Drain line 2nd I/V Gland	0	0	0	0.000	0.000
274	Suction line Flange	0	0	0	0.000	0.000
275	Pump Seal	0	0	0	0.000	0.000
276	Discharge line Flange	0	0	0	0.000	0.000
277	Vrain line I/V Gland	0	0	0	0.000	0.000
278	Vrain line safety flange	0	0	0	0.000	0.000
279	Meter line I/V Gland	0	0	0	0.000	0.000
280	NRV U/S Flange	0	0	0	0.000	0.000
281	NRV Top Flange	0	0	0	0.000	0.000
282	NRV D/S Flange	0	0	0	0.000	0.000
283	Drain line 1st I/V Gland	0	0	0	0.000	0.000
284	Drain line 2nd I/V Gland	0	0	0	0.000	0.000
285	OWS Point	0	0	0	0.000	0.000
286	Discharge line I/V U/S Flange	0	0	0	0.000	0.000
287	Discharge line I/V Gland	0	0	0	0.000	0.000
288	Discharge line I/V D/S Flange	0	0	0	0.000	0.000
289	MIN FLOW TO 16-VV-06 line I/V U/S Flange	0	0	0	0.000	0.000
290	MIN FLOW TO 16-VV-06 line I/V U/S Flange	0	0	0	0.000	0.000
291	MIN FLOW TO 16-VV-06 line I/V U/S Flange	0	0	0	0.000	0.000
292	NRV U/S Flange	0	0	0	0.000	0.000
293	NRV Top Flange	0	0	0	0.000	0.000
294	NRV D/S Flange	0	0	0	0.000	0.000
295	Drain line I/V Gland	0	0	0	0.000	0.000
296	Drain line safety Flange	0	0	0	0.000	0.000
297	HEAVY REFORMAT TO STORAGE U/S line I/V Gland	0	0	0	0.000	0.000
298	Top Flange	0	0	0	0.000	0.000
299	Drain line I/V Gland	0	0	0	0.000	0.000
300	Drain line Safety Flange	0	0	0	0.000	0.000
301	D/S line Stainer Flange	0	0	0	0.000	0.000
302	D/S line I/V Gland	0	0	0	0.000	0.000
303	16-PV-2102 line I/V Gland	0	0	0	0.000	0.000
304	Drain line I/V Gland	0	0	0	0.000	0.000

FUGITIVE EMISSIONS SURVEY REPORT

[April 2021]



Client : NRL

ETS

Work Order No: 4300058771-BOR/12.04.2019

ETS/NRL/FUGITIVE/012/21

S/N	Component ID	AVERAGE READING LEL %	READING (%NG)	READING (ppm)	EPA Correlation <u>Kg/Hr/Source</u>	Total Emission kg/annum
305	16-PV-2102 line C/V U/S Flange	0	0	0	0.000	0.000
306	16-PV-2102 line C/V Gland	22	1.1	11000	0.040	347.825
307	16-PV-2102 line C/V D/S Flange	0	0	0	0.000	0.000
308	Drain line I/V Gland	0	0	0	0.000	0.000
309	D/S line I/V Gland	0	0	0	0.000	0.000
310	Bypass line stainer Flange	0	0	0	0.000	0.000
311	Bypass line I/V Gland	0	0	0	0.000	0.000
	16-PA-CF-003A	0	0	0	0.000	0.000
312	Suction line I/V U/S Flange	0	0	0	0.000	0.000
313	Suction line I/V Gland	0	0	0	0.000	0.000
314	Suction line I/V D/S Flange	0	0	0	0.000	0.000
315	Stainer Top Flange	0	0	0	0.000	0.000
316	Suction line to outlet line 1st I/V	0	0	0	0.000	0.000
317	Suction line to outlet line 1st I/V	0	0	0	0.000	0.000
318	Suction line to outlet line 1st I/V	0	0	0	0.000	0.000
319	Suction line to outlet line 2nd I/V	0	0	0	0.000	0.000
320	Suction line to outlet line 2nd I/V	0	0	0	0.000	0.000
321	Suction line to outlet line 2nd I/V	0	0	0	0.000	0.000
322	Vrain line I/V Gland	0	0	0	0.000	0.000
323	Vrain line safety flange	0	0	0	0.000	0.000
324	Suction line to outlet line 3rd I/V	0	0	0	0.000	0.000
325	Suction line to outlet line 3rd I/V	0	0	0	0.000	0.000
326	Suction line to outlet line 3rd I/V	0	0	0	0.000	0.000
327	Drain line 1st I/V Gland	0	0	0	0.000	0.000
328	Drain line 2nd I/V Gland	0	0	0	0.000	0.000
329	steamer flange	0	0	0	0.000	0.000
330	Suction line flange	0	0	0	0.000	0.000
331	Discharge line flange	0	0	0	0.000	0.000
332	P.G. Meter I/V Gland	0	0	0	0.000	0.000
333	Meter line to drain line I/V Gland	0	0	0	0.000	0.000
334	Meter kine to Drain line safety	0	0	0	0.000	0.000
335	NRV U/S Flange	0	0	0	0.000	0.000
336	NRV Top Flange	0	0	0	0.000	0.000
337	NRV D/S Flange	0	0	0	0.000	0.000
338	Drain line 1st I/V Gland	0	0	0	0.000	0.000
339	Drain line 2nd I/V Gland	0	0	0	0.000	0.000
340	OWS Point	0	0	0	0.000	0.000
341	Discharge line I/V U/S Flange	0	0	0	0.000	0.000
342	Discharge line I/V Gland	0	0	0	0.000	0.000
343	Discharge line I/V D/S Flange	0	0	0	0.000	0.000
	16-PA-CF-003B	0	0	0	0.000	0.000
344	Suction line I/V U/S Flange	0	0	0	0.000	0.000
345	Suction line I/V Gland	0	0	0	0.000	0.000
346	Suction line I/V D/S Flange	0	0	0	0.000	0.000
347	Stainer Top Flange	0	0	0	0.000	0.000
348	Drain line 1st I/V Gland	0	0	0	0.000	0.000
349	Steamer Flange	0	0	0	0.000	0.000
350	Drain line 2nd I/V Gland	0	0	0	0.000	0.000
351	Suction line flange	0	0	0	0.000	0.000
352	Discharge line flange	0	0	0	0.000	0.000
353	Meter line I/V Gland	0	0	0	0.000	0.000
354	Meter line to drain line I/V Gland	0	0	0	0.000	0.000
355	Meter line to drain line safety	0	0	0	0.000	0.000
356	NRV U/S Flange	0	0	0	0.000	0.000
357	NRV Top Flange	0	0	0	0.000	0.000
358	NRV D/S Flange	0	0	0	0.000	0.000
359	Drain line 1st I/V Gland	0	0	0	0.000	0.000
360	Drain line 2nd I/V Gland	0	0	0	0.000	0.000
361	OWS Point	0	0	0	0.000	0.000
362	Discharge line I/V U/S Flange	0	0	0	0.000	0.000
363	Discharge line I/V Gland	0	0	0	0.000	0.000
364	Discharge line I/V D/S Flange	0	0	0	0.000	0.000
365	16-FV-1803 U/S line I/V Gland	0	0	0	0.000	0.000
366	Drain line I/V Gland	0	0	0	0.000	0.000

FUGITIVE EMISSIONS SURVEY REPORT

[April 2021]



Client : NRL

ETS

Work Order No: 4300058771-BOR/12.04.2019

ETS/NRL/FUGITIVE/012/21

S/N	Component ID	AVERAGE READING LEL %	READING (%NG)	READING (ppm)	EPA Correlation <u>Kg/Hr/Source</u>	Total Emission kg/annum
367	16-FV-1803 C/V U/S Flange	20	1	10000	0.036	312.013
368	16-FV-1803 C/V Gland	0	0	0	0.000	0.000
369	16-FV-1803 C/V D/S Flange	0	0	0	0.000	0.000
370	Drain line I/V Gland	0	0	0	0.000	0.000
371	D/S line I/V Gland	0	0	0	0.000	0.000
372	Bypass line I/V Gland	0	0	0	0.000	0.000
373	16-FV-1802 D/S line I/V U/S Flange	0	0	0	0.000	0.000
374	16-FV-1802 D/S line I/V Gland	0	0	0	0.000	0.000
375	16-FV-1802 D/S line I/V D/S Flange	0	0	0	0.000	0.000
376	Drain line I/V Gland	0	0	0	0.000	0.000
377	16-FV-1802 C/V U/S Flange	0	0	0	0.000	0.000
378	16-FV-1802 C/V Gland	0	0	0	0.000	0.000
379	16-FV-1802 C/V D/S Flange	0	0	0	0.000	0.000
380	Drain line I/V Gland	0	0	0	0.000	0.000
381	16-FV-1802 D/S line I/V U/S Flange	0	0	0	0.000	0.000
382	16-FV-1802 D/S line I/V Gland	0	0	0	0.000	0.000
383	16-FV-1802 D/S line I/V D/S Flange	0	0	0	0.000	0.000
384	Bypass line I/V U/S Flange	0	0	0	0.000	0.000
385	Bypass line I/V Gland	0	0	0	0.000	0.000
386	Bypass line I/V D/S Flange	0	0	0	0.000	0.000
	16-PA-CF-005A	0	0	0	0.000	0.000
387	Suction line I/V U/S Flange	0	0	0	0.000	0.000
388	Suction line I/V Gland	0	0	0	0.000	0.000
389	Suction line I/V D/S Flange	0	0	0	0.000	0.000
390	Stainer Top Flange	0	0	0	0.000	0.000
391	Drain line I/V Gland	0	0	0	0.000	0.000
392	Suction line flange	0	0	0	0.000	0.000
393	Discharge line flange	0	0	0	0.000	0.000
394	Meter line I/V Gland	0	0	0	0.000	0.000
395	Top Flange	0	0	0	0.000	0.000
396	Drain line 1st I/V Gland	0	0	0	0.000	0.000
397	Steamer Flange	0	0	0	0.000	0.000
398	Drain line 2nd I/V Gland	0	0	0	0.000	0.000
399	OWS Point	0	0	0	0.000	0.000
400	Discharge line I/V Gland	0	0	0	0.000	0.000
	16-PA-CF-005B	0	0	0	0.000	0.000
401	Suction line I/V U/S Flange	0	0	0	0.000	0.000
402	Suction line I/V Gland	0	0	0	0.000	0.000
403	Suction line I/V D/S Flange	0	0	0	0.000	0.000
404	Stainer Top Flange	0	0	0	0.000	0.000
405	Drain line I/V Gland	0	0	0	0.000	0.000
406	Suction line flange	0	0	0	0.000	0.000
407	Discharge line flange	0	0	0	0.000	0.000
408	P.G. Meter I/V Gland	0	0	0	0.000	0.000
409	Drain line 1st I/V Gland	0	0	0	0.000	0.000
410	Steamer Flange	0	0	0	0.000	0.000
411	Drain line 2nd I/V Gland	0	0	0	0.000	0.000
412	OWS Point	0	0	0	0.000	0.000
413	Top Flange	0	0	0	0.000	0.000
414	Discharge line I/V Gland	0	0	0	0.000	0.000
415	16-PV-2301 U/S line I/V U/S Flange	0	0	0	0.000	0.000
416	16-PV-2301 U/S line I/V Gland	0	0	0	0.000	0.000
417	16-PV-2301 U/S line I/V D/S Flange	0	0	0	0.000	0.000
418	Drain line 1st I/V Gland	0	0	0	0.000	0.000
419	Stainer Flange	0	0	0	0.000	0.000
420	Drain line 2nd I/V Gland	0	0	0	0.000	0.000
421	Drain line 3rd I/V Gland	0	0	0	0.000	0.000
422	16-PV-2301 C/V U/S Flange	0	0	0	0.000	0.000
423	16-PV-2102 C/V Gland	100	5	50000	0.223	1954.335
424	16-PV-2301 C/V D/S Flange	0	0	0	0.000	0.000
425	Drain line I/V Gland	0	0	0	0.000	0.000
426	16-PV-2301 D/S line I/V U/S Flange	0	0	0	0.000	0.000
427	16-PV-2301 D/S line I/V Gland	0	0	0	0.000	0.000
428	16-PV-2301 D/S line I/V D/S Flange	0	0	0	0.000	0.000

FUGITIVE EMISSIONS SURVEY REPORT

[April 2021]



Client : NRL

ETS

Work Order No: 4300058771-BOR/12.04.2019

ETS/NRL/FUGITIVE/012/21

S/N	Component ID	AVERAGE READING LEL %	READING (%NG)	READING (ppm)	EPA Correlation <u>Kg/Hr/Source</u>	Total Emission kg/annum
429	Bypass line I/V U/S Flange	0	0	0	0.000	0.000
430	Bypass line I/V Gland	0	0	0	0.000	0.000
431	Bypass line I/V D/S Flange	0	0	0	0.000	0.000
432	16-FV-1701 U/S line I/V U/S Flange	0	0	0	0.000	0.000
433	16-FV-1701 U/S line I/V Gland	0	0	0	0.000	0.000
434	16-FV-1701 U/S line I/V D/S Flange	0	0	0	0.000	0.000
435	16-FV-1701 C/V U/S Flange	0	0	0	0.000	0.000
436	16-FV-1701 C/V Gland	0	0	0	0.000	0.000
437	16-FV-1701 C/V D/S Flange	0	0	0	0.000	0.000
438	16-FV-1701 D/S line I/V U/S Flange	0	0	0	0.000	0.000
439	16-FV-1701 D/S line I/V Gland	0	0	0	0.000	0.000
440	16-FV-1701 D/S line I/V D/S Flange	0	0	0	0.000	0.000
441	Bypass line I/V U/S Flange	0	0	0	0.000	0.000
442	Bypass line I/V Gland	0	0	0	0.000	0.000
443	Bypass line I/V D/S Flange	0	0	0	0.000	0.000
Area: FURNACE		0	0	0	0.000	0.000
127	From CBD Pump Discharge line	0	0	0	0.000	0.000
128	From CBD Pump Discharge line	0	0	0	0.000	0.000
129	From CBD Pump Discharge line	0	0	0	0.000	0.000
130	Drain line I/V Gland	0	0	0	0.000	0.000
131	Drain line Safety Flange	0	0	0	0.000	0.000
132	From CBD Pump Discharge line	0	0	0	0.000	0.000
133	From CBD Pump Discharge line	0	0	0	0.000	0.000
134	From CBD Pump Discharge line	0	0	0	0.000	0.000
135	FEED NAPTHA line 1st I/V U/S Flange	0	0	0	0.000	0.000
136	FEED NAPTHA line 1st I/V Gland	0	0	0	0.000	0.000
137	FEED NAPTHA line 1st I/V D/S Flange	0	0	0	0.000	0.000
138	Drain line I/V Gland	0	0	0	0.000	0.000
139	Drain line Safety Flange	0	0	0	0.000	0.000
140	FEED NAPTHA line 2nd I/V U/S Flange	0	0	0	0.000	0.000
141	FEED NAPTHA line 2nd I/V Gland	0	0	0	0.000	0.000
142	FEED NAPTHA line 2nd I/V D/S Flange	0	0	0	0.000	0.000
143	NRV U/S Flange	0	0	0	0.000	0.000
144	NRV Top Flange	0	0	0	0.000	0.000
145	NRV D/S Flange	0	0	0	0.000	0.000
146	MS Product line 1st I/V U/S Flange	0	0	0	0.000	0.000
147	MS Product line 1st I/V Gland	0	0	0	0.000	0.000
148	MS Product line 1st I/V D/S Flange	0	0	0	0.000	0.000
149	NRV U/S Flange	0	0	0	0.000	0.000
150	NRV Top Flange	0	0	0	0.000	0.000
151	NRV D/S Flange	0	0	0	0.000	0.000
152	Drain line I/V Gland	0	0	0	0.000	0.000
153	Drain line Safety Flange	0	0	0	0.000	0.000
154	MS Product line 2nd I/V U/S Flange	0	0	0	0.000	0.000
155	MS Product line 2nd I/V Gland	0	0	0	0.000	0.000
156	MS Product line 2nd I/V D/S Flange	0	0	0	0.000	0.000
157	OFF SPEC NAP to Storage line 1	0	0	0	0.000	0.000
158	OFF SPEC NAP to Storage line 1	0	0	0	0.000	0.000
159	OFF SPEC NAP to Storage line 1	0	0	0	0.000	0.000
160	NRV U/S Flange	0	0	0	0.000	0.000
161	NRV Top Flange	0	0	0	0.000	0.000
162	NRV D/S Flange	0	0	0	0.000	0.000
163	Drain line I/V Gland	0	0	0	0.000	0.000
164	Drain line Safety Flange	0	0	0	0.000	0.000
165	OFF SPEC NAP to Storage line 2	0	0	0	0.000	0.000
166	OFF SPEC NAP to Storage line 2	0	0	0	0.000	0.000
167	OFF SPEC NAP to Storage line 2	0	0	0	0.000	0.000
168	Sl. No. 342963 line I/V U/S Flange	0	0	0	0.000	0.000
169	Sl. No. 342963 line I/V Gland	0	0	0	0.000	0.000
170	Sl. No. 342963 line I/V D/S Flange	0	0	0	0.000	0.000
171	Drain line I/V Gland	0	0	0	0.000	0.000
172	Drain line Safety Flange	0	0	0	0.000	0.000
173	Sl. No. 342966 line I/V U/S Flange	0	0	0	0.000	0.000
174	Sl. No. 342966 line I/V Gland	0	0	0	0.000	0.000

FUGITIVE EMISSIONS SURVEY REPORT

[April 2021]



Client : NRL

ETS

Work Order No: 4300058771-BOR/12.04.2019

ETS/NRL/FUGITIVE/012/21

S/N	Component ID	AVERAGE READING LEL %	READING (%NG)	READING (ppm)	EPA Correlation <u>Kg/Hr/Source</u>	Total Emission kg/annum
175	Sl. No. 342966 line I/V D/S Flange	0	0	0	0.000	0.000
176	Bypass line stainer Flange	0	0	0	0.000	0.000
177	Bypass line I/V Gland	0	0	0	0.000	0.000
178	14-UV-1804 line C/V U/S Flange	0	0	0	0.000	0.000
179	14-UV-1804 line C/V Gland	0	0	0	0.000	0.000
180	14-UV-1804 line C/V D/S Flange	0	0	0	0.000	0.000
181	Sl.No. 342945 line I/V U/S Flange	0	0	0	0.000	0.000
182	14-UV-1805 line C/V U/S Flange	0	0	0	0.000	0.000
183	14-UV-1805 line C/V Gland	0	0	0	0.000	0.000
184	14-UV-1805 line C/V D/S Flange	0	0	0	0.000	0.000
185	Sl. No. 342975 line I/V U/S Flange	0	0	0	0.000	0.000
186	Sl. No. 342975 line I/V Gland	0	0	0	0.000	0.000
187	Sl. No. 342975 line I/V D/S Flange	0	0	0	0.000	0.000
188	Sl. No. 342958 line I/V U/S Flange	0	0	0	0.000	0.000
189	Sl. No. 342958 line I/V gland	0	0	0	0.000	0.000
190	Sl. No. 342958 line I/V D/S Flange	0	0	0	0.000	0.000
191	Sl. No. 342977 line I/V U/S Flange	0	0	0	0.000	0.000
192	Sl. No. 342977 line I/V gland	0	0	0	0.000	0.000
193	Sl. No. 342977 line I/V D/S Flange	0	0	0	0.000	0.000
194	Sl. No. 342976 line I/V U/S Flange	0	0	0	0.000	0.000
195	Sl. No. 342976 line I/V gland	0	0	0	0.000	0.000
196	Sl. No. 342976 line I/V D/S Flange	0	0	0	0.000	0.000
197	Sl. No. 342971 line I/V U/S Flange	0	0	0	0.000	0.000
198	Sl. No. 342971 line I/V gland	0	0	0	0.000	0.000
199	Sl. No. 342971 line I/V D/S Flange	0	0	0	0.000	0.000
200	FG To 14-FF-01 Main Burner Sl.	0	0	0	0.000	0.000
201	FG To 14-FF-01 Main Burner Sl.	0	0	0	0.000	0.000
202	FG To 14-FF-01 Main Burner Sl.	0	0	0	0.000	0.000
203	Sl. No. 343005 line I/V U/S Flange	0	0	0	0.000	0.000
204	Sl. No. 343005 line I/V gland	0	0	0	0.000	0.000
205	Sl. No. 343005 line I/V D/S Flange	0	0	0	0.000	0.000
206	Sl. No. 342983 line I/V U/S Flange	0	0	0	0.000	0.000
207	Sl. No. 342983 line I/V gland	0	0	0	0.000	0.000
208	Sl. No. 342983 line I/V D/S Flange	0	0	0	0.000	0.000
209	Sl. No. 343003 line I/V U/S Flange	0	0	0	0.000	0.000
210	Sl. No. 343003 line I/V gland	0	0	0	0.000	0.000
211	Sl. No. 343003 line I/V D/S Flange	0	0	0	0.000	0.000
212	Sl. No. 342990 line I/V U/S Flange	0	0	0	0.000	0.000
213	Sl. No. 342990 line I/V gland	0	0	0	0.000	0.000
214	Sl. No. 342990 line I/V D/S Flange	0	0	0	0.000	0.000
215	14-UV-1801 line I/V U/S Flange	0	0	0	0.000	0.000
216	14-UV-1801 line I/V Gland	0	0	0	0.000	0.000
217	14-UV-1801 line I/V D/S Flange	0	0	0	0.000	0.000
218	14-UV-1802 line I/V U/S Flange	0	0	0	0.000	0.000
219	14-UV-1802 line I/V Gland	0	0	0	0.000	0.000
220	14-UV-1802 line I/V D/S Flange	0	0	0	0.000	0.000
221	Sl. No. 342943 line I/V U/S Flange	0	0	0	0.000	0.000
222	Sl. No. 342943 line I/V gland	0	0	0	0.000	0.000
223	Sl. No. 342943 line I/V D/S Flange	0	0	0	0.000	0.000
224	Sl. No. 342993 line I/V U/S Flange	0	0	0	0.000	0.000
225	Sl. No. 342993 line I/V gland	0	0	0	0.000	0.000
226	Sl. No. 342993 line I/V D/S Flange	0	0	0	0.000	0.000
227	14-PV-1801 line C/V U/S Flange	0	0	0	0.000	0.000
228	14-PV-1801 line C/V Gland	0	0	0	0.000	0.000
229	14-PV-1801 line C/V D/S Flange	0	0	0	0.000	0.000
230	15-FF-3 PILOT F.G. Line Sl. No. 3	0	0	0	0.000	0.000
231	15-FF-3 PILOT F.G. Line Sl. No. 4	0	0	0	0.000	0.000
232	15-FF-3 PILOT F.G. Line Sl. No. 5	0	0	0	0.000	0.000
233	Drain line I/V U/S Flange	0	0	0	0.000	0.000
234	Drain line I/V Gland	0	0	0	0.000	0.000
235	Drain line I/V D/S Flange	0	0	0	0.000	0.000
236	Sl. No. 342950 line I/V U/S Flange	0	0	0	0.000	0.000
237	Sl. No. 342950 line I/V gland	0	0	0	0.000	0.000
238	Sl. No. 342950 line I/V D/S Flange	0	0	0	0.000	0.000

FUGITIVE EMISSIONS SURVEY REPORT

[April 2021]



Client : NRL

ETS

Work Order No: 4300058771-BOR/12.04.2019

ETS/NRL/FUGITIVE/012/21

S/N	Component ID	AVERAGE READING LEL %	READING (%NG)	READING (ppm)	EPA Correlation <u>Kg/Hr/Source</u>	Total Emission kg/annum
239	Sl. No. 342973 line I/V U/S Flange	0	0	0	0.000	0.000
240	Sl. No. 342973 line I/V gland	0	0	0	0.000	0.000
241	Sl. No. 342973 line I/V D/S Flange	0	0	0	0.000	0.000
242	Sl. No. 342953 line I/V U/S Flange	0	0	0	0.000	0.000
243	Sl. No. 342953 line I/V gland	0	0	0	0.000	0.000
244	Sl. No. 342953 line I/V D/S Flange	0	0	0	0.000	0.000
245	Sl. No. 342960 line I/V U/S Flange	0	0	0	0.000	0.000
246	15-UV-2305 line C/V U/S Flange	0	0	0	0.000	0.000
247	15-UV-2305 line C/V Gland	0	0	0	0.000	0.000
248	15-UV-2305 line C/V D/S Flange	0	0	0	0.000	0.000
249	Sl. No. 342946 line I/V U/S Flange	0	0	0	0.000	0.000
250	Sl. No. 342946 line I/V gland	0	0	0	0.000	0.000
251	Sl. No. 342946 line I/V D/S Flange	0	0	0	0.000	0.000
252	15-UV-2304 line C/V U/S Flange	0	0	0	0.000	0.000
253	15-UV-2304 line C/V Gland	0	0	0	0.000	0.000
254	15-UV-2304 line C/V D/S Flange	0	0	0	0.000	0.000
255	Near 15-PT-2304 to PTY-2305	0	0	0	0.000	0.000
256	Near 15-PT-2304 to PTY-2305	0	0	0	0.000	0.000
257	Near 15-PT-2304 to PTY-2305	0	0	0	0.000	0.000
258	Drain line I/V Gland	0	0	0	0.000	0.000
259	Drain line Safety Flange	0	0	0	0.000	0.000
260	Near 15-PT-2304 to PTY-2305	0	0	0	0.000	0.000
261	Near 15-PT-2304 to PTY-2305	0	0	0	0.000	0.000
262	Near 15-PT-2304 to PTY-2305	0	0	0	0.000	0.000
263	15-PV-2301 U/S line I/V U/S Flange	0	0	0	0.000	0.000
264	15-PV-2301 U/S line I/V Gland	0	0	0	0.000	0.000
265	15-PV-2301 U/S line I/V D/S Flange	0	0	0	0.000	0.000
266	15-PV-2301 line C/V U/S Flange	0	0	0	0.000	0.000
267	15-PV-2301 line C/V Gland	0	0	0	0.000	0.000
268	15-PV-2301 line C/V D/S Flange	0	0	0	0.000	0.000
269	15-PV-2301 D/S line I/V U/S Flange	0	0	0	0.000	0.000
270	15-PV-2301 D/S line I/V Gland	0	0	0	0.000	0.000
271	15-PV-2301 D/S line I/V D/S Flange	0	0	0	0.000	0.000
272	Bypass line I/V U/S Flange	0	0	0	0.000	0.000
273	Bypass line I/V Gland	0	0	0	0.000	0.000
274	Bypass line I/V D/S Flange	0	0	0	0.000	0.000
275	15-UV-2301 line C/V U/S Flange	0	0	0	0.000	0.000
276	15-UV-2301 line C/V Gland	0	0	0	0.000	0.000
277	15-UV-2301 line C/V D/S Flange	0	0	0	0.000	0.000
278	15-FF-03 MAIN-FG To Sl. No. 34	0	0	0	0.000	0.000
279	15-FF-03 MAIN-FG To Sl. No. 35	0	0	0	0.000	0.000
280	15-FF-03 MAIN-FG To Sl. No. 36	0	0	0	0.000	0.000
281	Drain line I/V U/S Flange	0	0	0	0.000	0.000
282	Drain line I/V Gland	0	0	0	0.000	0.000
283	Drain line I/V D/S Flange	0	0	0	0.000	0.000
284	Sl. No. 343002 line I/V U/S Flange	0	0	0	0.000	0.000
285	Sl. No. 343002 line I/V gland	0	0	0	0.000	0.000
286	Sl. No. 343002 line I/V D/S Flange	0	0	0	0.000	0.000
287	Sl. No. 342986 line I/V U/S Flange	0	0	0	0.000	0.000
288	Sl. No. 342986 line I/V gland	0	0	0	0.000	0.000
289	Sl. No. 342986 line I/V D/S Flange	0	0	0	0.000	0.000
290	Sl. No. 342981 line I/V U/S Flange	0	0	0	0.000	0.000
291	Sl. No. 342981 line I/V gland	0	0	0	0.000	0.000
292	Sl. No. 342981 line I/V D/S Flange	0	0	0	0.000	0.000
293	Sl. No. 343001 line I/V U/S Flange	0	0	0	0.000	0.000
294	Sl. No. 343001 line I/V gland	0	0	0	0.000	0.000
295	Sl. No. 343001 line I/V D/S Flange	0	0	0	0.000	0.000
296	15-UV-2302 line C/V U/S Flange	0	0	0	0.000	0.000
297	15-UV-2302 line C/V Gland	0	0	0	0.000	0.000
298	15-UV-2302 line C/V D/S Flange	0	0	0	0.000	0.000
299	Sl. No. 342947 line I/V U/S Flange	0	0	0	0.000	0.000
300	Sl. No. 342947 line I/V gland	0	0	0	0.000	0.000
301	Sl. No. 342947 line I/V D/S Flange	0	0	0	0.000	0.000

FUGITIVE EMISSIONS SURVEY REPORT

[April 2021]



Client : NRL

ETS

Work Order No: 4300058771-BOR/12.04.2019

ETS/NRL/FUGITIVE/012/21

S/N	Component ID	AVERAGE READING LEL %	READING (%NG)	READING (ppm)	EPA Correlation Kg/Hr/Source	Total Emission kg/annum
AREA : BATTERY AREA		0	0	0	0.000	0.000
1	Fuel gas Inlet line U/S I/V U/S flange	0	0	0	0.000	0.000
2	Fuel gas Inlet line U/S I/V Gland	0	0	0	0.000	0.000
3	Fuel gas Inlet line U/S I/V D/S flange	0	0	0	0.000	0.000
4	Fuel gas Inlet line D/S I/V U/S flange	0	0	0	0.000	0.000
5	Fuel gas Inlet line D/S I/V Gland	0	0	0	0.000	0.000
6	Fuel gas Inlet line D/S I/V D/S flange	0	0	0	0.000	0.000
7	Sour gas outlet line U/S I/V U/S flange	0	0	0	0.000	0.000
8	Sour gas outlet line U/S I/V Gland	0	0	0	0.000	0.000
9	Sour gas outlet line U/S I/V D/S flange	0	0	0	0.000	0.000
10	Drain line I/V Gland	0	0	0	0.000	0.000
11	Drain line safety Flange	0	0	0	0.000	0.000
12	Sour gas outlet line D/S I/V U/S flange	0	0	0	0.000	0.000
13	Sour gas outlet line D/S I/V Gland	0	0	0	0.000	0.000
14	Sour gas outlet line D/S I/V D/S flange	0	0	0	0.000	0.000
15	LPG R/D outlet line U/S I/V U/S flange	0	0	0	0.000	0.000
16	LPG R/D outlet line U/S I/V Gland	0	0	0	0.000	0.000
17	LPG R/D outlet line U/S I/V D/S flange	0	0	0	0.000	0.000
18	Drain line I/V Gland	0	0	0	0.000	0.000
19	LPG R/D First I/V Gland	0	0	0	0.000	0.000
20	LPG R/D outlet line D/S I/V U/S flange	0	0	0	0.000	0.000
21	LPG R/D outlet line D/S I/V Gland	0	0	0	0.000	0.000
22	LPG R/D outlet line D/S I/V D/S flange	0	0	0	0.000	0.000
23	Hydrogen Rich Gas To PSA outlet	0	0	0	0.000	0.000
24	Hydrogen Rich Gas To PSA outlet	0	0	0	0.000	0.000
25	Hydrogen Rich Gas To PSA outlet	0	0	0	0.000	0.000
26	Drain line I/V Gland	0	0	0	0.000	0.000
27	Drain line safety Flange	0	0	0	0.000	0.000
28	NRV U/S Flange	0	0	0	0.000	0.000
29	NRV Top Flange	0	0	0	0.000	0.000
30	NRV D/S Flange	0	0	0	0.000	0.000
31	Hydrogen Rich Gas To PSA outlet line U/S I/V U/S flange	0	0	0	0.000	0.000
32	Hydrogen Rich Gas To PSA outlet line U/S I/V Gland	0	0	0	0.000	0.000
33	Hydrogen Rich Gas To PSA outlet line U/S I/V D/S flange	0	0	0	0.000	0.000
34	Hydrogen from PSA D/S line 1st I/V gland	30	1.5	15000	0.057	495.356
35	Hydrogen from PSA Inlet line U/S I/V Gland	0	0	0	0.000	0.000
36	Hydrogen from PSA Inlet line U/S I/V D/S Flange	0	0	0	0.000	0.000
37	NRV U/S Flange	0	0	0	0.000	0.000
38	NRV Top Flange	0	0	0	0.000	0.000
39	NRV D/S Flange	0	0	0	0.000	0.000
40	Drain line I/V Gland	0	0	0	0.000	0.000
41	Drain line safety Flange	0	0	0	0.000	0.000
42	Hydrogen from PSA Inlet line D/S I/V U/S Flange	0	0	0	0.000	0.000
43	Hydrogen from PSA Inlet line D/S I/V Gland	0	0	0	0.000	0.000
44	Hydrogen from PSA Inlet line D/S I/V D/S Flange	0	0	0	0.000	0.000
45	To 14-VV-01 S/U H. NAPTHA To	0	0	0	0.000	0.000
46	To 14-VV-01 S/U H. NAPTHA To	0	0	0	0.000	0.000
47	To 14-VV-01 S/U H. NAPTHA To	0	0	0	0.000	0.000
48	NRV U/S Flange	0	0	0	0.000	0.000
49	NRV Top Flange	0	0	0	0.000	0.000
50	NRV D/S Flange	0	0	0	0.000	0.000
51	Drain line I/V Gland	0	0	0	0.000	0.000
52	Drain line safety Flange	0	0	0	0.000	0.000
53	To 14-VV-01 S/U H. NAPTHA To	0	0	0	0.000	0.000
54	To 14-VV-01 S/U H. NAPTHA To	0	0	0	0.000	0.000
55	To 14-VV-01 S/U H. NAPTHA To	0	0	0	0.000	0.000
56	To 14-VV-01 S/U H. NAPTHA To	0	0	0	0.000	0.000
57	To 14-VV-01 S/U H. NAPTHA To	0	0	0	0.000	0.000
58	To 14-VV-01 S/U H. NAPTHA To	0	0	0	0.000	0.000
59	NRV U/S Flange	0	0	0	0.000	0.000
60	NRV Top Flange	0	0	0	0.000	0.000
61	NRV D/S Flange	0	0	0	0.000	0.000
62	Drain line I/V Gland	0	0	0	0.000	0.000

FUGITIVE EMISSIONS SURVEY REPORT

[April 2021]



Client : NRL

ETS

Work Order No: 4300058771-BOR/12.04.2019

ETS/NRL/FUGITIVE/012/21

S/N	Component ID	AVERAGE READING LEL %	READING (%NG)	READING (ppm)	EPA Correlation <u>Kg/Hr/Source</u>	Total Emission kg/annum
63	Drain line safety Flange	0	0	0	0.000	0.000
64	To 14-VV-01 S/U H. NAPTHA To	0	0	0	0.000	0.000
65	To 14-VV-01 S/U H. NAPTHA To	0	0	0	0.000	0.000
66	To 14-VV-01 S/U H. NAPTHA To	0	0	0	0.000	0.000
67	14-LV-1701 U/S line 1/V U/S Flange	0	0	0	0.000	0.000
68	14-LV-1701 U/S line 1/V Gland	0	0	0	0.000	0.000
69	14-LV-1701 U/S line 1/V D/S Flange	0	0	0	0.000	0.000
70	CDE line 1st 1/V Gland	0	0	0	0.000	0.000
71	CDE line 2nd 1/V Gland	0	0	0	0.000	0.000
72	Stainer Flange	0	0	0	0.000	0.000
73	CDE line 3rd 1/V Gland	0	0	0	0.000	0.000
74	14-LV-1701 C/V line U/S Flange	0	0	0	0.000	0.000
75	14-LV-1701 C/V line Gland	0	0	0	0.000	0.000
76	14-LV-1701 C/V line D/S Flange	0	0	0	0.000	0.000
77	14-LV-1701 D/S line 1/V U/S Flange	0	0	0	0.000	0.000
78	14-LV-1701 D/S line 1/V Gland	0	0	0	0.000	0.000
79	14-LV-1701 D/S line 1/V D/S Flange	0	0	0	0.000	0.000
80	Bypass line 1/V U/S Flange	0	0	0	0.000	0.000
81	Bypass line 1/V Gland	0	0	0	0.000	0.000
82	Bypass line 1/V D/S Flange	0	0	0	0.000	0.000
83	15-FV-1401 U/S line 1/V U./S Flange	0	0	0	0.000	0.000
84	15-FV-1401 U/S line 1/V Gland	0	0	0	0.000	0.000
85	15-FV-1401 U/S line 1/V D/S Flange	0	0	0	0.000	0.000
86	CDE line 1st 1/V Gland	0	0	0	0.000	0.000
87	CDE line 2nd 1/V Gland	0	0	0	0.000	0.000
88	Stainer Flange	0	0	0	0.000	0.000
89	CBD Drain line Top Flange	0	0	0	0.000	0.000
90	15-FV-1401 C/V line U./S Flange	0	0	0	0.000	0.000
91	15-FV-1401 C/V line Gland	0	0	0	0.000	0.000
92	15-FV-1401 C/V line D/S Flange	0	0	0	0.000	0.000
93	15-FV-1401 D/S line 1/V U./S Flange	0	0	0	0.000	0.000
94	15-FV-1401 D/S line 1/V Gland	0	0	0	0.000	0.000
95	15-FV-1401 D/S line 1/V D/S Flange	0	0	0	0.000	0.000
96	Bypass line 1/V U/S Flange	0	0	0	0.000	0.000
97	Bypass line 1/V Gland	0	0	0	0.000	0.000
98	Bypass line 1/V D/S Flange	0	0	0	0.000	0.000
99	15-PV-1401 U/S line 1/V U/S Flange	0	0	0	0.000	0.000
100	15-PV-1401 U/S line 1/V Gland	0	0	0	0.000	0.000
101	15-PV-1401 U/S line 1/V D/S Flange	0	0	0	0.000	0.000
102	15-PV-1401 C/V line U/S Flange	0	0	0	0.000	0.000
103	15-PV-1401 C/V line Gland	0	0	0	0.000	0.000
104	15-PV-1401 C/V line D/S Flange	0	0	0	0.000	0.000
105	15-PV-1401 D/S line 1/V U/S Flange	0	0	0	0.000	0.000
106	15-PV-1401 D/S line 1/V Gland	0	0	0	0.000	0.000
107	15-PV-1401 D/S line 1/V D/S Flange	0	0	0	0.000	0.000
108	To flare line 1st 1/V U/S Flange	0	0	0	0.000	0.000
109	To flare line 1st 1/V Gland	0	0	0	0.000	0.000
110	To flare line 1st 1/V D/S Flange	0	0	0	0.000	0.000
111	NRV U/S Flange	0	0	0	0.000	0.000
112	NRV Top Flange	0	0	0	0.000	0.000
113	NRV D/S Flange	0	0	0	0.000	0.000
114	Drain line 1/V Gland	0	0	0	0.000	0.000
115	Drain line safety Flange	0	0	0	0.000	0.000
116	To flare line 2nd 1/V U/S Flange	0	0	0	0.000	0.000
117	To flare line 2nd 1/V Gland	0	0	0	0.000	0.000
118	To flare line 2nd 1/V D/S Flange	0	0	0	0.000	0.000
119	To FG Header line 1st 1/V U/S Flange	0	0	0	0.000	0.000
120	To FG Header line 1st 1/V Gland	0	0	0	0.000	0.000
121	To FG Header line 1st 1/V D/S Flange	0	0	0	0.000	0.000
122	NRV Top Flange	0	0	0	0.000	0.000
123	NRV D/S Flange	0	0	0	0.000	0.000
124	Drain line 1/V Gland	0	0	0	0.000	0.000
125	Drain line safety Flange	0	0	0	0.000	0.000
126	To FG Header line 2nd 1/V U/S Flange	0	0	0	0.000	0.000

FUGITIVE EMISSIONS SURVEY REPORT

[April 2021]



Client : NRL

ETS

Work Order No: 4300058771-BOR/12.04.2019

ETS/NRL/FUGITIVE/012/21

S/N	Component ID	AVERAGE READING LEL %	READING (%NG)	READING (ppm)	EPA Correlation <u>Kg/Hr/Source</u>	Total Emission kg/annum
127	To FG Header line 2nd I/V Gland	0	0	0	0.000	0.000
128	To FG Header line 2nd I/V D/S Flange	0	0	0	0.000	0.000
	15-PA-CF-001A	0	0	0	0.000	0.000
129	Suction line I/V U/S Flange	0	0	0	0.000	0.000
130	Suction line I/V Gland	0	0	0	0.000	0.000
131	Suction line I/V D/S Flange	0	0	0	0.000	0.000
132	Stainer Top Flange	0	0	0	0.000	0.000
133	P.G. Meter line I/V Gland	0	0	0	0.000	0.000
134	Suction line Flange	0	0	0	0.000	0.000
135	Pump Seal	0	0	0	0.000	0.000
136	CBD line 1st I/V Gland	0	0	0	0.000	0.000
137	Stainer Flange	0	0	0	0.000	0.000
138	CBD line 2nd I/V Gland	0	0	0	0.000	0.000
139	Drain line I/V Gland	0	0	0	0.000	0.000
140	OWS Point	0	0	0	0.000	0.000
141	Discharge line U/S Flange	0	0	0	0.000	0.000
142	Meter line Flange	0	0	0	0.000	0.000
143	NRV U/S Flange	0	0	0	0.000	0.000
144	NRV Top Flange	0	0	0	0.000	0.000
145	NRV D/S Flange	0	0	0	0.000	0.000
146	Discharge line I/V U/S Flange	0	0	0	0.000	0.000
147	Discharge line I/V Gland	0	0	0	0.000	0.000
148	Discharge line I/V D/S Flange	0	0	0	0.000	0.000
	15-PA-CF-001B	0	0	0	0.000	0.000
149	Suction line I/V U/S Flange	0	0	0	0.000	0.000
150	Suction line I/V Gland	0	0	0	0.000	0.000
151	Suction line I/V D/S Flange	0	0	0	0.000	0.000
152	Stainer Top Flange	0	0	0	0.000	0.000
153	P.G. Meter line I/V Gland	0	0	0	0.000	0.000
154	Suction line Flange	0	0	0	0.000	0.000
155	Pump Seal	0	0	0	0.000	0.000
156	CBD line 1st I/V Gland	0	0	0	0.000	0.000
157	Stainer Flange	0	0	0	0.000	0.000
158	CBD line 2nd I/V Gland	0	0	0	0.000	0.000
159	Drain line I/V Gland	0	0	0	0.000	0.000
160	OWS Point	0	0	0	0.000	0.000
161	Discharge line U/S Flange	0	0	0	0.000	0.000
162	Meter line Flange	0	0	0	0.000	0.000
163	NRV U/S Flange	0	0	0	0.000	0.000
164	NRV Top Flange	0	0	0	0.000	0.000
165	NRV D/S Flange	0	0	0	0.000	0.000
166	Discharge line I/V U/S Flange	0	0	0	0.000	0.000
167	Discharge line I/V Gland	0	0	0	0.000	0.000
168	Discharge line I/V D/S Flange	0	0	0	0.000	0.000
169	15-PV-1301A U/S line I/V U/S Flange	0	0	0	0.000	0.000
170	15-PV-1301A U/S line I/V Gland	0	0	0	0.000	0.000
171	15-PV-1301A U/S line I/V D/S Flange	0	0	0	0.000	0.000
172	15-PV-1301A C/V line U/S Flange	0	0	0	0.000	0.000
173	15-PV-1301A C/V line Gland	0	0	0	0.000	0.000
174	15-PV-1301A C/V line D/S Flange	0	0	0	0.000	0.000
175	15-PV-1301A D/S line I/V U/S Flange	0	0	0	0.000	0.000
176	15-PV-1301A D/S line I/V Gland	20	1	10000	0.036	312.013
177	15-PV-1301A D/S line I/V D/S Flange	0	0	0	0.000	0.000
178	Bypass line I/V U/S Flange	0	0	0	0.000	0.000
179	Bypass line I/V Gland	0	0	0	0.000	0.000
180	Bypass line I/V D/S Flange	0	0	0	0.000	0.000
	15-PA-CF-002A	0	0	0	0.000	0.000
181	Suction line I/V U/S Flange	0	0	0	0.000	0.000
182	Suction line I/V Gland	0	0	0	0.000	0.000
183	Suction line I/V D/S Flange	0	0	0	0.000	0.000
184	Stainer Top Flange	0	0	0	0.000	0.000
185	P.G. Meter line I/V Gland	0	0	0	0.000	0.000
186	Suction line Flange	0	0	0	0.000	0.000
187	Pump Seal	0	0	0	0.000	0.000

FUGITIVE EMISSIONS SURVEY REPORT

[April 2021]



Client : NRL

ETS

Work Order No: 4300058771-BOR/12.04.2019

ETS/NRL/FUGITIVE/012/21

S/N	Component ID	AVERAGE READING LEL %	READING (%NG)	READING (ppm)	EPA Correlation <u>Kg/Hr/Source</u>	Total Emission kg/annum
188	CBD line 1st I/V Gland	0	0	0	0.000	0.000
189	Stainer Flange	0	0	0	0.000	0.000
190	CBD line 2nd I/V Gland	0	0	0	0.000	0.000
191	Drain line I/V Gland	0	0	0	0.000	0.000
192	OWS Point	0	0	0	0.000	0.000
193	Discharge line Flange	0	0	0	0.000	0.000
194	Meter line I/V Flange	0	0	0	0.000	0.000
195	NRV U/S Flange	0	0	0	0.000	0.000
196	NRV Top Flange	0	0	0	0.000	0.000
197	Discharge line I/V U/S Flange	0	0	0	0.000	0.000
198	Discharge line I/V Gland	0	0	0	0.000	0.000
199	Discharge line I/V D/S Flange	0	0	0	0.000	0.000
	15-PA-CF-002B	0	0	0	0.000	0.000
200	Suction line I/V U/S Flange	0	0	0	0.000	0.000
201	Suction line I/V Gland	0	0	0	0.000	0.000
202	Suction line I/V D/S Flange	0	0	0	0.000	0.000
203	Stainer Top Flange	0	0	0	0.000	0.000
204	P.G. Meter line I/V Gland	0	0	0	0.000	0.000
205	Suction line Flange	0	0	0	0.000	0.000
206	Pump Seal	0	0	0	0.000	0.000
207	CBD line 1st I/V Gland	0	0	0	0.000	0.000
208	CBD line 2nd I/V Gland	0	0	0	0.000	0.000
209	Stainer Flange	0	0	0	0.000	0.000
210	Drain line I/V Gland	0	0	0	0.000	0.000
211	OWS Point	0	0	0	0.000	0.000
212	Discharge line Flange	0	0	0	0.000	0.000
213	Meter line I/V Flange	0	0	0	0.000	0.000
214	NRV TOP Flange	0	0	0	0.000	0.000
215	NRV D/S Flange	0	0	0	0.000	0.000
216	Discharge line I/V U/S Flange	0	0	0	0.000	0.000
217	Discharge line I/V Gland	0	0	0	0.000	0.000
218	Discharge line I/V D/S Flange	0	0	0	0.000	0.000
219	15-FV-1503 U/S line I/V Gland	0	0	0	0.000	0.000
220	CBD line 1st I/V Gland	0	0	0	0.000	0.000
221	CBD line 2nd I/V Gland	0	0	0	0.000	0.000
222	Stainer Flange	0	0	0	0.000	0.000
223	CBD line 3rd I/V Gland	0	0	0	0.000	0.000
224	15-FV-1503 line c/v U/S flange	0	0	0	0.000	0.000
225	15-FV-1503 line c/v Gland	0	0	0	0.000	0.000
226	15-FV-1503 line c/v D/S flange	0	0	0	0.000	0.000
227	15-FV-1503 D/S line I/V Gland	0	0	0	0.000	0.000
228	Bypass line I/V Gland	0	0	0	0.000	0.000
	14-PACF-004A	0	0	0	0.000	0.000
229	Suction line I/V U/S Flange	0	0	0	0.000	0.000
230	Suction line I/V Gland	0	0	0	0.000	0.000
231	Suction line I/V D/S Flange	0	0	0	0.000	0.000
232	Stainer Top Flange	0	0	0	0.000	0.000
233	Suction line Flange	0	0	0	0.000	0.000
234	Pump Seal	0	0	0	0.000	0.000
235	Discharge line Flange	0	0	0	0.000	0.000
236	Meter line I/V Flange	0	0	0	0.000	0.000
237	NRV U/S Flange	0	0	0	0.000	0.000
238	NRV Top Flange	0	0	0	0.000	0.000
239	NRV D/S Flange	0	0	0	0.000	0.000
240	Discharge line I/V U/S Flange	0	0	0	0.000	0.000
241	Discharge line I/V Gland	0	0	0	0.000	0.000
242	Discharge line I/V D/S Flange	0	0	0	0.000	0.000
243	CBD line 1st I/V Gland	0	0	0	0.000	0.000
244	CBD line 2nd I/V Gland	0	0	0	0.000	0.000
245	Drain line I/V Gland	0	0	0	0.000	0.000
246	OWS Point	0	0	0	0.000	0.000
247	Stainer Flange	0	0	0	0.000	0.000
	14-PACF-004B	0	0	0	0.000	0.000
248	Suction line I/V U/S Flange	0	0	0	0.000	0.000

FUGITIVE EMISSIONS SURVEY REPORT

[April 2021]



Client : NRL

ETS

Work Order No: 4300058771-BOR/12.04.2019

ETS/NRL/FUGITIVE/012/21

S/N	Component ID	AVERAGE READING LEL %	READING (%NG)	READING (ppm)	EPA Correlation <u>Kg/Hr/Source</u>	Total Emission kg/annum
249	Suction line I/V Gland	0	0	0	0.000	0.000
250	Suction line I/V D/S Flange	0	0	0	0.000	0.000
251	Stainer Top Flange	0	0	0	0.000	0.000
252	Suction line Flange	0	0	0	0.000	0.000
253	Pump Seal	0	0	0	0.000	0.000
254	Discharge line Flange	0	0	0	0.000	0.000
255	Meter line I/V Flange	0	0	0	0.000	0.000
256	NRV U/S Flange	0	0	0	0.000	0.000
257	NRV Top Flange	0	0	0	0.000	0.000
258	NRV D/S Flange	0	0	0	0.000	0.000
259	Discharge line I/V U/S Flange	0	0	0	0.000	0.000
260	Discharge line I/V Gland	0	0	0	0.000	0.000
261	Discharge line I/V D/S Flange	0	0	0	0.000	0.000
262	CBD line 1st I/V Gland	0	0	0	0.000	0.000
263	CBD line 2nd I/V Gland	0	0	0	0.000	0.000
264	Stainer flange	0	0	0	0.000	0.000
265	CBD line 3rd I/V Gland	0	0	0	0.000	0.000
266	Drain line I/V Gland	0	0	0	0.000	0.000
267	OWS Point	0	0	0	0.000	0.000
	14-PACF-006A	0	0	0	0.000	0.000
268	Suction line I/V U/S Flange	0	0	0	0.000	0.000
269	Suction line I/V Gland	0	0	0	0.000	0.000
270	Suction line I/V D/S Flange	0	0	0	0.000	0.000
271	Stainer Top Flange	0	0	0	0.000	0.000
272	Suction line Flange	0	0	0	0.000	0.000
273	Pump Seal	0	0	0	0.000	0.000
274	Discharge line Flange	0	0	0	0.000	0.000
275	Meter line I/V gland	0	0	0	0.000	0.000
276	NRV U/S Flange	0	0	0	0.000	0.000
277	NRV Top Flange	0	0	0	0.000	0.000
278	NRV D/S Flange	0	0	0	0.000	0.000
279	Drain line I/V Gland	0	0	0	0.000	0.000
280	Drain line safety Flange	0	0	0	0.000	0.000
281	Discharge line I/V U/S Flange	0	0	0	0.000	0.000
282	Discharge line I/V Gland	0	0	0	0.000	0.000
283	Discharge line I/V D/S Flange	0	0	0	0.000	0.000
284	Pump To CBD line 1st I/V U/S Flange	0	0	0	0.000	0.000
285	Pump To CBD line 1st I/V Gland	0	0	0	0.000	0.000
286	Pump To CBD line 1st I/V D/S Flange	0	0	0	0.000	0.000
287	Pump To CBD line 2nd I/V Gland	0	0	0	0.000	0.000
288	Stainer Flange	0	0	0	0.000	0.000
289	Pump To CBD line 3rd I/V Gland	0	0	0	0.000	0.000
290	OWS Point	0	0	0	0.000	0.000
	14-PACF-006B	0	0	0	0.000	0.000
291	Suction line I/V U/S Flange	0	0	0	0.000	0.000
292	Suction line I/V Gland	0	0	0	0.000	0.000
293	Suction line I/V D/S Flange	0	0	0	0.000	0.000
294	Stainer Top Flange	0	0	0	0.000	0.000
295	Suction line Flange	0	0	0	0.000	0.000
296	Pump Seal	0	0	0	0.000	0.000
297	Discharge line Flange	0	0	0	0.000	0.000
298	Meter line I/V gland	0	0	0	0.000	0.000
299	NRV U/S Flange	0	0	0	0.000	0.000
300	NRV Top Flange	0	0	0	0.000	0.000
301	NRV D/S Flange	0	0	0	0.000	0.000
302	Drain line I/V Gland	0	0	0	0.000	0.000
303	Drain line safety Flange	0	0	0	0.000	0.000
304	Discharge line I/V U/S Flange	0	0	0	0.000	0.000
305	Discharge line I/V Gland	0	0	0	0.000	0.000
306	Discharge line I/V D/S Flange	0	0	0	0.000	0.000
307	Pump To CBD line 1st I/V U/S Flange	0	0	0	0.000	0.000
308	Pump To CBD line 1st I/V Gland	0	0	0	0.000	0.000
309	Pump To CBD line 1st I/V D/S Flange	0	0	0	0.000	0.000
310	Pump To CBD line 2nd I/V Gland	0	0	0	0.000	0.000

FUGITIVE EMISSIONS SURVEY REPORT

[April 2021]



Client : NRL

ETS

Work Order No: 4300058771-BOR/12.04.2019

ETS/NRL/FUGITIVE/012/21

S/N	Component ID	AVERAGE READING LEL %	READING (%NG)	READING (ppm)	EPA Correlation <u>Kg/Hr/Source</u>	Total Emission kg/annum
311	Stainer Flange	0	0	0	0.000	0.000
312	Pump To CBD line 3rd I/V Gland	0	0	0	0.000	0.000
313	OWS Point	0	0	0	0.000	0.000
314	14-FV-1103 U/S line I/V U/S Flange	0	0	0	0.000	0.000
315	14-FV-1103 U/S line I/V Gland	0	0	0	0.000	0.000
316	14-FV-1103 U/S line I/V D/S Flange	0	0	0	0.000	0.000
317	Drain line 1st I/V Gland	0	0	0	0.000	0.000
318	Drain line 2nd I/V Gland	0	0	0	0.000	0.000
319	Stainer Flange	0	0	0	0.000	0.000
320	Drain line 3rd I/V Gland	0	0	0	0.000	0.000
321	14-FV-1103 C/V line U/S Flange	0	0	0	0.000	0.000
322	14-FV-1103 C/V line Gland	0	0	0	0.000	0.000
323	14-FV-1103 C/V line D/S Flange	0	0	0	0.000	0.000
324	14-FV-1103 D/S line I/V U/S Flange	0	0	0	0.000	0.000
325	14-FV-1103 D/S line I/V Gland	0	0	0	0.000	0.000
326	14-FV-1103 D/S line I/V D/S Flange	0	0	0	0.000	0.000
327	Bypass line I/V U/S Flange	0	0	0	0.000	0.000
328	Bypass line I/V Gland	0	0	0	0.000	0.000
329	Bypass line I/V D/S Flange	0	0	0	0.000	0.000
330	14-UV-1101 CV U/S Flange	0	0	0	0.000	0.000
331	14-UV-1101 CV Gland	0	0	0	0.000	0.000
332	14-UV-1101 CV D/S Flange	0	0	0	0.000	0.000
	14-PA-CF-001A	0	0	0	0.000	0.000
333	Suction line I/V U/S Flange	0	0	0	0.000	0.000
334	Suction line I/V Gland	0	0	0	0.000	0.000
335	Suction line I/V D/S Flange	0	0	0	0.000	0.000
336	Stainer Top Flange	0	0	0	0.000	0.000
337	Drain line I/V Gland	0	0	0	0.000	0.000
338	Drain line stainer Flange	0	0	0	0.000	0.000
339	Suction line Flange	0	0	0	0.000	0.000
340	Pump Seal	0	0	0	0.000	0.000
341	Discharge line Flange	0	0	0	0.000	0.000
342	Meter line I/V gland	0	0	0	0.000	0.000
343	NRV U/S Flange	0	0	0	0.000	0.000
344	NRV Top Flange	0	0	0	0.000	0.000
345	NRV D/S Flange	0	0	0	0.000	0.000
346	Drain line I/V Gland	0	0	0	0.000	0.000
347	Drain line stainer Flange	0	0	0	0.000	0.000
348	Discharge line I/V U/S Flange	0	0	0	0.000	0.000
349	Discharge line I/V Gland	0	0	0	0.000	0.000
350	Discharge line I/V D/S Flange	0	0	0	0.000	0.000
351	Pump To CBD line 1st I/V Gland	0	0	0	0.000	0.000
352	Pump To CBD line 2nd I/V Gland	0	0	0	0.000	0.000
353	Stainer flange	0	0	0	0.000	0.000
354	Pump To CBD line 3rd I/V Gland	0	0	0	0.000	0.000
355	OWS Point	0	0	0	0.000	0.000
	14-PA-CF-001B	0	0	0	0.000	0.000
356	Suction line I/V U/S Flange	0	0	0	0.000	0.000
357	Suction line I/V Gland	0	0	0	0.000	0.000
358	Suction line I/V D/S Flange	0	0	0	0.000	0.000
359	Stainer Top Flange	0	0	0	0.000	0.000
360	Drain line I/V Gland	0	0	0	0.000	0.000
361	Drain line stainer Flange	0	0	0	0.000	0.000
362	Suction line Flange	0	0	0	0.000	0.000
363	Pump Seal	0	0	0	0.000	0.000
364	Discharge line Flange	0	0	0	0.000	0.000
365	Meter line I/V gland	0	0	0	0.000	0.000
366	NRV U/S Flange	0	0	0	0.000	0.000
367	NRV Top Flange	0	0	0	0.000	0.000
368	NRV D/S Flange	0	0	0	0.000	0.000
369	Drain line I/V Gland	0	0	0	0.000	0.000
370	Drain line stainer Flange	0	0	0	0.000	0.000
371	Discharge line I/V U/S Flange	0	0	0	0.000	0.000
372	Discharge line I/V Gland	0	0	0	0.000	0.000

FUGITIVE EMISSIONS SURVEY REPORT

[April 2021]



Client : NRL

ETS

Work Order No: 4300058771-BOR/12.04.2019

ETS/NRL/FUGITIVE/012/21

S/N	Component ID	AVERAGE READING LEL %	READING (%NG)	READING (ppm)	EPA Correlation <u>Kg/Hr/Source</u>	Total Emission kg/annum
373	Discharge line I/V D/S Flange	0	0	0	0.000	0.000
374	Pump To CBD line 1st I/V Gland	0	0	0	0.000	0.000
375	Pump To CBD line 2nd I/V Gland	0	0	0	0.000	0.000
376	Stainer flange	0	0	0	0.000	0.000
377	Pump To CBD line 3rd I/V Gland	0	0	0	0.000	0.000
378	OWS Point	0	0	0	0.000	0.000
379	NAPTHA to SLOP U/S line I/V U/S Flange	0	0	0	0.000	0.000
380	NAPTHA to SLOP U/S line I/V Gland	0	0	0	0.000	0.000
381	NAPTHA to SLOP U/S line I/V D/S Flange	0	0	0	0.000	0.000
382	NRV U/S Flange	0	0	0	0.000	0.000
383	NRV Top Flange	0	0	0	0.000	0.000
384	NRV D/S Flange	0	0	0	0.000	0.000
385	Drain line I/V Gland	0	0	0	0.000	0.000
386	Drain line safety Flange	0	0	0	0.000	0.000
387	NAPTHA to SLOP D/S line I/V U/S Flange	0	0	0	0.000	0.000
388	NAPTHA to SLOP D/S line I/V Gland	0	0	0	0.000	0.000
389	NAPTHA to SLOP D/S line I/V D/S Flange	0	0	0	0.000	0.000
390	Splitter Reflux To SLOP U/S line	0	0	0	0.000	0.000
391	Splitter Reflux To SLOP U/S line	0	0	0	0.000	0.000
392	Splitter Reflux To SLOP U/S line	0	0	0	0.000	0.000
393	NRV U/S Flange	0	0	0	0.000	0.000
394	NRV Top Flange	0	0	0	0.000	0.000
395	NRV D/S Flange	0	0	0	0.000	0.000
396	Drain line I/V Gland	0	0	0	0.000	0.000
397	Drain line safety Flange	0	0	0	0.000	0.000
398	Splitter Reflux To SLOP D/S line	0	0	0	0.000	0.000
399	Splitter Reflux To SLOP D/S line	0	0	0	0.000	0.000
400	Splitter Reflux To SLOP D/S line	0	0	0	0.000	0.000
401	2nd I/V U/S Flange	0	0	0	0.000	0.000
402	2nd I/V gland	0	0	0	0.000	0.000
403	2nd I/V D/S Flange	0	0	0	0.000	0.000
404	Splitter Reflux To SLOP U/S line	0	0	0	0.000	0.000
405	Splitter Reflux To SLOP U/S line	0	0	0	0.000	0.000
406	Splitter Reflux To SLOP U/S line	0	0	0	0.000	0.000
407	Splitter Reflux To SLOP U/S line	0	0	0	0.000	0.000
408	Splitter Reflux To SLOP U/S line	0	0	0	0.000	0.000
409	Splitter Reflux To SLOP U/S line	0	0	0	0.000	0.000
410	NRV U/S Flange	0	0	0	0.000	0.000
411	NRV Top Flange	0	0	0	0.000	0.000
412	NRV D/S Flange	0	0	0	0.000	0.000
413	Drain line I/V Gland	0	0	0	0.000	0.000
414	Drain line safety Flange	0	0	0	0.000	0.000
415	Splitter Reflux To SLOP D/S line	0	0	0	0.000	0.000
416	Splitter Reflux To SLOP D/S line	0	0	0	0.000	0.000
417	Splitter Reflux To SLOP D/S line	0	0	0	0.000	0.000
418	Hydrogen Rich gas From unit 15	0	0	0	0.000	0.000
419	Hydrogen Rich gas From unit 15	0	0	0	0.000	0.000
420	Hydrogen Rich gas From unit 15	0	0	0	0.000	0.000
421	NRV U/S Flange	0	0	0	0.000	0.000
422	NRV Top Flange	0	0	0	0.000	0.000
423	NRV D/S Flange	0	0	0	0.000	0.000
424	Drain line I/V Gland	0	0	0	0.000	0.000
425	Drain line safety Flange	0	0	0	0.000	0.000
426	Hydrogen Rich gas From unit 15	0	0	0	0.000	0.000
427	Hydrogen Rich gas From unit 15	0	0	0	0.000	0.000
428	Hydrogen Rich gas From unit 15	0	0	0	0.000	0.000
429	Hydrogen From PSA To 16-VV-2	0	0	0	0.000	0.000
430	Hydrogen From PSA To 16-VV-2	0	0	0	0.000	0.000
431	Hydrogen From PSA To 16-VV-2	0	0	0	0.000	0.000
432	NRV U/S Flange	0	0	0	0.000	0.000
433	NRV Top Flange	0	0	0	0.000	0.000
434	NRV D/S Flange	0	0	0	0.000	0.000
435	Drain line I/V Gland	0	0	0	0.000	0.000
436	Drain line safety Flange	0	0	0	0.000	0.000

FUGITIVE EMISSIONS SURVEY REPORT

[April 2021]



Client : NRL

ETS

Work Order No: 4300058771-BOR/12.04.2019

ETS/NRL/FUGITIVE/012/21

S/N	Component ID	AVERAGE READING LEL %	READING (%NG)	READING (ppm)	EPA Correlation <u>Kg/Hr/Source</u>	Total Emission kg/annum
437	Hydrogen From PSA To 16-VV-2	0	0	0	0.000	0.000
438	Hydrogen From PSA To 16-VV-2	0	0	0	0.000	0.000
439	Hydrogen From PSA To 16-VV-2	0	0	0	0.000	0.000
440	14-FV-1501-CV U/S I/V U/S Flange	0	0	0	0.000	0.000
441	14-FV-1501-CV U/S I/V Gland	0	0	0	0.000	0.000
442	14-FV-1501-CV U/S I/V D/S Flange	0	0	0	0.000	0.000
443	CBD line 1st I/V Gland	0	0	0	0.000	0.000
444	CBD line 2ND I/V Gland	0	0	0	0.000	0.000
445	CBD line 3RD I/V Gland	0	0	0	0.000	0.000
446	Stainer flange	0	0	0	0.000	0.000
447	14-FV-1501-CV U/S Flange	0	0	0	0.000	0.000
448	14-FV-1501-CV Gland	0	0	0	0.000	0.000
449	14-FV-1501-CV D/S Flange	0	0	0	0.000	0.000
450	14-FV-1501-CV D/S I/V U/S Flange	0	0	0	0.000	0.000
451	14-FV-1501-CV D/S I/V Gland	0	0	0	0.000	0.000
452	14-FV-1501-CV D/S I/V D/S Flange	0	0	0	0.000	0.000
453	Bypass line I/V U/S Flange	0	0	0	0.000	0.000
454	Bypass line I/V Gland	0	0	0	0.000	0.000
455	Bypass line I/V D/S Flange	0	0	0	0.000	0.000
456	From 14-PA-4 A/B to SLOP 1st I/V	0	0	0	0.000	0.000
457	From 14-PA-4 A/B to SLOP 1st I/V	0	0	0	0.000	0.000
458	From 14-PA-4 A/B to SLOP 1st I/V	0	0	0	0.000	0.000
459	From 14-PA-4 A/B to SLOP 2nd I/V	0	0	0	0.000	0.000
460	From 14-PA-4 A/B to SLOP 2nd I/V	0	0	0	0.000	0.000
461	14-FV-1701 U/S I/V U/S Flange	0	0	0	0.000	0.000
462	14-FV-1701 U/S I/V Gland	0	0	0	0.000	0.000
463	14-FV-1701 U/S I/V D/S Flange	0	0	0	0.000	0.000
464	CBD line 1st I/V Gland	0	0	0	0.000	0.000
465	CBD line 2ND I/V Gland	0	0	0	0.000	0.000
466	CBD line 3RD I/V Gland	0	0	0	0.000	0.000
467	Stainer flange	0	0	0	0.000	0.000
468	14-FV-1701 C/V U/S Flange	0	0	0	0.000	0.000
469	14-FV-1701 C/V Gland	0	0	0	0.000	0.000
470	14-FV-1701 C/V D/S Flange	0	0	0	0.000	0.000
471	14-FV-1701 D/S I/V U/S Flange	0	0	0	0.000	0.000
472	14-FV-1701 D/S I/V Flange	0	0	0	0.000	0.000
473	14-FV-1701 D/S I/V D/S Flange	0	0	0	0.000	0.000
474	Bypass line I/V U/S Flange	0	0	0	0.000	0.000
475	14-FV-1401 U/S I/V U/S Flange	0	0	0	0.000	0.000
476	14-FV-1401 U/S I/V Gland	0	0	0	0.000	0.000
477	14-FV-1401 U/S I/V D/S Flange	0	0	0	0.000	0.000
478	CBD line 1st I/V Gland	0	0	0	0.000	0.000
479	CBD line 2ND I/V Gland	0	0	0	0.000	0.000
480	CBD line 3RD I/V Gland	0	0	0	0.000	0.000
481	Stainer flange	0	0	0	0.000	0.000
482	14-FV-1401 C/V U/S Flange	0	0	0	0.000	0.000
483	14-FV-1401 C/V Gland	0	0	0	0.000	0.000
484	14-FV-1401 C/V D/S Flange	0	0	0	0.000	0.000
485	14-FV-1401 D/S I/V U/S Flange	0	0	0	0.000	0.000
486	14-FV-1401 D/S I/V Flange	0	0	0	0.000	0.000
487	14-FV-1401 D/S I/V D/S Flange	0	0	0	0.000	0.000
488	Bypass line I/V U/S Flange	0	0	0	0.000	0.000
489	Bypass line I/V Gland	0	0	0	0.000	0.000
490	Bypass line I/V D/S Flange	0	0	0	0.000	0.000
491	From 14-PA-CF-001 Start Up line	0	0	0	0.000	0.000
492	From 14-PA-CF-001 Start Up line	0	0	0	0.000	0.000
493	From 14-PA-CF-001 Start Up line	0	0	0	0.000	0.000
494	Hydrogen From unit 15 1st I/V	0	0	0	0.000	0.000
495	Stainer flange	0	0	0	0.000	0.000
496	Top flange	0	0	0	0.000	0.000
497	Drain line I/V Gland	0	0	0	0.000	0.000
498	Drain line safety Flange	0	0	0	0.000	0.000
499	Hydrogen From unit 15 2nd I/V	0	0	0	0.000	0.000
500	14-FV-1402 M/U to 14-VV-03 U/S	0	0	0	0.000	0.000

FUGITIVE EMISSIONS SURVEY REPORT

[April 2021]



Client : NRL

ETS

Work Order No: 4300058771-BOR/12.04.2019

ETS/NRL/FUGITIVE/012/21

S/N	Component ID	AVERAGE READING LEL %	READING (%NG)	READING (ppm)	EPA Correlation Kg/Hr/Source	Total Emission kg/annum
501	CBD line I/V Gland	0	0	0	0.000	0.000
502	14-FV-1402 C/V U/S Gland	0	0	0	0.000	0.000
503	14-FV-1402 C/V Gland	0	0	0	0.000	0.000
504	CBD line I/V Gland	0	0	0	0.000	0.000
505	14-FV-1402 D/S I/V Gland	0	0	0	0.000	0.000
506	Bypass line I/V Gland	0	0	0	0.000	0.000
507	Heavy Naptha From Unit 14 line	0	0	0	0.000	0.000
508	Heavy Naptha From Unit 14 line	0	0	0	0.000	0.000
509	Heavy Naptha From Unit 14 line	0	0	0	0.000	0.000
510	Heavy Naptha From Unit 14 line	0	0	0	0.000	0.000
511	Heavy Naptha From Unit 14 line	0	0	0	0.000	0.000
512	Feed Naptha To Unit 15 line U/S	0	0	0	0.000	0.000
513	Feed Naptha To Unit 15 line U/S	0	0	0	0.000	0.000
514	Feed Naptha To Unit 15 line U/S	0	0	0	0.000	0.000
515	NRV U/S Flange	0	0	0	0.000	0.000
516	NRV Top Flange	0	0	0	0.000	0.000
517	NRV D/S Flange	0	0	0	0.000	0.000
518	Drain line I/V Gland	0	0	0	0.000	0.000
519	Drain line safety Flange	0	0	0	0.000	0.000
520	Feed Naptha To Unit 15 line D/S	0	0	0	0.000	0.000
521	Feed Naptha To Unit 15 line D/S	0	0	0	0.000	0.000
522	Feed Naptha To Unit 15 line D/S	0	0	0	0.000	0.000
523	S/U line (Reaction Section BP) line	0	0	0	0.000	0.000
524	S/U line (Reaction Section BP) line	0	0	0	0.000	0.000
525	S/U line (Reaction Section BP) line	0	0	0	0.000	0.000
526	S/U line (Reaction Section BP) line	0	0	0	0.000	0.000
527	S/U line (Reaction Section BP) line	0	0	0	0.000	0.000
528	Hydrogen From PSA To 15-KA-0	0	0	0	0.000	0.000
529	Hydrogen From PSA To 15-KA-0	0	0	0	0.000	0.000
530	Hydrogen From PSA To 15-KA-0	0	0	0	0.000	0.000
531	NRV U/S Flange	0	0	0	0.000	0.000
532	NRV Top Flange	0	0	0	0.000	0.000
533	NRV D/S Flange	0	0	0	0.000	0.000
534	Drain line I/V Gland	0	0	0	0.000	0.000
535	Drain line safety Flange	0	0	0	0.000	0.000
536	Hydrogen From PSA To 15-KA-0	0	0	0	0.000	0.000
537	Hydrogen From PSA To 15-KA-0	0	0	0	0.000	0.000
538	Hydrogen From PSA To 15-KA-0	0	0	0	0.000	0.000
539	From 16-KA-001 A/B To 15-KA-0	0	0	0	0.000	0.000
540	From 16-KA-001 A/B To 15-KA-0	0	0	0	0.000	0.000
541	From 16-KA-001 A/B To 15-KA-0	0	0	0	0.000	0.000
542	NRV U/S Flange	0	0	0	0.000	0.000
543	NRV Top Flange	0	0	0	0.000	0.000
544	NRV D/S Flange	0	0	0	0.000	0.000
545	Vrain line I/V Gland	0	0	0	0.000	0.000
546	Vrain line Safety Gland	0	0	0	0.000	0.000
547	From 16-KA-001 A/B To 15-KA-0	0	0	0	0.000	0.000
548	From 16-KA-001 A/B To 15-KA-0	0	0	0	0.000	0.000
549	From 16-KA-001 A/B To 15-KA-0	0	0	0	0.000	0.000
550	To-15-KA-001 Seal line U/S I/V U/S Flange	0	0	0	0.000	0.000
551	To-15-KA-001 Seal line U/S I/V Gland	0	0	0	0.000	0.000
552	To-15-KA-001 Seal line U/S I/V D/S Flange	0	0	0	0.000	0.000
553	NRV U/S Flange	0	0	0	0.000	0.000
554	NRV Top Flange	0	0	0	0.000	0.000
555	NRV D/S Flange	0	0	0	0.000	0.000
556	To-15-KA-001 Seal line D/S I/V U/S Flange	0	0	0	0.000	0.000
557	To-15-KA-001 Seal line D/S I/V Gland	0	0	0	0.000	0.000
558	To-15-KA-001 Seal line D/S I/V D/S Flange	0	0	0	0.000	0.000
Unit: HCU						
AREA: B/L		0	0	0	0.000	0.000
1	S/N Naptha inlet line I/V U/S Flange	0	0	0	0.000	0.000
2	S/N Naptha inlet line I/V Gland	0	0	0	0.000	0.000
3	S/N Naptha inlet line I/V D/S Flange	0	0	0	0.000	0.000
4	Drain line I/V Gland	0	0	0	0.000	0.000

FUGITIVE EMISSIONS SURVEY REPORT

[April 2021]



Client : NRL

ETS

Work Order No: 4300058771-BOR/12.04.2019

ETS/NRL/FUGITIVE/012/21

S/N	Component ID	AVERAGE READING LEL %	READING (%NG)	READING (ppm)	EPA Correlation <u>Kg/Hr/Source</u>	Total Emission kg/annum
5	Drain line Safety Flange	0	0	0	0.000	0.000
6	NRV U/S Flange	0	0	0	0.000	0.000
7	NRV Top Flange	0	0	0	0.000	0.000
8	NRV D/S Flange	0	0	0	0.000	0.000
9	S/U LPG inlet line 1st I/V U/S Flange	0	0	0	0.000	0.000
10	S/U LPG inlet line 1st I/V Gland	0	0	0	0.000	0.000
11	S/U LPG inlet line 1st I/V D/S Flange	0	0	0	0.000	0.000
12	S/U LPG inlet line 2nd I/V U/S Flange	0	0	0	0.000	0.000
13	S/U LPG inlet line 2nd I/V Gland	0	0	0	0.000	0.000
14	S/U LPG inlet line 2nd I/V D/S Flange	0	0	0	0.000	0.000
15	C.L.P.S. Gas out let line 1st I/V U/S Flange	0	0	0	0.000	0.000
16	C.L.P.S. Gas out let line 1st I/V Gland	0	0	0	0.000	0.000
17	C.L.P.S. Gas out let line 1st I/V D/S Flange	0	0	0	0.000	0.000
18	Drain line I/V Gland	0	0	0	0.000	0.000
19	Drain line Safety Flange	0	0	0	0.000	0.000
20	C.L.P.S. Gas out let line 2nd I/V U/S Flange	0	0	0	0.000	0.000
21	C.L.P.S. Gas out let line 2nd I/V Gland	0	0	0	0.000	0.000
22	C.L.P.S. Gas out let line 2nd I/V D/S Flange	0	0	0	0.000	0.000
23	Sour Gas inlet line 1st I/V U/S Flange	0	0	0	0.000	0.000
24	Sour Gas inlet line 1st I/V Gland	0	0	0	0.000	0.000
25	Sour Gas inlet line 1st I/V D/S Flange	0	0	0	0.000	0.000
26	Sour Gas inlet line 2nd I/V U/S Flange	0	0	0	0.000	0.000
27	Sour Gas inlet line 2nd I/V Gland	0	0	0	0.000	0.000
28	Sour Gas inlet line 2nd I/V D/S Flange	0	0	0	0.000	0.000
29	Drain line I/V Gland	0	0	0	0.000	0.000
30	Drain line Safety Flange	0	0	0	0.000	0.000
31	LPG Product outlet line I/V U/S Flange	0	0	0	0.000	0.000
32	LPG Product outlet line I/V Gland	0	0	0	0.000	0.000
33	LPG Product outlet line I/V D/S Flange	0	0	0	0.000	0.000
34	Drain line I/V Gland	0	0	0	0.000	0.000
35	Drain line Safety Flange	0	0	0	0.000	0.000
36	NRV U/S Flange	0	0	0	0.000	0.000
37	NRV Top Flange	0	0	0	0.000	0.000
38	NRV D/S Flange	0	0	0	0.000	0.000
39	Verin line I/V Gland	0	0	0	0.000	0.000
40	Verin line Safety Flange	0	0	0	0.000	0.000
41	NAPTHA PRODUCT out let line 1st I/V U/S Flang	0	0	0	0.000	0.000
42	NAPTHA PRODUCT out let line 1st I/V Gland	0	0	0	0.000	0.000
43	NAPTHA PRODUCT out let line 1st I/V D/S Flang	0	0	0	0.000	0.000
44	NRV U/S Flange	0	0	0	0.000	0.000
45	NRV Top Flange	0	0	0	0.000	0.000
46	NRV D/S Flange	0	0	0	0.000	0.000
47	Drain line I/V Gland	0	0	0	0.000	0.000
48	Drain line Safety Flange	0	0	0	0.000	0.000
49	NAPTHA PRODUCT out let line 2nd I/V U/S Flang	0	0	0	0.000	0.000
50	NAPTHA PRODUCT out let line I/V Gland	0	0	0	0.000	0.000
51	NAPTHA PRODUCT out let line I/V D/S Flange	0	0	0	0.000	0.000
52	LIGHT NAPTHA TO NRMT out let line 1st I/V U/	0	0	0	0.000	0.000
53	LIGHT NAPTHA TO NRMT out let line 1st I/V Gl	0	0	0	0.000	0.000
54	LIGHT NAPTHA TO NRMT out let line 1st I/V D/	0	0	0	0.000	0.000
55	NRV U/S Flange	0	0	0	0.000	0.000
56	NRV Top Flange	0	0	0	0.000	0.000
57	NRV D/S Flange	0	0	0	0.000	0.000
58	Drain line I/V Gland	0	0	0	0.000	0.000
59	Drain line Safety Flange	0	0	0	0.000	0.000
60	LIGHT NAPTHA TO NRMT out let line 2nd I/V U	0	0	0	0.000	0.000
61	LIGHT NAPTHA TO NRMT out let line 2nd I/V G	0	0	0	0.000	0.000
62	LIGHT NAPTHA TO NRMT out let line 2nd I/V D	0	0	0	0.000	0.000
63	LPG outlet line I/V U/S Flange	0	0	0	0.000	0.000
64	LPG outlet line I/V Gland	0	0	0	0.000	0.000
65	LPG outlet line I/V D/S Flange	0	0	0	0.000	0.000
66	Drain line I/V Gland	0	0	0	0.000	0.000
67	Drain line Safety Flange	0	0	0	0.000	0.000
68	Inert Gas inlet line 1st I/V U/S Flange	0	0	0	0.000	0.000

FUGITIVE EMISSIONS SURVEY REPORT

[April 2021]



Client : NRL

ETS

Work Order No: 4300058771-BOR/12.04.2019

ETS/NRL/FUGITIVE/012/21

S/N	Component ID	AVERAGE READING LEL %	READING (%NG)	READING (ppm)	EPA Correlation <u>Kg/Hr/Source</u>	Total Emission kg/annum
69	Inert Gas inlet line 1st I/V Gland	0	0	0	0.000	0.000
70	Inert Gas inlet line 1st I/V D/S Flange	0	0	0	0.000	0.000
71	Inert Gas inlet line 2nd I/V U/S Flange	0	0	0	0.000	0.000
72	Inert Gas inlet line 2nd I/V Gland	0	0	0	0.000	0.000
73	Inert Gas inlet line 2nd I/V D/S Flange	0	0	0	0.000	0.000
74	Fuel Gas from SRB inlet line 1st I/V U/S Flange	0	0	0	0.000	0.000
75	Fuel Gas from SRB inlet line 1st I/V Gland	0	0	0	0.000	0.000
76	Fuel Gas from SRB inlet line 1st I/V D/S Flange	0	0	0	0.000	0.000
77	Fuel Gas from SRB inlet line 2nd I/V U/S Flange	0	0	0	0.000	0.000
78	Fuel Gas from SRB inlet line 2nd I/V Gland	0	0	0	0.000	0.000
79	Fuel Gas from SRB inlet line 2nd I/V D/S Flange	0	0	0	0.000	0.000
80	LP STEAM inlet line 1st I/V U/S Flange	0	0	0	0.000	0.000
81	LP STEAM inlet line 1st I/V Gland	0	0	0	0.000	0.000
82	LP STEAM inlet line 1st I/V D/S Flange	0	0	0	0.000	0.000
83	LP STEAM inlet line 2nd I/V U/S Flange	0	0	0	0.000	0.000
84	LP STEAM inlet line 2nd I/V Gland	0	0	0	0.000	0.000
85	LP STEAM inlet line 2nd I/V D/S Flange	0	0	0	0.000	0.000
	04-PA-052A	0	0	0	0.000	0.000
86	Suction line I/V U/S Flange	0	0	0	0.000	0.000
87	Suction line I/V Gland	0	0	0	0.000	0.000
88	Suction line I/V D/S Flange	0	0	0	0.000	0.000
89	Stainer Top Flange	0	0	0	0.000	0.000
90	Stainer Top Flange Drain line I/V Gland	0	0	0	0.000	0.000
91	Stainer Top Flange Drain line safety flange	0	0	0	0.000	0.000
92	Suction line Flange	0	0	0	0.000	0.000
93	Pump Seal	0	0	0	0.000	0.000
94	Discharge line flange	0	0	0	0.000	0.000
95	Meter line I/V Gland	0	0	0	0.000	0.000
96	NRV U/S Flange	0	0	0	0.000	0.000
97	NRV Top Flange	0	0	0	0.000	0.000
98	NRV D/S Flange	0	0	0	0.000	0.000
99	Drain line I/V Gland	0	0	0	0.000	0.000
100	Drain line Safety Flange	0	0	0	0.000	0.000
101	Discharge line I/V U/S Flange	0	0	0	0.000	0.000
102	Discharge line I/V Gland	0	0	0	0.000	0.000
103	Discharge line I/V D/S Flange	0	0	0	0.000	0.000
104	Pump to drain line I/V Gland	0	0	0	0.000	0.000
105	Stainer Flange	0	0	0	0.000	0.000
	04-PA-052B	0	0	0	0.000	0.000
106	Suction line I/V U/S Flange	0	0	0	0.000	0.000
107	Suction line I/V Gland	0	0	0	0.000	0.000
108	Suction line I/V D/S Flange	0	0	0	0.000	0.000
109	Stainer Top Flange	0	0	0	0.000	0.000
110	Stainer Top Flange Drain line I/V Gland	0	0	0	0.000	0.000
111	Stainer Top Flange Drain line safety flange	0	0	0	0.000	0.000
112	Suction line Flange	0	0	0	0.000	0.000
113	Pump Seal	0	0	0	0.000	0.000
114	Discharge line flange	0	0	0	0.000	0.000
115	Meter line I/V Gland	0	0	0	0.000	0.000
116	NRV U/S Flange	0	0	0	0.000	0.000
117	NRV Top Flange	0	0	0	0.000	0.000
118	NRV D/S Flange	0	0	0	0.000	0.000
119	Drain line I/V Gland	0	0	0	0.000	0.000
120	Drain line Safety Flange	0	0	0	0.000	0.000
121	Discharge line I/V U/S Flange	0	0	0	0.000	0.000
122	Discharge line I/V Gland	0	0	0	0.000	0.000
123	Discharge line I/V U/S Flange	0	0	0	0.000	0.000
124	Pump to drain line I/V Gland	0	0	0	0.000	0.000
125	Stainer Flange	0	0	0	0.000	0.000
126	04-FV-4701 U/S line I/V U/S Flange	0	0	0	0.000	0.000
127	04-FV-4701 U/S line I/V Gland	0	0	0	0.000	0.000
128	04-FV-4701 U/S line I/V D/S Flange	0	0	0	0.000	0.000
129	04-FV-4701 U/S line C/V U/S Flange	0	0	0	0.000	0.000
130	04-FV-4701C/V U/S Gland	0	0	0	0.000	0.000

FUGITIVE EMISSIONS SURVEY REPORT

[April 2021]



Client : NRL

ETS

Work Order No: 4300058771-BOR/12.04.2019

ETS/NRL/FUGITIVE/012/21

S/N	Component ID	AVERAGE READING LEL %	READING (%NG)	READING (ppm)	EPA Correlation <u>Kg/Hr/Source</u>	Total Emission kg/annum
131	04-FV-4701C/V D/S Flange	0	0	0	0.000	0.000
132	Drain line I/V Gland	0	0	0	0.000	0.000
133	Drain line Safety Flange	0	0	0	0.000	0.000
134	04-FV-4701D/S line I/V U/S Flange	0	0	0	0.000	0.000
135	04-FV-4701D/S line I/V Gland	0	0	0	0.000	0.000
136	04-FV-4701D/S line I/V D/S Flange	0	0	0	0.000	0.000
137	Bypass line I/V U/S Flange	0	0	0	0.000	0.000
138	Bypass line I/V Gland	0	0	0	0.000	0.000
139	Bypass line I/V D/S Flange	0	0	0	0.000	0.000
140	04-FV-9101 U/S line I/V U/S Flange	0	0	0	0.000	0.000
141	04-FV-9101 U/S line I/V Gland	0	0	0	0.000	0.000
142	04-FV-9101 U/S line I/V D/S Flange	0	0	0	0.000	0.000
143	Drain line I/V Gland	0	0	0	0.000	0.000
144	Drain line Safety Flange	0	0	0	0.000	0.000
145	04-FV-9101 C/V U/S Flange	0	0	0	0.000	0.000
146	04-FV-9101 C/V Gland	0	0	0	0.000	0.000
147	04-FV-9101 C/V D/S Flange	0	0	0	0.000	0.000
148	04-FV-9101 D/S line I/V U/S Flange	0	0	0	0.000	0.000
149	04-FV-9101 D/S line I/V Gland	0	0	0	0.000	0.000
150	04-FV-9101 D/S line I/V D/S Flange	0	0	0	0.000	0.000
151	Bypass line I/V U/S Flange	0	0	0	0.000	0.000
152	Bypass line I/V Gland	0	0	0	0.000	0.000
153	Bypass line I/V D/S Flange	0	0	0	0.000	0.000
154	04-LV-9504 U/S line I/V U/S Flange	0	0	0	0.000	0.000
155	04-LV-9504 U/S line I/V Gland	0	0	0	0.000	0.000
156	04-LV-9504 U/S line I/V D/S Flange	0	0	0	0.000	0.000
157	Drain line I/V Gland	0	0	0	0.000	0.000
158	Drain line Safety Flange	0	0	0	0.000	0.000
159	04-LV-9504 C/V U/S Flange	0	0	0	0.000	0.000
160	04-LV-9504 C/V Gland	0	0	0	0.000	0.000
161	04-LV-9504 C/V D/S Flange	0	0	0	0.000	0.000
162	04-LV-9504 D/S line I/V U/S Flange	0	0	0	0.000	0.000
163	04-LV-9504 D/S line I/V Gland	0	0	0	0.000	0.000
164	04-LV-9504 D/S line I/V D/S Flange	0	0	0	0.000	0.000
165	Bypass line I/V U/S Flange	0	0	0	0.000	0.000
166	Bypass line I/V Gland	0	0	0	0.000	0.000
167	Bypass line I/V D/S Flange	0	0	0	0.000	0.000
	04-PM-011A	0	0	0	0.000	0.000
168	Suction Line I/V U/S Flange	0	0	0	0.000	0.000
169	Suction Line I/V Gland	0	0	0	0.000	0.000
170	Suction Line I/V D/S Flange	0	0	0	0.000	0.000
171	Stainer Top Flange	0	0	0	0.000	0.000
172	Stainer Top Flange Drain line I/V Gland	0	0	0	0.000	0.000
173	Stainer Top Flange Drain line safety flange	0	0	0	0.000	0.000
174	Drain line I/V Gland	0	0	0	0.000	0.000
175	Drain line Safety Flange	0	0	0	0.000	0.000
176	Verain line I/V Gland	0	0	0	0.000	0.000
177	Verain line safety flange	0	0	0	0.000	0.000
178	Suction line Flange	0	0	0	0.000	0.000
179	Pump Seal	0	0	0	0.000	0.000
180	Discharge line 1st Flange	0	0	0	0.000	0.000
181	Discharge line 2nd Flange	0	0	0	0.000	0.000
182	Meter line I/V Gland	0	0	0	0.000	0.000
183	NRV U/S Flange	0	0	0	0.000	0.000
184	NRV Top Flange	0	0	0	0.000	0.000
185	Drain line I/V Gland	0	0	0	0.000	0.000
186	Drain line Safety Flange	0	0	0	0.000	0.000
187	Discharge line I/V U/S Flange	0	0	0	0.000	0.000
188	Discharge line I/V Gland	0	0	0	0.000	0.000
189	Discharge line I/V D/S Flange	0	0	0	0.000	0.000
190	Pump to drain line 1st I/V Gland	0	0	0	0.000	0.000
191	Stainer Flange	0	0	0	0.000	0.000
192	Pump to drain line 2nd I/V Gland	0	0	0	0.000	0.000
193	OWS Point	0	0	0	0.000	0.000

FUGITIVE EMISSIONS SURVEY REPORT

[April 2021]



Client : NRL

ETS

Work Order No: 4300058771-BOR/12.04.2019

ETS/NRL/FUGITIVE/012/21

S/N	Component ID	AVERAGE READING LEL %	READING (%NG)	READING (ppm)	EPA Correlation <u>Kg/Hr/Source</u>	Total Emission kg/annum
	04-PM-011B	0	0	0	0.000	0.000
194	Suction Line I/V U/S Flange	0	0	0	0.000	0.000
195	Suction Line I/V Gland	0	0	0	0.000	0.000
196	Suction Line I/V D/S Flange	0	0	0	0.000	0.000
197	Stainer Top Flange	0	0	0	0.000	0.000
198	Stainer Top Flange Drain line I/V Gland	0	0	0	0.000	0.000
199	Stainer Top Flange Drain line safety flange	0	0	0	0.000	0.000
200	Drain line I/V Gland	0	0	0	0.000	0.000
201	Drain line Safety Flange	0	0	0	0.000	0.000
202	Verain line I/V Gland	0	0	0	0.000	0.000
203	Verain line safety flange	0	0	0	0.000	0.000
204	Suction line Flange	0	0	0	0.000	0.000
205	Pump Seal	0	0	0	0.000	0.000
206	Discharge line 1st Flange	0	0	0	0.000	0.000
207	Discharge line 2nd Flange	0	0	0	0.000	0.000
208	Meter line I/V Gland	0	0	0	0.000	0.000
209	NRV U/S Flange	0	0	0	0.000	0.000
210	NRV Top Flange	0	0	0	0.000	0.000
211	NRV D/S Flange	0	0	0	0.000	0.000
212	Drain line I/V Gland	0	0	0	0.000	0.000
213	Drain line Safety Flange	0	0	0	0.000	0.000
214	Discharge line I/V U/S Flange	0	0	0	0.000	0.000
215	Discharge line I/V Gland	0	0	0	0.000	0.000
216	Discharge line I/V D/S Flange	0	0	0	0.000	0.000
217	Pump to drain line 1st I/V Gland	0	0	0	0.000	0.000
218	Stainer Flange	0	0	0	0.000	0.000
219	Pump to drain line 2nd I/V Gland	0	0	0	0.000	0.000
220	OWS Point	0	0	0	0.000	0.000
	04-PA-015A	0	0	0	0.000	0.000
221	Suction Line I/V U/S Flange	0	0	0	0.000	0.000
222	Suction Line I/V Gland	0	0	0	0.000	0.000
223	Suction Line I/V D/S Flange	0	0	0	0.000	0.000
224	Stainer Top Flange	0	0	0	0.000	0.000
225	Stainer Top Flange Drain line I/V Gland	0	0	0	0.000	0.000
226	Stainer Top Flange Drain line safety flange	0	0	0	0.000	0.000
227	Meter line I/V Gland	0	0	0	0.000	0.000
228	Stainer Flange	0	0	0	0.000	0.000
229	Suction line Flange	0	0	0	0.000	0.000
230	Pump Seal	0	0	0	0.000	0.000
231	Discharge line 1st flange	0	0	0	0.000	0.000
232	Meter line I/V Gland	0	0	0	0.000	0.000
233	Stainer Flange	0	0	0	0.000	0.000
234	NRV U/S Flange	0	0	0	0.000	0.000
235	NRV Top Flange	0	0	0	0.000	0.000
236	NRV D/S Flange	0	0	0	0.000	0.000
237	Drain line I/V Gland	0	0	0	0.000	0.000
238	Drain line Safety Flange	0	0	0	0.000	0.000
239	Discharge line I/V U/S Flange	0	0	0	0.000	0.000
240	Discharge line I/V Gland	0	0	0	0.000	0.000
241	Discharge line I/V D/S Flange	0	0	0	0.000	0.000
242	Pump to CBD line 1st I/V Gland	0	0	0	0.000	0.000
243	Stainer Flange	0	0	0	0.000	0.000
244	Pump to CBD line 2nd I/V Gland	0	0	0	0.000	0.000
245	Pump to CBD line 3rd I/V Gland	0	0	0	0.000	0.000
	04-PA-015B	0	0	0	0.000	0.000
246	Suction Line I/V U/S Flange	0	0	0	0.000	0.000
247	Suction Line I/V Gland	0	0	0	0.000	0.000
248	Suction Line I/V D/S Flange	0	0	0	0.000	0.000
249	stainer Top Flange	0	0	0	0.000	0.000
250	stainer Top Flange Drain line I/V Gland	0	0	0	0.000	0.000
251	stainer Top Flange Drain line safety flange	0	0	0	0.000	0.000
252	Meter line I/V Gland	0	0	0	0.000	0.000
253	stainer Flange	0	0	0	0.000	0.000
254	Suction line Flange	0	0	0	0.000	0.000

FUGITIVE EMISSIONS SURVEY REPORT

[April 2021]



Client : NRL

ETS

Work Order No: 4300058771-BOR/12.04.2019

ETS/NRL/FUGITIVE/012/21

S/N	Component ID	AVERAGE READING LEL %	READING (%NG)	READING (ppm)	EPA Correlation <u>Kg/Hr/Source</u>	Total Emission kg/annum
255	Pump Seal	0	0	0	0.000	0.000
256	Discharge line 1st flange	0	0	0	0.000	0.000
257	Meter line I/V Gland	0	0	0	0.000	0.000
258	stainer Flange	0	0	0	0.000	0.000
259	NRV U/S Flange	0	0	0	0.000	0.000
260	NRV Top Flange	0	0	0	0.000	0.000
261	NRV D/S Flange	0	0	0	0.000	0.000
262	Drain line I/V Gland	0	0	0	0.000	0.000
263	Drain line Safety Flange	0	0	0	0.000	0.000
264	Discharge line I/V U/S Flange	0	0	0	0.000	0.000
265	Discharge line I/V Gland	0	0	0	0.000	0.000
266	Discharge line I/V D/S Flange	0	0	0	0.000	0.000
267	Pump to CBD line 1st I/V Gland	0	0	0	0.000	0.000
268	stainer Flange	0	0	0	0.000	0.000
269	Pump to CBD line 2nd I/V Gland	0	0	0	0.000	0.000
270	Pump to CBD line 3rd I/V Gland	0	0	0	0.000	0.000
271	OWS Point	0	0	0	0.000	0.000
	04PM-014A	0	0	0	0.000	0.000
272	Suction Line I/V U/S Flange	0	0	0	0.000	0.000
273	Suction Line I/V Gland	0	0	0	0.000	0.000
274	Suction Line I/V D/S Flange	0	0	0	0.000	0.000
275	stainer Top Flange	0	0	0	0.000	0.000
276	stainer Top Flange Drain line I/V Gland	0	0	0	0.000	0.000
277	stainer Top Flange Drain line safety flange	0	0	0	0.000	0.000
278	Meter line I/V Gland	0	0	0	0.000	0.000
279	Suction line Flange	0	0	0	0.000	0.000
280	Pump Seal	0	0	0	0.000	0.000
281	Discharge line flange	0	0	0	0.000	0.000
282	Meter line I/V Gland	0	0	0	0.000	0.000
283	NRV U/S Flange	0	0	0	0.000	0.000
284	NRV Top Flange	0	0	0	0.000	0.000
285	NRV D/S Flange	0	0	0	0.000	0.000
286	Drain line I/V Gland	0	0	0	0.000	0.000
287	Drain line Safety Flange	0	0	0	0.000	0.000
288	Discharge line I/V U/S Flange	0	0	0	0.000	0.000
289	Discharge line I/V Gland	0	0	0	0.000	0.000
290	Discharge line I/V D/S Flange	0	0	0	0.000	0.000
291	Pump to CBD line 1st I/V Gland	0	0	0	0.000	0.000
292	stainer Flange	0	0	0	0.000	0.000
293	Pump to CBD line 2nd I/V Gland	0	0	0	0.000	0.000
294	Pump to CBD line 3rd I/V Gland	0	0	0	0.000	0.000
295	OWS Point	0	0	0	0.000	0.000
	04-PM-014B	0	0	0	0.000	0.000
296	Suction Line I/V U/S Flange	0	0	0	0.000	0.000
297	Suction Line I/V Gland	0	0	0	0.000	0.000
298	Suction Line I/V D/S Flange	0	0	0	0.000	0.000
299	stainer Top Flange	0	0	0	0.000	0.000
300	stainer Top Flange Drain line I/V Gland	0	0	0	0.000	0.000
301	stainer Top Flange Drain line safety flange	0	0	0	0.000	0.000
302	Meter line I/V Gland	0	0	0	0.000	0.000
303	Suction line Flange	0	0	0	0.000	0.000
304	Pump Seal	0	0	0	0.000	0.000
305	Discharge line flange	0	0	0	0.000	0.000
306	Meter line I/V Gland	0	0	0	0.000	0.000
307	NRV U/S Flange	0	0	0	0.000	0.000
308	NRV Top Flange	0	0	0	0.000	0.000
309	NRV D/S Flange	0	0	0	0.000	0.000
310	Drain line I/V Gland	0	0	0	0.000	0.000
311	Drain line Safety Flange	0	0	0	0.000	0.000
312	Discharge line I/V U/S Flange	0	0	0	0.000	0.000
313	Discharge line I/V Gland	0	0	0	0.000	0.000
314	Discharge line I/V D/S Flange	0	0	0	0.000	0.000
315	Pump to CBD line 1st I/V Gland	0	0	0	0.000	0.000
316	stainer Flange	0	0	0	0.000	0.000

FUGITIVE EMISSIONS SURVEY REPORT

[April 2021]



Client : NRL

ETS

Work Order No: 4300058771-BOR/12.04.2019

ETS/NRL/FUGITIVE/012/21

S/N	Component ID	AVERAGE READING LEL %	READING (%NG)	READING (ppm)	EPA Correlation <u>Kg/Hr/Source</u>	Total Emission kg/annum
317	Pump to CBD line 2nd I/V Gland	0	0	0	0.000	0.000
318	Pump to CBD line 3rd I/V Gland	0	0	0	0.000	0.000
319	OWS Point	0	0	0	0.000	0.000
320	04-FV-1606 U/S line I/V Gland	0	0	0	0.000	0.000
321	Drain line I/V Gland	0	0	0	0.000	0.000
322	Drain line Safety Flange	0	0	0	0.000	0.000
323	04-FV-1606 C/V U/S Flange	0	0	0	0.000	0.000
324	04-FV-1607 C/V Gland	0	0	0	0.000	0.000
325	04-FV-1608 C/V D/S Flange	0	0	0	0.000	0.000
326	04-FV-1606 D/S line I/V Gland	0	0	0	0.000	0.000
327	Bypass line I/V Gland	0	0	0	0.000	0.000
328	04-FV-1706 U/S line I/V Gland	0	0	0	0.000	0.000
329	Drain line I/V Gland	0	0	0	0.000	0.000
330	Drain line Safety Flange	0	0	0	0.000	0.000
331	04-FV-1706 C/V U/S Flange	0	0	0	0.000	0.000
332	04-FV-1706 C/V Gland	0	0	0	0.000	0.000
333	04-FV-1706 C/V D/S Flange	0	0	0	0.000	0.000
334	04-FV-1706 D/S line I/V Gland	0	0	0	0.000	0.000
335	Bypass line I/V Gland	0	0	0	0.000	0.000
336	04-LV-1712 U/S line I/V Gland	0	0	0	0.000	0.000
337	Drain line I/V Gland	0	0	0	0.000	0.000
338	Drain line Safety Flange	0	0	0	0.000	0.000
339	04-LV-1712 C/V U/S Flange	0	0	0	0.000	0.000
340	04-LV-1712 C/V Gland	0	0	0	0.000	0.000
341	04-LV-1712 C/V D/S Flange	0	0	0	0.000	0.000
342	04-LV-1712 D/S line I/V Gland	0	0	0	0.000	0.000
343	Bypass line I/V Gland	0	0	0	0.000	0.000
	AREA: PUMP	0	0	0	0.000	0.000
1	04-PV-1708 U/S line I/V U/S Flange	0	0	0	0.000	0.000
2	04-PV-1708 U/S line I/V Gland	0	0	0	0.000	0.000
3	04-PV-1708 U/S line I/V D/S Flange	0	0	0	0.000	0.000
4	Drain line I/V Gland	0	0	0	0.000	0.000
5	Drain line Safety Flange	0	0	0	0.000	0.000
6	04-PV-1708 C/V U/S Flange	0	0	0	0.000	0.000
7	04-PV-1708 C/V Gland	0	0	0	0.000	0.000
8	04-PV-1708 C/V D/S Flange	0	0	0	0.000	0.000
9	Drain line I/V Gland	0	0	0	0.000	0.000
10	Drain line Safety Flange	0	0	0	0.000	0.000
11	04-PV-1708 D/S line I/V U/S Flange	0	0	0	0.000	0.000
12	04-PV-1708 D/S line I/V Gland	0	0	0	0.000	0.000
13	04-PV-1708 D/S line I/V D/S Flange	0	0	0	0.000	0.000
14	Bypass line I/V U/S Flange	0	0	0	0.000	0.000
15	Bypass line I/V Gland	0	0	0	0.000	0.000
16	Bypass line I/V D/S Flange	0	0	0	0.000	0.000
17	04-LV-1709 U/S line I/V U/S Flange	0	0	0	0.000	0.000
18	04-LV-1709 U/S line I/V Gland	0	0	0	0.000	0.000
19	04-LV-1709 U/S line I/V D/S Flange	0	0	0	0.000	0.000
20	Drain line I/V Gland	0	0	0	0.000	0.000
21	Drain line Safety Flange	0	0	0	0.000	0.000
22	04-LV-1709 C/V U/S Flange	0	0	0	0.000	0.000
23	04-LV-1709 C/V Gland	0	0	0	0.000	0.000
24	04-LV-1709 C/V D/S Flange	0	0	0	0.000	0.000
25	Drain line I/V Gland	0	0	0	0.000	0.000
26	Drain line Safety Flange	0	0	0	0.000	0.000
27	04-LV-1709 D/S line I/V U/S Flange	0	0	0	0.000	0.000
28	04-LV-1709 D/S line I/V Gland	0	0	0	0.000	0.000
29	04-LV-1709 D/S line I/V D/S Flange	0	0	0	0.000	0.000
30	Bypass line I/V U/S Flange	0	0	0	0.000	0.000
31	Bypass line I/V Gland	0	0	0	0.000	0.000
32	Bypass line I/V D/S Flange	0	0	0	0.000	0.000
33	04-LV-1703 U/S line I/V U/S Flange	0	0	0	0.000	0.000
34	04-LV-1703 U/S line I/V Gland	0	0	0	0.000	0.000
35	04-LV-1703 U/S line I/V D/S Flange	0	0	0	0.000	0.000

FUGITIVE EMISSIONS SURVEY REPORT

[April 2021]



Client : NRL

ETS

Work Order No: 4300058771-BOR/12.04.2019

ETS/NRL/FUGITIVE/012/21

S/N	Component ID	AVERAGE READING LEL %	READING (%NG)	READING (ppm)	EPA Correlation <u>Kg/Hr/Source</u>	Total Emission kg/annum
36	Drain line I/V Gland	0	0	0	0.000	0.000
37	Drain line Safety Flange	0	0	0	0.000	0.000
38	04-LV-1703 C/V U/S Flange	0	0	0	0.000	0.000
39	04-LV-1703 C/V Gland	0	0	0	0.000	0.000
40	04-LV-1703 C/V D/S Flange	0	0	0	0.000	0.000
41	04-LV-1703 D/S line I/V U/S Flange	0	0	0	0.000	0.000
42	04-LV-1703 I/V Gland	0	0	0	0.000	0.000
43	04-LV-1703 I/V D/S Flange	0	0	0	0.000	0.000
44	Bypass line I/V U/S Flange	0	0	0	0.000	0.000
45	Bypass line I/V Gland	0	0	0	0.000	0.000
46	Bypass line I/V D/S Flange	0	0	0	0.000	0.000
47	04-PV-1520A U/S line I/V Gland	0	0	0	0.000	0.000
48	Drain line I/V Gland	0	0	0	0.000	0.000
49	Drain line Safety Flange	0	0	0	0.000	0.000
50	04-PV-1520 A C/V U/S Flange	0	0	0	0.000	0.000
51	04-PV-1520 A C/V Gland	0	0	0	0.000	0.000
52	04-PV-1520 A C/V D/S Flange	0	0	0	0.000	0.000
53	04-PV-1520 A D/S line I/V Gland	0	0	0	0.000	0.000
54	04-PV-1520 B U/S line I/V Gland	0	0	0	0.000	0.000
55	Drain line I/V Gland	0	0	0	0.000	0.000
56	Drain line Safety Flange	0	0	0	0.000	0.000
57	04-PV-1520 B C/V U/S Flange	0	0	0	0.000	0.000
58	04-PV-1520 B C/V Gland	0	0	0	0.000	0.000
59	04-PV-1520 B C/V D/S Flange	0	0	0	0.000	0.000
60	04-PV-1520 B D/S line I/V Gland	0	0	0	0.000	0.000
61	04-LV-1603 U/S line I/V U/S Flange	0	0	0	0.000	0.000
62	04-LV-1603 U/S line I/V Gland	0	0	0	0.000	0.000
63	04-LV-1603 U/S line I/V D/S Flange	0	0	0	0.000	0.000
64	Drain line I/V Gland	0	0	0	0.000	0.000
65	Drain line Safety Flange	0	0	0	0.000	0.000
66	04-LV-1603 C/V U/S Flange	0	0	0	0.000	0.000
67	04-LV-1603 C/V Gland	0	0	0	0.000	0.000
68	04-LV-1603 C/V D/S Flange	0	0	0	0.000	0.000
69	04-LV-1603 D/S line I/V U/S Flange	0	0	0	0.000	0.000
70	04-LV-1603 D/S line I/V Gland	0	0	0	0.000	0.000
71	04-LV-1603 D/S line I/V D/S Flange	0	0	0	0.000	0.000
72	Bypass line I/V U/S Flange	0	0	0	0.000	0.000
73	Bypass line I/V Gland	0	0	0	0.000	0.000
74	Bypass line I/V D/S Flange	0	0	0	0.000	0.000
75	04-FV-9102 U/S line I/V Gland	0	0	0	0.000	0.000
76	Drain line I/V Gland	0	0	0	0.000	0.000
77	Drain line Safety Flange	0	0	0	0.000	0.000
78	04-FV-1902 C/V Gland	0	0	0	0.000	0.000
79	04-FV-1902 D/S line I/V U/S Flange	0	0	0	0.000	0.000
80	04-FV-1902 D/S line I/V Gland	0	0	0	0.000	0.000
81	04-FV-1902 D/S line I/V D/S Flange	0	0	0	0.000	0.000
82	Bypass line I/V U/S Flange	0	0	0	0.000	0.000

FUGITIVE EMISSIONS SURVEY REPORT

[August 2021]



Client : NRL

ETS

Work Order No: 4300058771-BOR/12.04.2019

ETS/NRL/FUGITIVE/004/21

S/N	Component ID	AVERAGE READING LEL %	READING (%NG)	READING (ppm)	EPA Correlation Kg/Hr/Source	Total Emission kg/annum
UNIT : DCU						
Area = B/L						
1	LPG inlet line U/S I/V Gland	0	0	0	0.000	0.000
2	Stealer Flange	0	0	0	0.000	0.000
3	Drain line I/V Gland	0	0	0	0.000	0.000
4	Drain line Safety Flange	0	0	0	0.000	0.000
5	Top Flange	0	0	0	0.000	0.000
6	LPG inlet line D/S I/V Gland	0	0	0	0.000	0.000
7	P.G. Meter line Gland	0	0	0	0.000	0.000
8	P.G. Meter SAMPLING line I/V Gland	0	0	0	0.000	0.000
9	Vent line I/V Galnd	0	0	0	0.000	0.000
10	Vent line safety Flange	0	0	0	0.000	0.000
11	Naphtha to Offside line 1st I/V U/S Flange	0	0	0	0.000	0.000
12	Naphtha to Offside line 1st I/V Gland	0	0	0	0.000	0.000
13	Naphtha to Offside line 1st I/V D/S Flange	0	0	0	0.000	0.000
14	Stealer Flange	0	0	0	0.000	0.000
15	Naphtha to Offside line 2nd I/V U/S Flange	0	0	0	0.000	0.000
16	Naphtha to Offside line 2nd I/V Gland	0	0	0	0.000	0.000
17	Naphtha to Offside line 2nd I/V D/S Flange	0	0	0	0.000	0.000
18	Vent line I/V Galnd	0	0	0	0.000	0.000
19	Vent line safety Flange	0	0	0	0.000	0.000
20	Inert Gas inlet line U/S I/V U/S Flange	0	0	0	0.000	0.000
21	Inert Gas inlet line U/S I/V Gland	0	0	0	0.000	0.000
22	Inert Gas inlet line U/S I/V D/S Flange	0	0	0	0.000	0.000
23	Drain line I/V Gland	0	0	0	0.000	0.000
24	Drain line Safety Flange	0	0	0	0.000	0.000
25	Inert Gas inlet line D/S I/V U/S Flange	0	0	0	0.000	0.000
26	Inert Gas inlet line D/S I/V Gland	0	0	0	0.000	0.000
27	Inert Gas inlet line D/S I/V D/S Flange	0	0	0	0.000	0.000
28	Vent line I/V Galnd	0	0	0	0.000	0.000
29	Vent line safety Flange	0	0	0	0.000	0.000
30	FG to Unit inlet line D/S I/V U/S Flange	0	0	0	0.000	0.000
31	FG to Unit inlet line D/S I/V Gland	0	0	0	0.000	0.000
32	FG to Unit inlet line D/S I/V D/S Flange	0	0	0	0.000	0.000
33	FG to Unit inlet line U/S I/V Gland	0	0	0	0.000	0.000
34	Vent line I/V Galnd	0	0	0	0.000	0.000
35	Vent line safety Flange	0	0	0	0.000	0.000
36	VV-9 DISCH HDR Outlet line I/V U/S Flange	0	0	0	0.000	0.000
37	VV-9 DISCH HDR Outlet line I/V Gland	0	0	0	0.000	0.000
38	VV-9 DISCH HDR Outlet line I/V D/S Flange	0	0	0	0.000	0.000
39	Drain line I/V Gland	0	0	0	0.000	0.000
40	Drain line Safety Flange	0	0	0	0.000	0.000
41	NRV U/S Flange	0	0	0	0.000	0.000
42	NRV Top Flange	0	0	0	0.000	0.000
43	NRV D/S Flange	0	0	0	0.000	0.000
44	Drain line I/V Gland	0	0	0	0.000	0.000
45	Drain line Safety Flange	0	0	0	0.000	0.000
46	GO TO IFO HDR line 1st I/V Gland	0	0	0	0.000	0.000
47	Drain line I/V Gland	0	0	0	0.000	0.000
48	Drain line Safety Flange	0	0	0	0.000	0.000
49	Stealer Flange	0	0	0	0.000	0.000
50	GO TO IFO HDR line 2nd I/V Gland	0	0	0	0.000	0.000
	03-PA-48A					
51	Suction line I/V U/S Flange	0	0	0	0.000	0.000
52	Suction line I/V Gland	0	0	0	0.000	0.000
53	Suction line I/V D/S Flange	0	0	0	0.000	0.000
54	Stainer Top Flange	0	0	0	0.000	0.000
55	Stainer Top Flange Drain line I/V Gland	0	0	0	0.000	0.000
56	Stainer Top Flange Drain line safety flange	0	0	0	0.000	0.000
57	Suction line Flange	0	0	0	0.000	0.000
58	Pump Seal	0	0	0	0.000	0.000
59	Discharge line flange	0	0	0	0.000	0.000
60	Vent line I/V Galnd	0	0	0	0.000	0.000
61	Vent line safety Flange	0	0	0	0.000	0.000
62	1st Stainer Flange	0	0	0	0.000	0.000
63	2nd Stainer Flange	0	0	0	0.000	0.000
64	Drain line I/V Gland	0	0	0	0.000	0.000
65	Drain line Safety Flange	0	0	0	0.000	0.000
66	Discharge line flange	0	0	0	0.000	0.000
67	03-SDV-1704 U/S I/V Gland	0	0	0	0.000	0.000
68	Stainer Flange	0	0	0	0.000	0.000
69	OVS Point	0	0	0	0.000	0.000
70	03-SDV-1704 C/V I/V Gland	0	0	0	0.000	0.000
71	03-SDV-1704 C/V Gland	0	0	0	0.000	0.000
72	03-SDV-1704 C/V D/S Flange	0	0	0	0.000	0.000
73	03-SDV-1704 D/S I/V Gland	0	0	0	0.000	0.000
74	03-SDV-1706 U/S I/V Gland	0	0	0	0.000	0.000
75	Drain line I/V Gland	0	0	0	0.000	0.000
76	Drain line Safety Flange	0	0	0	0.000	0.000
77	03-PV-1706 C/V U/S Flange	0	0	0	0.000	0.000
78	03-PV-1706 C/V Gland	0	0	0	0.000	0.000
79	03-PV-1706 C/V D/S Flange	0	0	0	0.000	0.000
80	Drain line I/V Gland	0	0	0	0.000	0.000
81	03-PV-1706 C/V D/S Flange	0	0	0	0.000	0.000
82	Bypass line 1st I/V Gland	0	0	0	0.000	0.000
83	Sampling line 1st I/V Gland	0	0	0	0.000	0.000
84	Sampling line 2nd I/V Gland	0	0	0	0.000	0.000
85	LPG to Coaleser line U/S I/V Gland	0	0	0	0.000	0.000

FUGITIVE EMISSIONS SURVEY REPORT

[August 2021]



Client : NRL

ETS

Work Order No: 4300058771-BOR/12.04.2019

ETS/NRL/FUGITIVE/004/21

S/N	Component ID	AVERAGE READING LEL %	READING (%NG)	READING (ppm)	EPA Correlation Kg/Hr/Source	Total Emission kg/annum
86	Sampling line I/V Gland	0	0	0	0.000	0.000
87	LPG to Coaleser line D/S I/V Gland	0	0	0	0.000	0.000
88	LPG to Coaleser line I/V Gland	0	0	0	0.000	0.000
89	Sampling line 1st I/V Gland	0	0	0	0.000	0.000
90	Sampling line 2nd I/V Gland	0	0	0	0.000	0.000
91	Sampling line 3rd I/V Gland	0	0	0	0.000	0.000
92	Bypass line 1st I/V Gland	0	0	0	0.000	0.000
93	03-HV-1701 U/S I/V Flange	0	0	0	0.000	0.000
94	Drain line I/V Gland	0	0	0	0.000	0.000
95	Drain line Safety Flange	0	0	0	0.000	0.000
96	03-HV-1701 C/V U/S Flange	0	0	0	0.000	0.000
97	03-HV-1701 C/V Gland	0	0	0	0.000	0.000
98	03-HV-1701 C/V D/S Flange	0	0	0	0.000	0.000
99	Drain line I/V Gland	0	0	0	0.000	0.000
100	Drain line Safety Flange	0	0	0	0.000	0.000
101	03-HV-1701 D/S I/V Flange	0	0	0	0.000	0.000
102	Bypass line 1st I/V Gland	0	0	0	0.000	0.000
103	03-PA-0016-A-Suction line I/V U/S Flange	0	0	0	0.000	0.000
104	03-PA-0016-A-Suction line I/V Gland	0	0	0	0.000	0.000
105	03-PA-0016-A-Suction line I/V D/S Flange	0	0	0	0.000	0.000
106	Stainer Top Flange	0	0	0	0.000	0.000
107	Stainer Top Flange Drain line I/V Gland	0	0	0	0.000	0.000
108	Stainer Top Flange Drain line safety flange	0	0	0	0.000	0.000
109	Suction line Flange	0	0	0	0.000	0.000
110	Pump Seal	0	0	0	0.000	0.000
111	Discharge line flange	0	0	0	0.000	0.000
112	P.G. Meter I/V Gland	0	0	0	0.000	0.000
113	P.G. Meter SAMPLING line I/V Gland	0	0	0	0.000	0.000
114	NRV U/S Flange	0	0	0	0.000	0.000
115	NRV Top Flange	0	0	0	0.000	0.000
116	NRV D/S Flange	0	0	0	0.000	0.000
117	Drain line I/V Gland	0	0	0	0.000	0.000
118	Drain line Safety Flange	0	0	0	0.000	0.000
119	Discharge line I/V U/S Flange	0	0	0	0.000	0.000
120	Discharge line I/V Gland	0	0	0	0.000	0.000
121	Discharge line I/V D/S Flange	0	0	0	0.000	0.000
122	Pump to CBD line I/V Gland	0	0	0	0.000	0.000
123	Stainer Flange	0	0	0	0.000	0.000
124	Drain line I/V Gland	0	0	0	0.000	0.000
125	OWS Point	0	0	0	0.000	0.000
126	03-PA-0016-B-Suction line I/V U/S Flange	0	0	0	0.000	0.000
127	03-PA-0016-B-Suction line I/V Gland	0	0	0	0.000	0.000
128	03-PA-0016-B-Suction line I/V D/S Flange	0	0	0	0.000	0.000
129	Stainer Top Flange	0	0	0	0.000	0.000
130	Stainer Top Flange Drain line I/V Gland	0	0	0	0.000	0.000
131	Stainer Top Flange Drain line safety flange	0	0	0	0.000	0.000
132	Suction line Flange	0	0	0	0.000	0.000
133	Pump Seal	0	0	0	0.000	0.000
134	Discharge line flange	0	0	0	0.000	0.000
135	P.G. Meter I/V Gland	0	0	0	0.000	0.000
136	P.G. Meter SAMPLING line I/V Gland	0	0	0	0.000	0.000
137	NRV U/S Flange	0	0	0	0.000	0.000
138	NRV Top Flange	0	0	0	0.000	0.000
139	NRV D/S Flange	0	0	0	0.000	0.000
140	Drain line I/V Gland	0	0	0	0.000	0.000
141	Drain line Safety Flange	0	0	0	0.000	0.000
142	Discharge line I/V U/S Flange	0	0	0	0.000	0.000
143	Discharge line I/V Gland	0	0	0	0.000	0.000
144	Discharge line I/V D/S Flange	0	0	0	0.000	0.000
145	Pump to CBD line I/V Gland	0	0	0	0.000	0.000
146	Stainer Flange	0	0	0	0.000	0.000
147	Drain line I/V Gland	0	0	0	0.000	0.000
148	Drain line Safety Flange	0	0	0	0.000	0.000
149	OWS Point	0	0	0	0.000	0.000
	03-PA-00-018A					
150	Suction line I/V U/S Flange	0	0	0	0.000	0.000
151	Suction line I/V Gland	0	0	0	0.000	0.000
152	Suction line I/V D/S Flange	0	0	0	0.000	0.000
153	Stainer Top Flange	0	0	0	0.000	0.000
154	Drain line I/V Gland	0	0	0	0.000	0.000
155	Drain line Safety Flange	0	0	0	0.000	0.000
156	Suction line Flange	0	0	0	0.000	0.000
157	Pump Seal	0	0	0	0.000	0.000
158	Discharge line flange	0	0	0	0.000	0.000
159	P.G. Meter I/V Gland	0	0	0	0.000	0.000
160	P.G. Meter SAMPLING line I/V Gland	0	0	0	0.000	0.000
161	NRV U/S Flange	0	0	0	0.000	0.000
162	NRV Top Flange	0	0	0	0.000	0.000
163	NRV D/S Flange	0	0	0	0.000	0.000
164	Drain line I/V Gland	0	0	0	0.000	0.000
165	Drain line Safety Flange	0	0	0	0.000	0.000
166	Discharge line I/V U/S Flange	0	0	0	0.000	0.000
167	Discharge line I/V Gland	0	0	0	0.000	0.000

FUGITIVE EMISSIONS SURVEY REPORT

[August 2021]



Client : NRL

ETS

Work Order No: 4300058771-BOR/12.04.2019		ETS/NRL/FUGITIVE/004/21				
S/N	Component ID	AVERAGE READING LEL %	READING (%NG)	READING (ppm)	EPA Correlation Kg/Hr/Source	Total Emission kg/annum
168	Discharge line I/V D/S Flange	0	0	0	0.000	0.000
169	Pump to CBD line I/V Gland	0	0	0	0.000	0.000
170	Stainer Flange	0	0	0	0.000	0.000
171	Pump to CBD line 2nd I/V Gland	0	0	0	0.000	0.000
172	Stainer Flange	0	0	0	0.000	0.000
173	Pump to CBD line 3rd I/V Gland	0	0	0	0.000	0.000
174	Pump to Drain line Stainer Flange	0	0	0	0.000	0.000
175	OWS Point	0	0	0	0.000	0.000
176	To Flare HDR line U/S I/V Gland	0	0	0	0.000	0.000
177	Stainer Flange	0	0	0	0.000	0.000
178	To Flare HDR line D/S I/V Gland	0	0	0	0.000	0.000
179	03-PA-0018-B-Suction line I/V U/S Flange	0	0	0	0.000	0.000
180	03-PA-0018-B-Suction line I/V Gland	0	0	0	0.000	0.000
181	03-PA-0018-B-Suction line I/V D/S Flange	0	0	0	0.000	0.000
182	Stainer Top Flange	0	0	0	0.000	0.000
183	Drain line I/V Gland	0	0	0	0.000	0.000
184	Drain line Safety Flange	0	0	0	0.000	0.000
185	Suction line Flange	0	0	0	0.000	0.000
186	Pump Seal	0	0	0	0.000	0.000
187	Discharge line flange	0	0	0	0.000	0.000
188	P.G. Meter I/V Gland	0	0	0	0.000	0.000
189	P.G. Meter SAMPLING line I/V Gland	0	0	0	0.000	0.000
190	NRV U/S Flange	0	0	0	0.000	0.000
191	NRV Top Flange	0	0	0	0.000	0.000
192	NRV D/S Flange	0	0	0	0.000	0.000
193	Drain line I/V Gland	0	0	0	0.000	0.000
194	Drain line Safety Flange	0	0	0	0.000	0.000
195	Discharge line I/V U/S Flange	0	0	0	0.000	0.000
196	Discharge line I/V Gland	0	0	0	0.000	0.000
197	Discharge line I/V U/S Flange	0	0	0	0.000	0.000
198	Pump to CBD line I/V Gland	0	0	0	0.000	0.000
199	Stainer Flange	0	0	0	0.000	0.000
200	Pump to CBD line 2nd I/V Gland	0	0	0	0.000	0.000
201	Stainer Flange	0	0	0	0.000	0.000
202	Pump to Drain line Stainer Flange	0	0	0	0.000	0.000
203	OWS Point	0	0	0	0.000	0.000
Area: Pump						
1	03-FV-1601-West side line I/V U/S Flange	0	0	0	0.000	0.000
2	03-FV-1601-West side line I/V Gland	0	0	0	0.000	0.000
3	03-FV-1601-West side line I/V D/S Flange	0	0	0	0.000	0.000
4	Drain line I/V Gland	0	0	0	0.000	0.000
5	Drain line Safety Flange	0	0	0	0.000	0.000
6	03-FV-1601-West side line C/V U/S Flange	0	0	0	0.000	0.000
7	03-FV-1601-West side line C/V Gland	0	0	0	0.000	0.000
8	03-FV-1601-West side line C/V D/S Flange	0	0	0	0.000	0.000
9	Drain line I/V Gland	0	0	0	0.000	0.000
10	Drain line Safety Flange	0	0	0	0.000	0.000
11	03-FV-1601-East side line I/V U/S Flange	0	0	0	0.000	0.000
12	03-FV-1601-East side line I/V Gland	0	0	0	0.000	0.000
13	03-FV-1601-East side line I/V D/S Flange	0	0	0	0.000	0.000
14	Bypass line I/V U/S Flange	0	0	0	0.000	0.000
15	Bypass line I/V Gland	0	0	0	0.000	0.000
16	Bypass line I/V D/S Flange	0	0	0	0.000	0.000
17	CBD line Stainer Flange	0	0	0	0.000	0.000
18	CBD line I/V Gland	0	0	0	0.000	0.000
19	03-FV-1605 U/S I/V U/S Flange	0	0	0	0.000	0.000
20	03-FV-1605 U/S I/V Gland	0	0	0	0.000	0.000
21	03-FV-1605 U/S I/V D/S Flange	0	0	0	0.000	0.000
22	Drain line I/V Gland	0	0	0	0.000	0.000
23	Drain line Safety Flange	0	0	0	0.000	0.000
24	03-FV-1605 C/V U/S Flange	0	0	0	0.000	0.000
25	03-FV-1605 C/V Gland	0	0	0	0.000	0.000
26	03-FV-1605 C/V D/S Flange	0	0	0	0.000	0.000
27	Drain line I/V Gland	0	0	0	0.000	0.000
28	Drain line Safety Flange	0	0	0	0.000	0.000
29	03-FV-1605 D/S I/V U/S Flange	0	0	0	0.000	0.000
30	03-FV-1605 D/S I/V Gland	0	0	0	0.000	0.000
31	03-FV-1605 D/S I/V D/S Flange	0	0	0	0.000	0.000
32	Bypass line I/V U/S Flange	0	0	0	0.000	0.000
33	Bypass line I/V Gland	0	0	0	0.000	0.000
34	Bypass line I/V D/S Flange	0	0	0	0.000	0.000
35	03-FV-1602 U/S I/V Gland	30	1.5	15000	0.057	495.356
36	Drain line I/V Gland	0	0	0	0.000	0.000
37	Drain line Safety Flange	0	0	0	0.000	0.000
38	03-FV-1602 C/V U/S Flange	0	0	0	0.000	0.000
39	03-FV-1602 C/V Gland	20	1	10000	0.036	312.013
40	03-FV-1602 C/V D/S Flange	0	0	0	0.000	0.000
41	Drain line I/V Gland	0	0	0	0.000	0.000
42	Drain line Safety Flange	0	0	0	0.000	0.000
43	03-FV-1602 D/S I/V Gland	0	0	0	0.000	0.000
44	Bypass line I/V U/S Flange	0	0	0	0.000	0.000
45	Bypass line I/V Gland	0	0	0	0.000	0.000
46	Bypass line I/V D/S Flange	0	0	0	0.000	0.000
03-PA-00-021A						
47	Suction line I/V U/S Flange	0	0	0	0.000	0.000
48	Suction line I/V Gland	0	0	0	0.000	0.000
49	Suction line I/V D/S Flange	0	0	0	0.000	0.000

FUGITIVE EMISSIONS SURVEY REPORT

[August 2021]



Client : NRL

ETS

Work Order No: 4300058771-BOR/12.04.2019		ETS/NRL/FUGITIVE/004/21				
S/N	Component ID	AVERAGE READING LEL %	READING (%NG)	READING (ppm)	EPA Correlation Kg/Hr/Source	Total Emission kg/annum
50	Stainer Top Flange	0	0	0	0.000	0.000
51	Drain line I/V Gland	0	0	0	0.000	0.000
52	Drain line Safety Flange	0	0	0	0.000	0.000
53	Suction line Flange	0	0	0	0.000	0.000
54	Pump Seal	0	0	0	0.000	0.000
55	Discharge line flange	0	0	0	0.000	0.000
56	P.G. Meter I/V Gland	0	0	0	0.000	0.000
57	P.G. Meter 2nd I/V Gland	0	0	0	0.000	0.000
58	NRV U/S Flange	0	0	0	0.000	0.000
59	NRV Top Flange	0	0	0	0.000	0.000
60	NRV D/S Flange	0	0	0	0.000	0.000
61	Drain line I/V Gland	0	0	0	0.000	0.000
62	Drain line Safety Flange	0	0	0	0.000	0.000
63	Discharge line I/V U/S Flange	0	0	0	0.000	0.000
64	Discharge line I/V Gland	0	0	0	0.000	0.000
65	Discharge line I/V D/S Flange	0	0	0	0.000	0.000
66	CBD line I/V Gland	0	0	0	0.000	0.000
67	Stainer Flange	0	0	0	0.000	0.000
68	Drain line I/V Gland	0	0	0	0.000	0.000
69	Drain line Safety Flange	0	0	0	0.000	0.000
70	OWS Point	0	0	0	0.000	0.000
03-PA-00-021B						
71	Suction line I/V U/S Flange	0	0	0	0.000	0.000
72	Suction line I/V Gland	0	0	0	0.000	0.000
73	Suction line I/V D/S Flange	0	0	0	0.000	0.000
74	Stainer Top Flange	0	0	0	0.000	0.000
75	Drain line I/V Gland	0	0	0	0.000	0.000
76	Drain line Safety Flange	0	0	0	0.000	0.000
77	Suction line Flange	0	0	0	0.000	0.000
78	Pump Seal	0	0	0	0.000	0.000
79	Discharge line flange	0	0	0	0.000	0.000
80	P.G. Meter I/V Gland	0	0	0	0.000	0.000
81	P.G. Meter Sampling line I/V Gland	0	0	0	0.000	0.000
82	NRV U/S Flange	0	0	0	0.000	0.000
83	NRV Top Flange	0	0	0	0.000	0.000
84	NRV D/S Flange	0	0	0	0.000	0.000
85	Drain line I/V Gland	0	0	0	0.000	0.000
86	Drain line Safety Flange	0	0	0	0.000	0.000
87	Discharge line I/V U/S Flange	0	0	0	0.000	0.000
88	Discharge line I/V Gland	0	0	0	0.000	0.000
89	Discharge line I/V D/S Flange	0	0	0	0.000	0.000
90	CBD line I/V Gland	0	0	0	0.000	0.000
91	Stainer Flange	0	0	0	0.000	0.000
92	Drain line I/V Gland	0	0	0	0.000	0.000
93	Drain line Safety Flange	0	0	0	0.000	0.000
94	OWS Point	0	0	0	0.000	0.000
95	03-FV-1503 U/S I/V U/S Flange	0	0	0	0.000	0.000
96	03-FV-1503 U/S I/V Gland	0	0	0	0.000	0.000
97	03-FV-1503 U/S I/V D/S Flange	0	0	0	0.000	0.000
98	Drain line I/V Gland	0	0	0	0.000	0.000
99	Drain line Safety Flange	0	0	0	0.000	0.000
100	03-FV-1503 C/V U/S Flange	0	0	0	0.000	0.000
101	03-FV-1503 C/V Gland	0	0	0	0.000	0.000
102	03-FV-1503 C/V D/S Flange	0	0	0	0.000	0.000
103	Drain line I/V Gland	0	0	0	0.000	0.000
104	Drain line Safety Flange	0	0	0	0.000	0.000
105	03-FV-1503 D/S I/V U/S Flange	0	0	0	0.000	0.000
106	03-FV-1503 D/S I/V Gland	0	0	0	0.000	0.000
107	03-FV-1503 D/S I/V D/S Flange	0	0	0	0.000	0.000
108	Bypass line I/V U/S Flange	0	0	0	0.000	0.000
109	Bypass line I/V Gland	0	0	0	0.000	0.000
110	Bypass line I/V D/S Flange	0	0	0	0.000	0.000
03-PA-00-00-020A						
111	Suction line I/V U/S Flange	0	0	0	0.000	0.000
112	Suction line I/V Gland	0	0	0	0.000	0.000
113	Suction line I/V D/S Flange	0	0	0	0.000	0.000
114	Stainer Top Flange	0	0	0	0.000	0.000
115	Drain line I/V Gland	0	0	0	0.000	0.000
116	Drain line Safety Flange	0	0	0	0.000	0.000
117	Suction line Flange	0	0	0	0.000	0.000
118	Pump Seal	0	0	0	0.000	0.000
119	Discharge line flange	0	0	0	0.000	0.000
120	P.G. Meter I/V Gland	0	0	0	0.000	0.000
121	P.G. Meter SAMPLING line I/V Gland	0	0	0	0.000	0.000
122	NRV U/S Flange	0	0	0	0.000	0.000
123	NRV Top Flange	0	0	0	0.000	0.000
124	NRV D/S Flange	0	0	0	0.000	0.000
125	Drain line I/V Gland	0	0	0	0.000	0.000
126	Drain line Safety Flange	0	0	0	0.000	0.000
127	Discharge line I/V U/S Flange	0	0	0	0.000	0.000
128	Discharge line I/V Gland	0	0	0	0.000	0.000
129	Discharge line I/V D/S Flange	0	0	0	0.000	0.000
130	Pump to CBD line 1st Stainer Flange	0	0	0	0.000	0.000
131	Pump to CBD line I/V Gland	0	0	0	0.000	0.000
132	Pump to CBD line 2nd Stainer Flange	0	0	0	0.000	0.000
133	Pump to CBD line I/V Gland	0	0	0	0.000	0.000
134	Pump to CBD line 3rd Stainer Flange	0	0	0	0.000	0.000
135	Pump to CBD line I/V Gland	0	0	0	0.000	0.000

FUGITIVE EMISSIONS SURVEY REPORT

[August 2021]



Client : NRL

ETS

Work Order No: 4300058771-BOR/12.04.2019		ETS/NRL/FUGITIVE/004/21				
S/N	Component ID	AVERAGE READING LEL %	READING (%NG)	READING (ppm)	EPA Correlation Kg/Hr/Source	Total Emission kg/annum
136	Drain line I/V Gland	0	0	0	0.000	0.000
137	OWS Point	0	0	0	0.000	0.000
	03-PA-00-00-020B					
138	Suction line I/V U/S Flange	0	0	0	0.000	0.000
139	Suction line I/V Gland	0	0	0	0.000	0.000
140	Suction line I/V D/S Flange	0	0	0	0.000	0.000
141	Stainer Top Flange	0	0	0	0.000	0.000
142	Drain line I/V Gland	0	0	0	0.000	0.000
143	Drain line Safety Flange	0	0	0	0.000	0.000
144	Suction line Flange	0	0	0	0.000	0.000
145	Pump Seal	0	0	0	0.000	0.000
146	Discharge line flange	0	0	0	0.000	0.000
147	P.G. Meter I/V Gland	0	0	0	0.000	0.000
148	P.G. Meter SAMPLING line I/V Gland	0	0	0	0.000	0.000
149	NRV U/S Flange	0	0	0	0.000	0.000
150	NRV Top Flange	0	0	0	0.000	0.000
151	NRV D/S Flange	0	0	0	0.000	0.000
152	Drain line I/V Gland	0	0	0	0.000	0.000
153	Drain line Safety Flange	0	0	0	0.000	0.000
154	Discharge line I/V U/S Flange	0	0	0	0.000	0.000
155	Discharge line I/V Gland	0	0	0	0.000	0.000
156	Discharge line I/V D/S Flange	0	0	0	0.000	0.000
157	CBD line I/V U/S Flange	0	0	0	0.000	0.000
158	CBD LINE I/V GLAND	0	0	0	0.000	0.000
159	CBD line I/V D/S Flange	0	0	0	0.000	0.000
160	CBD LINE 2nd I/V GLAND	0	0	0	0.000	0.000
161	Stainer Flange	0	0	0	0.000	0.000
162	CBD LINE 3rd I/V GLAND	0	0	0	0.000	0.000
163	Drain line I/V Gland	0	0	0	0.000	0.000
164	OWS Point	0	0	0	0.000	0.000
165	PA-001-A/B Pump out to storage line U/S I/V U/S Flange	0	0	0	0.000	0.000
166	PA-001-A/B Pump out to storage line U/S I/V Gland	0	0	0	0.000	0.000
167	PA-001-A/B Pump out to storage line U/S I/V D/S Flange	0	0	0	0.000	0.000
168	Drain line I/V Gland	0	0	0	0.000	0.000
169	Drain line Safety Flange	0	0	0	0.000	0.000
170	PA-001-A/B Pump out to storage line D/S I/V U/S Flange	0	0	0	0.000	0.000
171	PA-001-A/B Pump out to storage line D/S I/V Gland	0	0	0	0.000	0.000
172	PA-001-A/B Pump out to storage line D/S I/V D/S Flange	0	0	0	0.000	0.000
173	Naptha to CD Inlet line I/V U/S Flange	0	0	0	0.000	0.000
174	Naptha to CD Inlet line I/V Gland	0	0	0	0.000	0.000
175	Naptha to CD Inlet line I/V D/S Flange	0	0	0	0.000	0.000
176	Drain line I/V Gland	0	0	0	0.000	0.000
177	Drain line Safety Flange	0	0	0	0.000	0.000
178	STAB Naptha to Run Down Line I/V U/S Flange	0	0	0	0.000	0.000
179	STAB Naptha to Run Down Line I/V Gland	0	0	0	0.000	0.000
180	STAB Naptha to Run Down Line I/V D/S Flange	0	0	0	0.000	0.000
181	STAB NAPTHA to Slope HDR U/S line I/V U/S Flange	0	0	0	0.000	0.000
182	STAB NAPTHA to Slope HDR U/S line I/V Gland	0	0	0	0.000	0.000
183	STAB NAPTHA to Slope HDR U/S line I/V D/S Flange	0	0	0	0.000	0.000
184	Drain line I/V Gland	0	0	0	0.000	0.000
185	Drain line Safety Flange	0	0	0	0.000	0.000
186	STAB NAPTHA to Slope HDR D/S line I/V U/S Flange	0	0	0	0.000	0.000
187	STAB NAPTHA to Slope HDR D/S line I/V Gland	0	0	0	0.000	0.000
188	STAB NAPTHA to Slope HDR D/S line I/V D/S Flange	0	0	0	0.000	0.000
189	03-PV-1406-line C/V U/S Flange	0	0	0	0.000	0.000
190	03-PV-1406-line C/V Gland	0	0	0	0.000	0.000
191	03-PV-1406-line C/V D/S Flange	0	0	0	0.000	0.000
192	DRR-5699-East Site line I/V U/S Flange	0	0	0	0.000	0.000
193	DRR-5699-East Site line I/V Gland	0	0	0	0.000	0.000
194	DRR-5699-East Site line I/V D/S Flange	0	0	0	0.000	0.000
195	Stainer Flange	0	0	0	0.000	0.000
196	DRR-5699-West Site line I/V U/S Flange	0	0	0	0.000	0.000
197	DRR-5699-West Site line I/V Gland	0	0	0	0.000	0.000
198	DRR-5699-West Site line I/V D/S Flange	0	0	0	0.000	0.000
199	Stainer Flange	0	0	0	0.000	0.000
200	WG-9 to WG-10 line 1st I/V U/S Flange	0	0	0	0.000	0.000
201	WG-9 to WG-10 line 1st I/V Gland	0	0	0	0.000	0.000
202	WG-9 to WG-10 line 1st I/V D/S Flange	0	0	0	0.000	0.000
203	WG-9 to WG-10 line 2nd I/V U/S Flange	0	0	0	0.000	0.000
204	WG-9 to WG-10 line 2nd I/V Gland	0	0	0	0.000	0.000
205	WG-9 to WG-10 line 2nd I/V D/S Flange	0	0	0	0.000	0.000
206	WG-10-line East Site line I/V U/S Flange	0	0	0	0.000	0.000
207	WG-10-line East Site line I/V Gland	0	0	0	0.000	0.000
208	WG-10-line East Site line I/V D/S Flange	0	0	0	0.000	0.000
209	Stainer Flange	0	0	0	0.000	0.000
210	WG-10-line West Site line I/V U/S Flange	0	0	0	0.000	0.000
211	WG-10-line west Site line I/V Gland	0	0	0	0.000	0.000
212	WG-10-line West Site line I/V D/S Flange	0	0	0	0.000	0.000
213	Stainer Flange	0	0	0	0.000	0.000
214	WG-10 to WG-9 line 1st I/V U/S Flange	0	0	0	0.000	0.000
215	WG-10 to WG-9 line 1st I/V Gland	0	0	0	0.000	0.000
216	WG-10 to WG-9 line 1st I/V D/S Flange	0	0	0	0.000	0.000
217	WG-10 to WG-9 line 2nd I/V U/S Flange	0	0	0	0.000	0.000
218	WG-10 to WG-9 line 2nd I/V Gland	0	0	0	0.000	0.000
219	WG-10 to WG-9 line 2nd I/V D/S Flange	0	0	0	0.000	0.000
220	FRACT-OFF Gas From VV-2 line I/V U/S Flange	0	0	0	0.000	0.000
221	FRACT-OFF Gas From VV-2 line I/V Gland	0	0	0	0.000	0.000
222	FRACT-OFF Gas From VV-2 line I/V D/S Flange	0	0	0	0.000	0.000

FUGITIVE EMISSIONS SURVEY REPORT

[August 2021]



Client : NRL

ETS

Work Order No: 4300058771-BOR/12.04.2019

ETS/NRL/FUGITIVE/004/21

S/N	Component ID	AVERAGE READING LEL %	READING (%NG)	READING (ppm)	EPA Correlation Kg/Hr/Source	Total Emission kg/annum
	03-PM-00-003B WILD Naptha					
223	Suction line I/V U/S Flange	0	0	0	0.000	0.000
224	Suction line I/V Gland	0	0	0	0.000	0.000
225	Suction line I/V D/S Flange	0	0	0	0.000	0.000
226	Stainer Top Flange	0	0	0	0.000	0.000
227	Drain line I/V Gland	0	0	0	0.000	0.000
228	Drain line Safety Flange	0	0	0	0.000	0.000
229	Suction line Flange	0	0	0	0.000	0.000
230	Discharge line flange	0	0	0	0.000	0.000
231	Top Flange	0	0	0	0.000	0.000
232	P.G. Meter I/V Gland	0	0	0	0.000	0.000
233	P.G. Meter SAMPLING line I/V Gland	0	0	0	0.000	0.000
234	Discharge line I/V Gland	0	0	0	0.000	0.000
	03-PM-00-003A WILD Naptha					
235	Suction line I/V U/S Flange	0	0	0	0.000	0.000
236	Suction line I/V Gland	0	0	0	0.000	0.000
237	Suction line I/V D/S Flange	0	0	0	0.000	0.000
238	Stainer Top Flange	0	0	0	0.000	0.000
239	Drain line I/V Gland	0	0	0	0.000	0.000
240	Drain line Safety Flange	0	0	0	0.000	0.000
241	Suction line Flange	0	0	0	0.000	0.000
242	Discharge line flange	0	0	0	0.000	0.000
243	Top Flange	0	0	0	0.000	0.000
244	P.G. Meter I/V Gland	0	0	0	0.000	0.000
245	P.G. Meter SAMPLING line I/V Gland	0	0	0	0.000	0.000
246	Discharge line I/V Gland	0	0	0	0.000	0.000
247	Drain Point	0	0	0	0.000	0.000
248	Slope From Off site line U/S I/V Gland	0	0	0	0.000	0.000
249	Drain line I/V Gland	0	0	0	0.000	0.000
250	Drain line Safety Flange	0	0	0	0.000	0.000
251	Stainer Top Flange	0	0	0	0.000	0.000
252	D/S line I/V U/S Flange	0	0	0	0.000	0.000
253	From PA-17-A/B line Top Flange	0	0	0	0.000	0.000
254	From PA-17-A/B line I/V Gland	0	0	0	0.000	0.000
	03-PA-00-003A					
255	Suction line I/V U/S Flange	0	0	0	0.000	0.000
256	Suction line I/V Gland	0	0	0	0.000	0.000
257	Suction line I/V D/S Flange	0	0	0	0.000	0.000
258	Stainer Top Flange	0	0	0	0.000	0.000
259	Drain line I/V Gland	0	0	0	0.000	0.000
260	Drain line Safety Flange	0	0	0	0.000	0.000
261	Suction line Flange	0	0	0	0.000	0.000
262	Discharge line flange	0	0	0	0.000	0.000
263	Vent line safety Flange	0	0	0	0.000	0.000
264	P.G. Meter I/V Gland	0	0	0	0.000	0.000
265	P.G. Meter SAMPLING line I/V Gland	0	0	0	0.000	0.000
266	Discharge line I/V U/S Flange	0	0	0	0.000	0.000
267	Discharge line I/V Gland	0	0	0	0.000	0.000
268	Discharge line I/V D/S Flange	0	0	0	0.000	0.000
269	Suction line I/V U/S Flange	0	0	0	0.000	0.000
270	Suction line I/V D/S Flange	0	0	0	0.000	0.000
271	Stainer Top Flange	0	0	0	0.000	0.000
272	Drain line I/V Gland	0	0	0	0.000	0.000
273	Drain line Safety Flange	0	0	0	0.000	0.000
274	Suction line Flange	0	0	0	0.000	0.000
275	Discharge line flange	0	0	0	0.000	0.000
276	P.G. Meter I/V Gland	0	0	0	0.000	0.000
277	P.G. Meter SAMPLING line I/V Gland	0	0	0	0.000	0.000
278	NRV U/S Flange	0	0	0	0.000	0.000
279	NRV Top Flange	0	0	0	0.000	0.000
280	NRV D/S Flange	0	0	0	0.000	0.000
281	Discharge line I/V U/S Flange	0	0	0	0.000	0.000
282	Discharge line I/V Gland	0	0	0	0.000	0.000
283	Discharge line I/V D/S Flange	0	0	0	0.000	0.000
	Area: Pump					
1	03-PV-2301-line U/S I/V Gland	0	0	0	0.000	0.000
2	Drain line I/V Gland	0	0	0	0.000	0.000
3	03-PV-2301-line C/V U/S Flange	0	0	0	0.000	0.000
4	03-PV-2301-line C/V Gland	0	0	0	0.000	0.000
5	03-PV-2301-line C/V D/S Flange	0	0	0	0.000	0.000
6	Drain line I/V Gland	0	0	0	0.000	0.000
7	03-PV-2301-line D/S I/V Gland	0	0	0	0.000	0.000
8	03-LV-1101-B line U/S I/V U/S Flange	0	0	0	0.000	0.000
9	Drain line I/V Gland	0	0	0	0.000	0.000
10	Drain line Safety Flange	0	0	0	0.000	0.000
11	03-LV-1101-B line C/V U/S Flange	0	0	0	0.000	0.000
12	03-LV-1101-B line C/V Gland	0	0	0	0.000	0.000
13	03-LV-1101-B line C/V D/S Flange	0	0	0	0.000	0.000
14	Drain line I/V Gland	0	0	0	0.000	0.000
15	Drain line Safety Flange	0	0	0	0.000	0.000
16	02-LV-1101-B D/S I/V U/S Flange	0	0	0	0.000	0.000
17	02-LV-1101-B D/S I/V Gland	0	0	0	0.000	0.000
18	02-LV-1101-B D/S I/V D/S Flange	0	0	0	0.000	0.000
19	Bypass line I/V Gland	0	0	0	0.000	0.000
	03-PA-00-0017A					
20	Suction line I/V U/S Flange	0	0	0	0.000	0.000
21	Suction line I/V Gland	0	0	0	0.000	0.000
22	Suction line I/V D/S Flange	0	0	0	0.000	0.000

FUGITIVE EMISSIONS SURVEY REPORT

[August 2021]



Client : NRL

ETS

Work Order No: 4300058771-BOR/12.04.2019		ETS/NRL/FUGITIVE/004/21				
S/N	Component ID	AVERAGE READING LEL %	READING (%NG)	READING (ppm)	EPA Correlation Kg/Hr/Source	Total Emission kg/annum
23	Stainer Top Flange	0	0	0	0.000	0.000
24	Drain line I/V Gland	0	0	0	0.000	0.000
25	Drain line Safety Flange	0	0	0	0.000	0.000
26	Suction line Flange	0	0	0	0.000	0.000
27	Pump Seal	0	0	0	0.000	0.000
28	Discharge line flange	0	0	0	0.000	0.000
29	P.G. Meter I/V Gland	0	0	0	0.000	0.000
30	P.G. Meter SAMPLING line I/V Gland	0	0	0	0.000	0.000
31	NRV U/S Flange	0	0	0	0.000	0.000
32	NRV Top Flange	0	0	0	0.000	0.000
33	NRV D/S Flange	0	0	0	0.000	0.000
34	Drain line I/V Gland	0	0	0	0.000	0.000
35	Drain line Safety Flange	0	0	0	0.000	0.000
36	Discharge line I/V U/S Flange	0	0	0	0.000	0.000
37	Discharge line I/V Gland	0	0	0	0.000	0.000
38	Discharge line I/V D/S Flange	0	0	0	0.000	0.000
39	CBD line I/V Gland	0	0	0	0.000	0.000
40	Stainer Flange	0	0	0	0.000	0.000
41	Drain line I/V Gland	0	0	0	0.000	0.000
42	OWS Point	0	0	0	0.000	0.000
	03-PA-00-0017B					
43	Suction line I/V U/S Flange	0	0	0	0.000	0.000
44	Suction line I/V Gland	0	0	0	0.000	0.000
45	Suction line I/V D/S Flange	0	0	0	0.000	0.000
46	Stainer Top Flange	0	0	0	0.000	0.000
47	Stainer Top Flange Drain line I/V Gland	0	0	0	0.000	0.000
48	Stainer Top Flange Drain line Safety Flange	0	0	0	0.000	0.000
49	Suction line Flange	0	0	0	0.000	0.000
50	Pump Seal	0	0	0	0.000	0.000
51	Discharge line flange	0	0	0	0.000	0.000
52	P.G. Meter I/V Gland	0	0	0	0.000	0.000
53	P.G. Meter SAMPLING line I/V Gland	0	0	0	0.000	0.000
54	NRV U/S Flange	0	0	0	0.000	0.000
55	NRV Top Flange	0	0	0	0.000	0.000
56	NRV D/S Flange	0	0	0	0.000	0.000
57	Drain line I/V Gland	0	0	0	0.000	0.000
58	Drain line Safety Flange	0	0	0	0.000	0.000
59	Discharge line I/V U/S Flange	0	0	0	0.000	0.000
60	Discharge line I/V Gland	0	0	0	0.000	0.000
61	Discharge line I/V D/S Flange	0	0	0	0.000	0.000
62	CBD line I/V Gland	0	0	0	0.000	0.000
63	Stainer Flange	0	0	0	0.000	0.000
64	Drain line I/V Gland	0	0	0	0.000	0.000
65	Stainer Flange	0	0	0	0.000	0.000
66	OWS Point	0	0	0	0.000	0.000
67	03-PV-1104 line U/S I/V Flange	0	0	0	0.000	0.000
68	Drain line I/V Gland	0	0	0	0.000	0.000
69	Drain line Safety Flange	0	0	0	0.000	0.000
70	03-PV-1104 line C/V U/S Flange	0	0	0	0.000	0.000
71	03-PV-1104 line C/V Gland	0	0	0	0.000	0.000
72	03-PV-1104 line C/V D/S Flange	0	0	0	0.000	0.000
73	Drain line I/V Gland	0	0	0	0.000	0.000
74	Drain line Safety Flange	0	0	0	0.000	0.000
75	03-PV-1104 line D/S I/V Flange	0	0	0	0.000	0.000
76	Bypass line I/V Gland	0	0	0	0.000	0.000
77	P.G. Meter I/V Gland	0	0	0	0.000	0.000
78	P.G. Meter SAMPLING line I/V Gland	0	0	0	0.000	0.000
79	Drain & Sampling line 1st I/V Gland	0	0	0	0.000	0.000
80	Drain & Sampling line 2nd I/V Gland	0	0	0	0.000	0.000
81	Go To SLDF HDR line U/S I/V Gland	0	0	0	0.000	0.000
82	Drain line I/V Gland	0	0	0	0.000	0.000
83	Drain line Safety Flange	0	0	0	0.000	0.000
84	Stainer Flange	0	0	0	0.000	0.000
85	D/S line I/V U/S Flange	0	0	0	0.000	0.000
86	Go To CH HDR line U/S I/V Gland	0	0	0	0.000	0.000
87	Drain line I/V Gland	0	0	0	0.000	0.000
88	Drain line Safety Flange	0	0	0	0.000	0.000
89	D/S line I/V U/S Flange	0	0	0	0.000	0.000
90	03-FV-1107 line U/S I/V Gland	0	0	0	0.000	0.000
91	Drain line I/V Gland	0	0	0	0.000	0.000
92	Drain line Safety Flange	0	0	0	0.000	0.000
93	03-FV-1107 line C/V I/V Gland	0	0	0	0.000	0.000
94	03-FV-1107 line C/V Gland	0	0	0	0.000	0.000
95	03-FV-1107 line C/V D/S Flange	0	0	0	0.000	0.000
96	Drain line I/V Gland	0	0	0	0.000	0.000
97	Drain line Safety Flange	0	0	0	0.000	0.000
98	03-FV-1107 line U/S I/V Gland	0	0	0	0.000	0.000
99	Bypass line I/V Gland	0	0	0	0.000	0.000
100	Bypass line P.G. Meter I/V Gland	0	0	0	0.000	0.000
101	P.G. Meter SAMPLING line I/V Gland	0	0	0	0.000	0.000
102	Drain line sampling line 1st I/V Gland	0	0	0	0.000	0.000
103	Drain line sampling line 2nd I/V Gland	0	0	0	0.000	0.000
104	KERO II TO SLOP line stainer Flange	0	0	0	0.000	0.000
105	Drain line I/V Gland	0	0	0	0.000	0.000
106	Drain line Safety Flange	0	0	0	0.000	0.000
107	Stainer Flange	0	0	0	0.000	0.000
108	2nd I/V Gland	0	0	0	0.000	0.000
109	KERO II TO CD HDR line Stainer Flange	0	0	0	0.000	0.000

FUGITIVE EMISSIONS SURVEY REPORT

[August 2021]



Client : NRL

ETS

Work Order No: 4300058771-BOR/12.04.2019		ETS/NRL/FUGITIVE/004/21				
S/N	Component ID	AVERAGE READING LEL %	READING (%NG)	READING (ppm)	EPA Correlation Kg/Hr/Source	Total Emission kg/annum
110	KERO II TO CD HDR line Stainer I/V Gland	0	0	0	0.000	0.000
111	Drain line I/V Gland	0	0	0	0.000	0.000
112	Drain line Safety Flange	0	0	0	0.000	0.000
113	03-FV-1108 line U/S I/V Gland	0	0	0	0.000	0.000
114	Drain line I/V Gland	0	0	0	0.000	0.000
115	Drain line Safety Flange	0	0	0	0.000	0.000
116	03-FV-1106 line U/S I/V Gland	0	0	0	0.000	0.000
117	03-FV-1106 line C/V Gland	0	0	0	0.000	0.000
118	03-FV-1106 line C/V D/S Flange	0	0	0	0.000	0.000
119	Drain line I/V Gland	0	0	0	0.000	0.000
120	Drain line Safety Flange	0	0	0	0.000	0.000
121	03-FV-1108 line D/S I/V Gland	0	0	0	0.000	0.000
122	Bypass line I/V Gland	0	0	0	0.000	0.000
123	P.G. Meter I/V Gland	0	0	0	0.000	0.000
124	P.G. Meter SAMPLING line I/V Gland	0	0	0	0.000	0.000
125	Drain line 1st I/V Gland	0	0	0	0.000	0.000
126	Drain line 2nd I/V Gland	0	0	0	0.000	0.000
127	KRRO-1 TO SLOP HEADER line U/S I/V Gland	0	0	0	0.000	0.000
128	Strainer Flange	0	0	0	0.000	0.000
129	Drain line I/V Gland	0	0	0	0.000	0.000
130	Drain line Safety Flange	0	0	0	0.000	0.000
131	D/S I/V Gland	0	0	0	0.000	0.000
Pump & Furnace						
1	03-FV-1402 line U/S I/V Gland	0	0	0	0.000	0.000
2	Drain line I/V Gland	0	0	0	0.000	0.000
3	Drain line Safety Flange	0	0	0	0.000	0.000
4	03-FV-1402 line C/V U/S Flange	0	0	0	0.000	0.000
5	03-FV-1402 line C/V Gland	0	0	0	0.000	0.000
6	03-FV-1402 line C/V D/S Flange	0	0	0	0.000	0.000
7	Drain line I/V Gland	0	0	0	0.000	0.000
8	Drain line Safety Flange	0	0	0	0.000	0.000
9	03-FV-1402 line D/S I/V Gland	0	0	0	0.000	0.000
10	Bypass line I/V Gland	0	0	0	0.000	0.000
11	03-FV-1402 line U/S I/V U/S Flange	0	0	0	0.000	0.000
12	03-FV-1402 line U/S I/V Gland	0	0	0	0.000	0.000
13	03-FV-1402 line U/S I/V D/S Flange	0	0	0	0.000	0.000
14	Drain line I/V Gland	0	0	0	0.000	0.000
15	Drain line Safety Flange	0	0	0	0.000	0.000
16	03-FV-1402 line C/V U/S Flange	0	0	0	0.000	0.000
17	03-FV-1402 line C/V Gland	0	0	0	0.000	0.000
18	03-FV-1402 line C/V D/S Flange	0	0	0	0.000	0.000
19	Drain line I/V Gland	0	0	0	0.000	0.000
20	Drain line Safety Flange	0	0	0	0.000	0.000
21	03-FV-1402 line D/S I/V U/S Flange	0	0	0	0.000	0.000
22	03-FV-1402 line D/S I/V Gland	0	0	0	0.000	0.000
23	03-FV-1402 line D/S I/V D/S Flange	0	0	0	0.000	0.000
24	Bypass line I/V U/S Flange	0	0	0	0.000	0.000
25	Bypass line I/V Gland	0	0	0	0.000	0.000
26	Bypass line I/V D/S Flange	0	0	0	0.000	0.000
	03-EE-24(NAP) COOLER SHELL STAB NAP TUBE-CW					
27	South side line Stainer Flange	0	0	0	0.000	0.000
28	CBD line 1st I/V U/S Flange	0	0	0	0.000	0.000
29	CBD LINE 1st I/V GLAND	0	0	0	0.000	0.000
30	CBD line 1st I/V D/S Flange	0	0	0	0.000	0.000
31	CBD line 2nd I/V U/S Flange	0	0	0	0.000	0.000
32	CBD LINE 2nd I/V GLAND	0	0	0	0.000	0.000
33	CBD line 2nd I/V D/S Flange	0	0	0	0.000	0.000
34	Drain line I/V Gland	0	0	0	0.000	0.000
35	OWS Point	0	0	0	0.000	0.000
	03-PM-00-019A					
36	Suction line I/V U/S Flange	0	0	0	0.000	0.000
37	Suction line I/V Gland	0	0	0	0.000	0.000
38	Suction line I/V D/S Flange	0	0	0	0.000	0.000
39	Stainer Top Flange	0	0	0	0.000	0.000
40	Stainer Top Flange Drain line I/V Gland	0	0	0	0.000	0.000
41	Stainer Top Flange Drain line Safety Flange	0	0	0	0.000	0.000
42	Suction line Flange	0	0	0	0.000	0.000
43	Discharge line flange	0	0	0	0.000	0.000
44	P.G. Meter I/V Gland	0	0	0	0.000	0.000
45	P.G. Meter SAMPLING line I/V Gland	0	0	0	0.000	0.000
46	Top Flange	0	0	0	0.000	0.000
47	Drain line I/V Gland	0	0	0	0.000	0.000
48	Drain line Safety Flange	0	0	0	0.000	0.000
49	Discharge line flange	0	0	0	0.000	0.000
	03-PM-00-019B					
50	Suction line I/V U/S Flange	0	0	0	0.000	0.000
51	Suction line I/V Gland	0	0	0	0.000	0.000
52	Suction line I/V D/S Flange	0	0	0	0.000	0.000
53	Stainer Top Flange	0	0	0	0.000	0.000
54	Stainer Top Flange Drain line I/V Gland	0	0	0	0.000	0.000
55	Stainer Top Flange Drain line Safety Flange	0	0	0	0.000	0.000
56	Suction line Flange	0	0	0	0.000	0.000
57	Discharge line flange	0	0	0	0.000	0.000
58	P.G. Meter I/V Gland	0	0	0	0.000	0.000
59	P.G. Meter SAMPLING line I/V Gland	0	0	0	0.000	0.000
60	Top Flange	0	0	0	0.000	0.000
61	Drain line I/V Gland	0	0	0	0.000	0.000

FUGITIVE EMISSIONS SURVEY REPORT

[August 2021]



Client : NRL

ETS

Work Order No: 4300058771-BOR/12.04.2019		ETS/NRL/FUGITIVE/004/21				
S/N	Component ID	AVERAGE READING LEL %	READING (%NG)	READING (ppm)	EPA Correlation Kg/Hr/Source	Total Emission kg/annum
62	Drain line Safety Flange	0	0	0	0.000	0.000
63	Discharge line flange	0	0	0	0.000	0.000
64	03-FV-1401 line U/S I/V U/S Flange	0	0	0	0.000	0.000
65	03-FV-1401 line U/S I/V Gland	0	0	0	0.000	0.000
66	03-FV-1401 line U/S I/V D/S Flange	0	0	0	0.000	0.000
67	Drain line I/V Gland	0	0	0	0.000	0.000
68	Drain line Safety Flange	0	0	0	0.000	0.000
69	03-FV-1401 line C/V U/S Flange	0	0	0	0.000	0.000
70	03-FV-1401 line C/V Gland	0	0	0	0.000	0.000
71	03-FV-1401 line C/V D/S Flange	0	0	0	0.000	0.000
72	03-FV-1401 line D/S I/V U/S Flange	0	0	0	0.000	0.000
73	03-FV-1401 line D/S I/V Gland	0	0	0	0.000	0.000
74	03-FV-1401 line D/S I/V D/S Flange	0	0	0	0.000	0.000
75	Drain line I/V Gland	0	0	0	0.000	0.000
76	Drain line Safety Flange	0	0	0	0.000	0.000
77	Bypass line I/V U/S Flange	0	0	0	0.000	0.000
78	Bypass line I/V Gland	0	0	0	0.000	0.000
79	Bypass line I/V D/S Flange	0	0	0	0.000	0.000
	03-PA-00-002A					
80	Suction line I/V U/S Flange	0	0	0	0.000	0.000
81	Suction line I/V Gland	0	0	0	0.000	0.000
82	Suction line I/V D/S Flange	0	0	0	0.000	0.000
83	Stainer Top Flange	0	0	0	0.000	0.000
84	Stainer Top Flange Drain line I/V Gland	0	0	0	0.000	0.000
85	Stainer Top Flange Drain line Safety Flange	0	0	0	0.000	0.000
86	Suction line Flange	0	0	0	0.000	0.000
87	Pump Seal	0	0	0	0.000	0.000
88	Discharge line flange	0	0	0	0.000	0.000
89	P.G. Meter I/V Gland	0	0	0	0.000	0.000
90	P.G. Meter SAMPLING line I/V Gland	0	0	0	0.000	0.000
91	NRV U/S Flange	0	0	0	0.000	0.000
92	NRV Top Flange	0	0	0	0.000	0.000
93	NRV D/S Flange	0	0	0	0.000	0.000
94	Drain line I/V Gland	0	0	0	0.000	0.000
95	Drain line Safety Flange	0	0	0	0.000	0.000
96	Discharge line I/V U/S Flange	0	0	0	0.000	0.000
97	Discharge line I/V Gland	0	0	0	0.000	0.000
98	Discharge line I/V D/S Flange	0	0	0	0.000	0.000
99	Pump to CBD line I/V Gland	0	0	0	0.000	0.000
100	Stainer Flange	0	0	0	0.000	0.000
101	2nd I/V Gland	0	0	0	0.000	0.000
102	Drain line I/V Gland	0	0	0	0.000	0.000
103	Stainer Flange	0	0	0	0.000	0.000
104	Drain line OWS Point	0	0	0	0.000	0.000
	03-PA-00-002B					
105	Suction line I/V U/S Flange	0	0	0	0.000	0.000
106	Suction line I/V Gland	0	0	0	0.000	0.000
107	Suction line I/V D/S Flange	0	0	0	0.000	0.000
108	Stainer Top Flange	0	0	0	0.000	0.000
109	Stainer Top Flange Drain line I/V Gland	0	0	0	0.000	0.000
110	Stainer Top Flange Drain line Safety Flange	0	0	0	0.000	0.000
111	Suction line Flange	0	0	0	0.000	0.000
112	Pump Seal	0	0	0	0.000	0.000
113	Discharge line flange	0	0	0	0.000	0.000
114	P.G. Meter I/V Gland	0	0	0	0.000	0.000
115	P.G. Meter SAMPLING line I/V Gland	0	0	0	0.000	0.000
116	NRV U/S Flange	0	0	0	0.000	0.000
117	NRV Top Flange	0	0	0	0.000	0.000
118	NRV D/S Flange	0	0	0	0.000	0.000
119	Drain line I/V Gland	0	0	0	0.000	0.000
120	Drain line Safety Flange	0	0	0	0.000	0.000
121	Discharge line I/V U/S Flange	0	0	0	0.000	0.000
122	Discharge line I/V Gland	0	0	0	0.000	0.000
123	Discharge line I/V D/S Flange	0	0	0	0.000	0.000
124	Pump to CBD line I/V Gland	0	0	0	0.000	0.000
125	Stainer Flange	0	0	0	0.000	0.000
126	2nd I/V Gland	0	0	0	0.000	0.000
127	Drain line I/V Gland	0	0	0	0.000	0.000
128	Stainer Flange	0	0	0	0.000	0.000
129	Drain line OWS Point	0	0	0	0.000	0.000
130	03-PV-1203 line U/S I/V Gland	0	0	0	0.000	0.000
131	Drain line I/V Gland	0	0	0	0.000	0.000
132	Drain line Safety Flange	0	0	0	0.000	0.000
133	03-PV-1203 line C/V Gland	0	0	0	0.000	0.000
134	03-PV-1203 line D/S I/V Gland	0	0	0	0.000	0.000
135	Drain line I/V Gland	0	0	0	0.000	0.000
136	Drain line Safety Flange	0	0	0	0.000	0.000
137	Bypass line I/V Gland	0	0	0	0.000	0.000
138	03-PV-1206 U/S line I/V Gland	0	0	0	0.000	0.000
139	Drain line I/V Gland	0	0	0	0.000	0.000
140	Drain line Safety Flange	0	0	0	0.000	0.000
141	03-PV-1206 line C/V Gland	0	0	0	0.000	0.000
142	Drain line I/V Gland	0	0	0	0.000	0.000
143	Drain line Safety Flange	0	0	0	0.000	0.000
144	03-PV-1206 D/S line I/V Gland	0	0	0	0.000	0.000
145	Bypass line I/V Gland	0	0	0	0.000	0.000
146	03-PV-1204 line U/S I/V Gland	0	0	0	0.000	0.000
147	Drain line I/V Gland	0	0	0	0.000	0.000

FUGITIVE EMISSIONS SURVEY REPORT

[August 2021]



Client : NRL

ETS

Work Order No: 4300058771-BOR/12.04.2019		ETS/NRL/FUGITIVE/004/21				
S/N	Component ID	AVERAGE READING LEL %	READING (%NG)	READING (ppm)	EPA Correlation Kg/Hr/Source	Total Emission kg/annum
148	Drain line Safety Flange	0	0	0	0.000	0.000
149	03-PV-1204 C/V Gland	0	0	0	0.000	0.000
150	Drain line I/V Gland	0	0	0	0.000	0.000
151	Drain line Safety Flange	0	0	0	0.000	0.000
152	03-PV-1204 D/S line I/V Gland	0	0	0	0.000	0.000
153	Bypass line I/V Gland	0	0	0	0.000	0.000
154	03-PV-1207 U/S line I/V Gland	0	0	0	0.000	0.000
155	Drain line I/V Gland	0	0	0	0.000	0.000
156	Drain line Safety Flange	0	0	0	0.000	0.000
157	03-PV-1207 C/V Gland	0	0	0	0.000	0.000
158	Drain line I/V Gland	0	0	0	0.000	0.000
159	Drain line Safety Flange	0	0	0	0.000	0.000
160	03-PV-1207 D/S line I/V Gland	0	0	0	0.000	0.000
161	Bypass line I/V Gland	0	0	0	0.000	0.000
Area= Furnace West Side						
162	B. No. -1-Pilot Gas line I/V U/S Flange	0	0	0	0.000	0.000
163	B. No. -1-Pilot Gas line I/V Gland	0	0	0	0.000	0.000
164	B. No. -1-Pilot Gas line I/V D/S Flange	0	0	0	0.000	0.000
165	Fuel Gas line I/V U/S Flange	0	0	0	0.000	0.000
166	Fuel Gas line I/V Gland	0	0	0	0.000	0.000
167	Fuel Gas line I/V D/S Flange	0	0	0	0.000	0.000
168	B. No. -2-Pilot Gas line I/V U/S Flange	0	0	0	0.000	0.000
169	B. No. -2-Pilot Gas line I/V Gland	0	0	0	0.000	0.000
170	B. No. -2-Pilot Gas line I/V D/S Flange	0	0	0	0.000	0.000
171	Fuel Gas line I/V U/S Flange	0	0	0	0.000	0.000
172	Fuel Gas line I/V Gland	0	0	0	0.000	0.000
173	Fuel Gas line I/V D/S Flange	0	0	0	0.000	0.000
174	B. No. -3-Pilot Gas line I/V U/S Flange	0	0	0	0.000	0.000
175	B. No. -3-Pilot Gas line I/V Gland	0	0	0	0.000	0.000
176	B. No. -3-Pilot Gas line I/V D/S Flange	0	0	0	0.000	0.000
177	Fuel Gas line I/V U/S Flange	0	0	0	0.000	0.000
178	Fuel Gas line I/V Gland	0	0	0	0.000	0.000
179	Fuel Gas line I/V D/S Flange	0	0	0	0.000	0.000
180	B. No. -4-Pilot Gas line I/V U/S Flange	0	0	0	0.000	0.000
181	B. No. -4-Pilot Gas line I/V Gland	0	0	0	0.000	0.000
182	B. No. -4-Pilot Gas line I/V D/S Flange	0	0	0	0.000	0.000
183	Fuel Gas line I/V U/S Flange	0	0	0	0.000	0.000
184	Fuel Gas line I/V Gland	0	0	0	0.000	0.000
185	Fuel Gas line I/V D/S Flange	0	0	0	0.000	0.000
186	B. No. -5-Pilot Gas line I/V U/S Flange	0	0	0	0.000	0.000
187	B. No. -5-Pilot Gas line I/V Gland	0	0	0	0.000	0.000
188	B. No. -5-Pilot Gas line I/V D/S Flange	0	0	0	0.000	0.000
189	Fuel Gas line I/V U/S Flange	0	0	0	0.000	0.000
190	Fuel Gas line I/V Gland	0	0	0	0.000	0.000
191	Fuel Gas line I/V D/S Flange	0	0	0	0.000	0.000
192	B. No. -6-Pilot Gas line I/V U/S Flange	0	0	0	0.000	0.000
193	B. No. -6-Pilot Gas line I/V Gland	0	0	0	0.000	0.000
194	B. No. -6-Pilot Gas line I/V D/S Flange	0	0	0	0.000	0.000
195	Fuel Gas line I/V U/S Flange	0	0	0	0.000	0.000
196	Fuel Gas line I/V Gland	0	0	0	0.000	0.000
197	Fuel Gas line I/V D/S Flange	0	0	0	0.000	0.000
198	B. No. -7-Pilot Gas line I/V U/S Flange	0	0	0	0.000	0.000
199	B. No. -7-Pilot Gas line I/V Gland	0	0	0	0.000	0.000
200	B. No. -7-Pilot Gas line I/V D/S Flange	0	0	0	0.000	0.000
201	Fuel Gas line I/V U/S Flange	0	0	0	0.000	0.000
202	Fuel Gas line I/V Gland	0	0	0	0.000	0.000
203	Fuel Gas line I/V D/S Flange	0	0	0	0.000	0.000
204	B. No. -8-Pilot Gas line I/V U/S Flange	0	0	0	0.000	0.000
205	B. No. -8-Pilot Gas line I/V Gland	0	0	0	0.000	0.000
206	B. No. -8-Pilot Gas line I/V D/S Flange	0	0	0	0.000	0.000
207	Fuel Gas line I/V U/S Flange	0	0	0	0.000	0.000
208	Fuel Gas line I/V Gland	0	0	0	0.000	0.000
209	Fuel Gas line I/V D/S Flange	0	0	0	0.000	0.000
210	B. No. -9-Pilot Gas line I/V U/S Flange	0	0	0	0.000	0.000
211	B. No. -9-Pilot Gas line I/V Gland	0	0	0	0.000	0.000
212	B. No. -9-Pilot Gas line I/V D/S Flange	0	0	0	0.000	0.000
213	Fuel Gas line I/V U/S Flange	0	0	0	0.000	0.000
214	Fuel Gas line I/V Gland	0	0	0	0.000	0.000
215	Fuel Gas line I/V D/S Flange	0	0	0	0.000	0.000
216	B. No. -10-Pilot Gas line I/V U/S Flange	0	0	0	0.000	0.000
217	B. No. -10-Pilot Gas line I/V Gland	0	0	0	0.000	0.000
218	B. No. -10-Pilot Gas line I/V D/S Flange	0	0	0	0.000	0.000
219	Fuel Gas line I/V U/S Flange	0	0	0	0.000	0.000
220	Fuel Gas line I/V Gland	0	0	0	0.000	0.000
221	Fuel Gas line I/V D/S Flange	0	0	0	0.000	0.000
222	B. No. -11-Pilot Gas line I/V U/S Flange	0	0	0	0.000	0.000
223	B. No. -11-Pilot Gas line I/V Gland	0	0	0	0.000	0.000
224	B. No. -11-Pilot Gas line I/V D/S Flange	0	0	0	0.000	0.000
225	Fuel Gas line I/V U/S Flange	0	0	0	0.000	0.000
226	Fuel Gas line I/V Gland	0	0	0	0.000	0.000
227	Fuel Gas line I/V D/S Flange	0	0	0	0.000	0.000
228	B. No. -12-Pilot Gas line I/V U/S Flange	0	0	0	0.000	0.000
229	B. No. -12-Pilot Gas line I/V Gland	0	0	0	0.000	0.000
230	B. No. -12-Pilot Gas line I/V D/S Flange	0	0	0	0.000	0.000
231	Fuel Gas line I/V U/S Flange	0	0	0	0.000	0.000
232	Fuel Gas line I/V Gland	0	0	0	0.000	0.000
233	Fuel Gas line I/V D/S Flange	0	0	0	0.000	0.000
234	B. No. -13-Pilot Gas line I/V U/S Flange	0	0	0	0.000	0.000

FUGITIVE EMISSIONS SURVEY REPORT

[August 2021]



Client : NRL

ETS

Work Order No: 4300058771-BOR/12.04.2019		ETS/NRL/FUGITIVE/004/21				
S/N	Component ID	AVERAGE READING LEL %	READING (%NG)	READING (ppm)	EPA Correlation Kg/Hr/Source	Total Emission kg/annum
235	B. No. -13-Pilot Gas line I/V Gland	0	0	0	0.000	0.000
236	B. No. -13-Pilot Gas line I/V D/S Flange	0	0	0	0.000	0.000
237	Fuel Gas line I/V U/S Flange	0	0	0	0.000	0.000
238	Fuel Gas line I/V Gland	0	0	0	0.000	0.000
239	Fuel Gas line I/V D/S Flange	0	0	0	0.000	0.000
240	B. No. -14-Pilot Gas line I/V U/S Flange	0	0	0	0.000	0.000
241	B. No. -14-Pilot Gas line I/V Gland	0	0	0	0.000	0.000
242	B. No. -14-Pilot Gas line I/V D/S Flange	0	0	0	0.000	0.000
243	Fuel Gas line I/V U/S Flange	0	0	0	0.000	0.000
244	Fuel Gas line I/V Gland	0	0	0	0.000	0.000
245	Fuel Gas line I/V D/S Flange	0	0	0	0.000	0.000
246	B. No. -15-Pilot Gas line I/V U/S Flange	0	0	0	0.000	0.000
247	B. No. -15-Pilot Gas line I/V Gland	0	0	0	0.000	0.000
248	B. No. -15-Pilot Gas line I/V D/S Flange	0	0	0	0.000	0.000
249	Fuel Gas line I/V U/S Flange	0	0	0	0.000	0.000
250	Fuel Gas line I/V Gland	0	0	0	0.000	0.000
251	Fuel Gas line I/V D/S Flange	0	0	0	0.000	0.000
252	B. No. -16-Pilot Gas line I/V U/S Flange	0	0	0	0.000	0.000
253	B. No. -16-Pilot Gas line I/V Gland	0	0	0	0.000	0.000
254	B. No. -16-Pilot Gas line I/V D/S Flange	0	0	0	0.000	0.000
255	Fuel Gas line I/V U/S Flange	0	0	0	0.000	0.000
256	Fuel Gas line I/V Gland	0	0	0	0.000	0.000
257	Fuel Gas line I/V D/S Flange	0	0	0	0.000	0.000
	Area=East side DCU					
258	B. No. -1-Pilot Gas line I/V U/S Flange	0	0	0	0.000	0.000
259	B. No. -1-Pilot Gas line I/V Gland	0	0	0	0.000	0.000
260	B. No. -1-Pilot Gas line I/V D/S Flange	0	0	0	0.000	0.000
261	Fuel Gas line I/V U/S Flange	0	0	0	0.000	0.000
262	Fuel Gas line I/V Gland	0	0	0	0.000	0.000
263	Fuel Gas line I/V D/S Flange	0	0	0	0.000	0.000
264	B. No. -2-Pilot Gas line I/V U/S Flange	0	0	0	0.000	0.000
265	B. No. -2-Pilot Gas line I/V Gland	0	0	0	0.000	0.000
266	B. No. -2-Pilot Gas line I/V D/S Flange	0	0	0	0.000	0.000
267	Fuel Gas line I/V U/S Flange	0	0	0	0.000	0.000
268	Fuel Gas line I/V Gland	0	0	0	0.000	0.000
269	Fuel Gas line I/V D/S Flange	0	0	0	0.000	0.000
270	B. No. -3-Pilot Gas line I/V U/S Flange	0	0	0	0.000	0.000
271	B. No. -3-Pilot Gas line I/V Gland	0	0	0	0.000	0.000
272	B. No. -3-Pilot Gas line I/V D/S Flange	0	0	0	0.000	0.000
273	Fuel Gas line I/V U/S Flange	0	0	0	0.000	0.000
274	Fuel Gas line I/V Gland	0	0	0	0.000	0.000
275	Fuel Gas line I/V D/S Flange	0	0	0	0.000	0.000
276	B. No. -4-Pilot Gas line I/V U/S Flange	0	0	0	0.000	0.000
277	B. No. -4-Pilot Gas line I/V Gland	0	0	0	0.000	0.000
278	B. No. -4-Pilot Gas line I/V D/S Flange	0	0	0	0.000	0.000
279	Fuel Gas line I/V U/S Flange	0	0	0	0.000	0.000
280	Fuel Gas line I/V Gland	0	0	0	0.000	0.000
281	Fuel Gas line I/V D/S Flange	0	0	0	0.000	0.000
282	B. No. -5-Pilot Gas line I/V U/S Flange	0	0	0	0.000	0.000
283	B. No. -5-Pilot Gas line I/V Gland	0	0	0	0.000	0.000
284	B. No. -5-Pilot Gas line I/V D/S Flange	0	0	0	0.000	0.000
285	Fuel Gas line I/V U/S Flange	0	0	0	0.000	0.000
286	Fuel Gas line I/V Gland	0	0	0	0.000	0.000
287	Fuel Gas line I/V D/S Flange	0	0	0	0.000	0.000
288	B. No. -6-Pilot Gas line I/V U/S Flange	0	0	0	0.000	0.000
289	B. No. -6-Pilot Gas line I/V Gland	0	0	0	0.000	0.000
290	B. No. -6-Pilot Gas line I/V D/S Flange	0	0	0	0.000	0.000
291	Fuel Gas line I/V U/S Flange	0	0	0	0.000	0.000
292	Fuel Gas line I/V Gland	0	0	0	0.000	0.000
293	Fuel Gas line I/V D/S Flange	0	0	0	0.000	0.000
294	B. No. -7-Pilot Gas line I/V U/S Flange	0	0	0	0.000	0.000
295	B. No. -7-Pilot Gas line I/V Gland	0	0	0	0.000	0.000
296	B. No. -7-Pilot Gas line I/V D/S Flange	0	0	0	0.000	0.000
297	Fuel Gas line I/V U/S Flange	0	0	0	0.000	0.000
298	Fuel Gas line I/V Gland	0	0	0	0.000	0.000
299	Fuel Gas line I/V D/S Flange	0	0	0	0.000	0.000
300	B. No. -8-Pilot Gas line I/V U/S Flange	0	0	0	0.000	0.000
301	B. No. -8-Pilot Gas line I/V Gland	0	0	0	0.000	0.000
302	B. No. -8-Pilot Gas line I/V D/S Flange	0	0	0	0.000	0.000
303	Fuel Gas line I/V U/S Flange	0	0	0	0.000	0.000
304	Fuel Gas line I/V Gland	0	0	0	0.000	0.000
305	Fuel Gas line I/V D/S Flange	0	0	0	0.000	0.000
306	B. No. -9-Pilot Gas line I/V U/S Flange	0	0	0	0.000	0.000
307	B. No. -9-Pilot Gas line I/V Gland	0	0	0	0.000	0.000
308	B. No. -9-Pilot Gas line I/V D/S Flange	0	0	0	0.000	0.000
309	Fuel Gas line I/V U/S Flange	0	0	0	0.000	0.000
310	Fuel Gas line I/V Gland	0	0	0	0.000	0.000
311	Fuel Gas line I/V D/S Flange	0	0	0	0.000	0.000
312	B. No. -10-Pilot Gas line I/V U/S Flange	0	0	0	0.000	0.000
313	B. No. -10-Pilot Gas line I/V Gland	0	0	0	0.000	0.000
314	B. No. -10-Pilot Gas line I/V D/S Flange	0	0	0	0.000	0.000
315	Fuel Gas line I/V U/S Flange	0	0	0	0.000	0.000
316	Fuel Gas line I/V Gland	0	0	0	0.000	0.000
317	Fuel Gas line I/V D/S Flange	0	0	0	0.000	0.000
318	B. No. -11-Pilot Gas line I/V U/S Flange	0	0	0	0.000	0.000
319	B. No. -11-Pilot Gas line I/V Gland	0	0	0	0.000	0.000
320	B. No. -11-Pilot Gas line I/V D/S Flange	0	0	0	0.000	0.000
321	Fuel Gas line I/V U/S Flange	0	0	0	0.000	0.000

FUGITIVE EMISSIONS SURVEY REPORT

[August 2021]



Client : NRL

ETS

Work Order No: 4300058771-BOR/12.04.2019		ETS/NRL/FUGITIVE/004/21				
S/N	Component ID	AVERAGE READING LEL %	READING (%NG)	READING (ppm)	EPA Correlation Kg/Hr/Source	Total Emission kg/annum
322	Fuel Gas line I/V Gland	0	0	0	0.000	0.000
323	Fuel Gas line I/V D/S Flange	0	0	0	0.000	0.000
324	B. No. -12-Pilot Gas line I/V U/S Flange	0	0	0	0.000	0.000
325	B. No. -12-Pilot Gas line I/V Gland	0	0	0	0.000	0.000
326	B. No. -12-Pilot Gas line I/V D/S Flange	0	0	0	0.000	0.000
327	Fuel Gas line I/V U/S Flange	0	0	0	0.000	0.000
328	Fuel Gas line I/V Gland	0	0	0	0.000	0.000
329	Fuel Gas line I/V D/S Flange	0	0	0	0.000	0.000
330	B. No. -13-Pilot Gas line I/V U/S Flange	0	0	0	0.000	0.000
331	B. No. -13-Pilot Gas line I/V Gland	0	0	0	0.000	0.000
332	B. No. -13-Pilot Gas line I/V D/S Flange	0	0	0	0.000	0.000
333	Fuel Gas line I/V U/S Flange	0	0	0	0.000	0.000
334	Fuel Gas line I/V Gland	0	0	0	0.000	0.000
335	Fuel Gas line I/V D/S Flange	0	0	0	0.000	0.000
336	B. No. -14-Pilot Gas line I/V U/S Flange	0	0	0	0.000	0.000
337	B. No. -14-Pilot Gas line I/V Gland	0	0	0	0.000	0.000
338	B. No. -14-Pilot Gas line I/V D/S Flange	0	0	0	0.000	0.000
339	Fuel Gas line I/V U/S Flange	0	0	0	0.000	0.000
340	Fuel Gas line I/V Gland	0	0	0	0.000	0.000
341	Fuel Gas line I/V D/S Flange	0	0	0	0.000	0.000
342	B. No. -15-Pilot Gas line I/V U/S Flange	0	0	0	0.000	0.000
343	B. No. -15-Pilot Gas line I/V Gland	0	0	0	0.000	0.000
344	B. No. -15-Pilot Gas line I/V D/S Flange	0	0	0	0.000	0.000
345	Fuel Gas line I/V U/S Flange	0	0	0	0.000	0.000
346	Fuel Gas line I/V Gland	0	0	0	0.000	0.000
347	Fuel Gas line I/V D/S Flange	0	0	0	0.000	0.000
348	B. No. -16-Pilot Gas line I/V U/S Flange	0	0	0	0.000	0.000
349	B. No. -16-Pilot Gas line I/V Gland	0	0	0	0.000	0.000
350	B. No. -16-Pilot Gas line I/V D/S Flange	0	0	0	0.000	0.000
351	Fuel Gas line I/V U/S Flange	0	0	0	0.000	0.000
352	Fuel Gas line I/V Gland	0	0	0	0.000	0.000
353	Fuel Gas line I/V D/S Flange	0	0	0	0.000	0.000
354	03-FV-1603 line U/S I/V U/S Flange	0	0	0	0.000	0.000
355	03-FV-1603 line discharge I/V Gland	0	0	0	0.000	0.000
356	03-FV-1603 line U/S I/V D/S Flange	0	0	0	0.000	0.000
357	Drain line I/V Gland	0	0	0	0.000	0.000
358	Drain line Safety Flange	0	0	0	0.000	0.000
359	03-FV-1603 line C/V U/S Flange	0	0	0	0.000	0.000
360	03-FV-1603 line C/V Gland	0	0	0	0.000	0.000
361	03-FV-1603 line C/V D/S Flange	0	0	0	0.000	0.000
362	Drain line I/V Gland	0	0	0	0.000	0.000
363	Drain line Safety Flange	0	0	0	0.000	0.000
364	west side line I/V U/S Flange	0	0	0	0.000	0.000
365	west side line I/V Gland	0	0	0	0.000	0.000
366	west side line I/V D/S Flange	0	0	0	0.000	0.000
367	Bypass line I/V U/S Flange	0	0	0	0.000	0.000
368	Bypass line I/V Gland	0	0	0	0.000	0.000
369	Bypass line I/V D/S Flange	0	0	0	0.000	0.000
Unit: CDU/VDU						
Area: B/L						
1	Intergas Inlet Line U/S I/V U/S Flange	0	0	0	0.000	0.000
2	Intergas Inlet Line U/S I/V U/S Gland	0	0	0	0.000	0.000
3	Intergas Inlet Line U/S I/V D/S Flange	0	0	0	0.000	0.000
4	Intergas Inlet Line D/S I/V U/S Flange	0	0	0	0.000	0.000
5	Intergas Inlet Line D/S I/V U/S Gland	0	0	0	0.000	0.000
6	Intergas Inlet Line D/S I/V D/S Flange	0	0	0	0.000	0.000
7	UNSTAB Naptha Outlet Line U/S I/V	0	0	0	0.000	0.000
8	UNSTAB Naptha Outlet Line U/S I/V	0	0	0	0.000	0.000
9	UNSTAB Naptha Outlet Line U/S I/V	0	0	0	0.000	0.000
10	UNSTAB Naptha Outlet Line D/S I/V	0	0	0	0.000	0.000
11	UNSTAB Naptha Outlet Line D/S I/V	0	0	0	0.000	0.000
12	UNSTAB Naptha Outlet Line D/S I/V	0	0	0	0.000	0.000
13	STAB Naptha to Storage Outlet Line	0	0	0	0.000	0.000
14	STAB Naptha to Storage Outlet Line	0	0	0	0.000	0.000
15	STAB Naptha to Storage Outlet Line	0	0	0	0.000	0.000
16	Meter line 1st I/V Gland	0	0	0	0.000	0.000
17	Meter line 2nd I/V Gland	0	0	0	0.000	0.000
18	Drain line 1st I/V Gland	0	0	0	0.000	0.000
19	Drain line 2nd I/V Gland	0	0	0	0.000	0.000
20	Vrain Line I/V Gland	0	0	0	0.000	0.000
21	Vrain Line Safety Flange	0	0	0	0.000	0.000
22	LPG Bullet Outlet U/S Line I/V U/S Flange	0	0	0	0.000	0.000
23	LPG Bullet Outlet U/S Line I/V U/S Gland	0	0	0	0.000	0.000
24	LPG Bullet Outlet U/S Line I/V D/S Flange	0	0	0	0.000	0.000
25	LPG Bullet Outlet D/S Line I/V U/S Flange	0	0	0	0.000	0.000
26	LPG Bullet Outlet D/S Line I/V U/S Gland	0	0	0	0.000	0.000
27	LPG Bullet Outlet D/S Line I/V D/S Flange	0	0	0	0.000	0.000
28	LPG to Inlet Vrain Line I/V Gland	0	0	0	0.000	0.000
29	LPG to Inlet Vrain Line I/V Safety Flange	0	0	0	0.000	0.000
30	LPG to Inlet U/S Line I/V U/S Flange	0	0	0	0.000	0.000
31	LPG to Inlet U/S Line I/V U/S Gland	0	0	0	0.000	0.000
32	LPG to Inlet U/S Line I/V D/S Flange	0	0	0	0.000	0.000
33	LPG to Inlet D/S Line I/V U/S Flange	0	0	0	0.000	0.000
34	LPG to Inlet D/S Line I/V U/S Gland	0	0	0	0.000	0.000
35	LPG to Inlet D/S Line I/V D/S Flange	0	0	0	0.000	0.000
36	LPG Ex SPHERE Inlet U/S Line I/V U/S Flange	0	0	0	0.000	0.000

FUGITIVE EMISSIONS SURVEY REPORT

[August 2021]



Client : NRL

ETS

Work Order No: 4300058771-BOR/12.04.2019 ETS/NRL/FUGITIVE/004/21

S/N	Component ID	AVERAGE READING LEL %	READING (%NG)	READING (ppm)	EPA Correlation Kg/Hr/Source	Total Emission kg/annum
37	LPG Ex SPHERE Inlet U/S Line I/V U/S Gland	0	0	0	0.000	0.000
38	LPG Ex SPHERE Inlet U/S Line I/V D/S Flange	0	0	0	0.000	0.000
39	LPG Ex SPHERE Inlet D/S Line I/V U/S Flange	0	0	0	0.000	0.000
40	LPG Ex SPHERE Inlet D/S Line I/V U/S Gland	0	0	0	0.000	0.000
41	LPG Ex SPHERE Inlet D/S Line I/V D/S Flange	0	0	0	0.000	0.000
42	Fuel gas Inlet Line U/S I/V U/S Flange	0	0	0	0.000	0.000
43	Fuel gas Inlet Line U/S I/V U/S Gland	0	0	0	0.000	0.000
44	Fuel gas Inlet Line U/S I/V D/S Flange	0	0	0	0.000	0.000
45	Fuel gas Inlet Line D/S I/V U/S Flange	0	0	0	0.000	0.000
46	Fuel gas Inlet Line D/S I/V U/S Gland	0	0	0	0.000	0.000
47	Fuel gas Inlet Line D/S I/V D/S Flange	0	0	0	0.000	0.000
48	Vrain Line I/V Gland	0	0	0	0.000	0.000
49	Vrain Line Safety Flange	0	0	0	0.000	0.000
50	LPG to SPHERE Inlet U/S Line I/V U/S Flange	0	0	0	0.000	0.000
51	LPG to SPHERE Inlet U/S Line I/V U/S Gland	0	0	0	0.000	0.000
52	LPG to SPHERE Inlet U/S Line I/V D/S Flange	0	0	0	0.000	0.000
53	LPG to SPHERE Inlet D/S Line I/V U/S Flange	0	0	0	0.000	0.000
54	LPG to SPHERE Inlet D/S Line I/V U/S Gland	0	0	0	0.000	0.000
55	LPG to SPHERE Inlet D/S Line I/V D/S Flange	0	0	0	0.000	0.000
56	Meter line Flange	0	0	0	0.000	0.000
57	01-FV-1905 U/S Line I/V U/S Flange	0	0	0	0.000	0.000
58	01-FV-1905 U/S Line I/V U/S Gland	0	0	0	0.000	0.000
59	01-FV-1905 U/S Line I/V D/S Flange	0	0	0	0.000	0.000
60	Drain line I/V Gland	0	0	0	0.000	0.000
61	Drain line Safety Flange	0	0	0	0.000	0.000
62	01-FV-1905 C/V Line I/V U/S Flange	0	0	0	0.000	0.000
63	01-FV-1905 C/V Line I/V U/S Gland	0	0	0	0.000	0.000
64	01-FV-1905 C/V Line I/V D/S Flange	0	0	0	0.000	0.000
65	01-FV-1905 D/S Line I/V U/S Flange	0	0	0	0.000	0.000
66	01-FV-1905 D/S Line I/V U/S Gland	0	0	0	0.000	0.000
67	01-FV-1905 D/S Line I/V D/S Flange	0	0	0	0.000	0.000
68	Bypass line I/V U/S Flange	0	0	0	0.000	0.000
69	Bypass line I/V Gland	0	0	0	0.000	0.000
70	Bypass line I/V D/S Flange	0	0	0	0.000	0.000
71	01-FV-1921 U/S Line I/V U/S Flange	0	0	0	0.000	0.000
72	01-FV-1921 U/S Line I/V U/S Gland	0	0	0	0.000	0.000
73	01-FV-1921 U/S Line I/V D/S Flange	0	0	0	0.000	0.000
74	Drain line I/V Gland	0	0	0	0.000	0.000
75	Drain line Safety Flange	0	0	0	0.000	0.000
76	01-FV-1921 C/V U/S Flange	0	0	0	0.000	0.000
77	01-FV-1921 C/V U/S Gland	0	0	0	0.000	0.000
78	01-FV-1921 C/V D/S Flange	0	0	0	0.000	0.000
79	01-FV-1921 D/S Line I/V U/S Flange	0	0	0	0.000	0.000
80	01-FV-1921 D/S Line I/V U/S Gland	0	0	0	0.000	0.000
81	01-FV-1921 D/S Line I/V D/S Flange	0	0	0	0.000	0.000
82	Drain line I/V Gland	0	0	0	0.000	0.000
83	Drain line Safety Flange	0	0	0	0.000	0.000
84	Bypass line I/V U/S Flange	0	0	0	0.000	0.000
85	Bypass line I/V Gland	0	0	0	0.000	0.000
86	Bypass line I/V D/S Flange	0	0	0	0.000	0.000
87	01-LV-1701 U/S Line I/V U/S Flange	0	0	0	0.000	0.000
88	01-LV-1701 U/S Line I/V U/S Gland	0	0	0	0.000	0.000
89	01-LV-1701 U/S Line I/V D/S Flange	0	0	0	0.000	0.000
90	Drain line I/V Gland	0	0	0	0.000	0.000
91	Drain line Safety Flange	0	0	0	0.000	0.000
92	01-LV-1701 C/S Line I/V U/S Flange	0	0	0	0.000	0.000
93	01-LV-1701 C/S Line I/V U/S Gland	0	0	0	0.000	0.000
94	01-LV-1701 C/S Line I/V D/S Flange	0	0	0	0.000	0.000
95	01-LV-1701 D/S Line I/V U/S Flange	0	0	0	0.000	0.000
96	01-LV-1701 D/S Line I/V U/S Gland	0	0	0	0.000	0.000
97	01-LV-1701 D/S Line I/V D/S Flange	0	0	0	0.000	0.000
98	Drain line I/V Gland	0	0	0	0.000	0.000
99	Drain line Safety Flange	0	0	0	0.000	0.000
100	Bypass line I/V U/S Flange	0	0	0	0.000	0.000
101	Bypass line I/V Gland	0	0	0	0.000	0.000
102	Bypass line I/V D/S Flange	0	0	0	0.000	0.000
103	01-FV-1901 U/S Line I/V U/S Flange	0	0	0	0.000	0.000
104	01-FV-1901 U/S Line I/V U/S Gland	0	0	0	0.000	0.000
105	01-FV-1901 U/S Line I/V D/S Flange	0	0	0	0.000	0.000
106	Drain line I/V Gland	0	0	0	0.000	0.000
107	Drain line Safety Flange	0	0	0	0.000	0.000
108	01-FV-1901 C/V U/S Flange	0	0	0	0.000	0.000
109	01-FV-1901 C/V U/S Gland	0	0	0	0.000	0.000
110	01-FV-1901 C/V D/S Flange	0	0	0	0.000	0.000
111	01-FV-1901 D/S Line I/V U/S Flange	0	0	0	0.000	0.000
112	01-FV-1901 D/S Line I/V U/S Gland	0	0	0	0.000	0.000
113	01-FV-1901 D/S Line I/V D/S Flange	0	0	0	0.000	0.000
114	Drain line I/V Gland	0	0	0	0.000	0.000
115	Drain line Safety Flange	0	0	0	0.000	0.000
116	Bypass line I/V U/S Flange	0	0	0	0.000	0.000
117	Bypass line I/V U/S Gland	0	0	0	0.000	0.000
118	01-FV-1904 U/S Line I/V U/S Flange	0	0	0	0.000	0.000
119	01-FV-1904 U/S Line I/V U/S Gland	0	0	0	0.000	0.000
120	01-FV-1904 U/S Line I/V D/S Flange	0	0	0	0.000	0.000
121	Drain line I/V Gland	0	0	0	0.000	0.000
122	Drain line Safety Flange	0	0	0	0.000	0.000
123	01-FV-1904 C/V U/S Flange	0	0	0	0.000	0.000
124	01-FV-1904 C/V U/S Gland	0	0	0	0.000	0.000

FUGITIVE EMISSIONS SURVEY REPORT

[August 2021]



Client : NRL

ETS

Work Order No: 4300058771-BOR/12.04.2019

ETS/NRL/FUGITIVE/004/21

S/N	Component ID	AVERAGE READING LEL %	READING (%NG)	READING (ppm)	EPA Correlation Kg/Hr/Source	Total Emission kg/annum
125	01-FV-1904 C/V D/S Flange	0	0	0	0.000	0.000
126	01-FV-1904 D/S Line I/V U/S Flange	0	0	0	0.000	0.000
127	01-FV-1904 D/S Line I/V U/S Gland	0	0	0	0.000	0.000
128	01-FV-1904 D/S Line I/V D/S Flange	0	0	0	0.000	0.000
129	Bypass line I/V U/S Flange	0	0	0	0.000	0.000
130	Bypass line I/V Gland	0	0	0	0.000	0.000
131	Bypass line I/V D/S Flange	0	0	0	0.000	0.000
132	01-FV-1903 U/S Line I/V U/S Flange	0	0	0	0.000	0.000
133	01-FV-1903 U/S Line I/V U/S Gland	0	0	0	0.000	0.000
134	01-FV-1903 U/S Line I/V D/S Flange	0	0	0	0.000	0.000
135	Drain line I/V Gland	0	0	0	0.000	0.000
136	Drain line Safety Flange	0	0	0	0.000	0.000
137	01-FV-1903 C/V U/S Flange	0	0	0	0.000	0.000
138	01-FV-1903 C/V U/S Gland	0	0	0	0.000	0.000
139	01-FV-1903 C/V D/S Flange	0	0	0	0.000	0.000
140	01-FV-1903 D/S Line I/V U/S Flange	0	0	0	0.000	0.000
141	01-FV-1903 D/S Line I/V U/S Gland	0	0	0	0.000	0.000
142	01-FV-1903 D/S Line I/V D/S Flange	0	0	0	0.000	0.000
143	Drain line I/V Gland	0	0	0	0.000	0.000
144	Drain line Safety Flange	0	0	0	0.000	0.000
145	Bypass line I/V U/S Flange	0	0	0	0.000	0.000
146	Bypass line I/V Gland	0	0	0	0.000	0.000
147	Bypass line I/V D/S Flange	0	0	0	0.000	0.000
148	01-PA-106A Suction Line I/V Gland	0	0	0	0.000	0.000
149	Stainer Top Flange	0	0	0	0.000	0.000
150	Stainer Top Flange Drain line I/V Gland	0	0	0	0.000	0.000
151	Stainer Top Flange Drain line Safety Flange	0	0	0	0.000	0.000
152	Suction line Flange	0	0	0	0.000	0.000
153	Pump seal	0	0	0	0.000	0.000
154	Discharge line flange	0	0	0	0.000	0.000
155	Meter line 1st I/V Gland	0	0	0	0.000	0.000
156	Meter line 2nd I/V Gland	0	0	0	0.000	0.000
157	Meter line Sampling I/V Gland	0	0	0	0.000	0.000
158	Discharge line Gland	0	0	0	0.000	0.000
159	01-PA-106B Suction Line I/V Gland	0	0	0	0.000	0.000
160	Stainer Top Flange	0	0	0	0.000	0.000
161	Stainer Top Flange Drain line I/V Gland	0	0	0	0.000	0.000
162	Stainer Top Flange Drain line Safety Flange	0	0	0	0.000	0.000
163	Suction line Flange	0	0	0	0.000	0.000
164	Pump seal	0	0	0	0.000	0.000
165	Discharge line flange	0	0	0	0.000	0.000
166	Meter line 1st I/V Gland	0	0	0	0.000	0.000
167	Meter line 2nd I/V Gland	0	0	0	0.000	0.000
168	Meter line Sampling I/V Gland	0	0	0	0.000	0.000
169	Discharge line Gland	0	0	0	0.000	0.000
170	01-PA-105A Suction line I/V U/S Flange	0	0	0	0.000	0.000
171	01-PA-105A Suction line I/V U/S Gland	0	0	0	0.000	0.000
172	01-PA-105A Suction line I/V D/S Flange	0	0	0	0.000	0.000
173	Stainer Top Flange	0	0	0	0.000	0.000
174	Stainer Top Flange Drain line I/V Gland	0	0	0	0.000	0.000
175	Stainer Top Flange Drain line Safety Flange	0	0	0	0.000	0.000
176	Suction line Flange	0	0	0	0.000	0.000
177	Pump seal	0	0	0	0.000	0.000
178	Discharge line flange	0	0	0	0.000	0.000
179	Meter line 1st I/V Gland	0	0	0	0.000	0.000
180	Meter line 2nd I/V Gland	0	0	0	0.000	0.000
181	Meter line Sampling I/V Gland	0	0	0	0.000	0.000
182	NRV I/V U/S Flange	0	0	0	0.000	0.000
183	NRV Top Flange	0	0	0	0.000	0.000
184	NRV I/V D/S Flange	0	0	0	0.000	0.000
185	Discharge line I/V U/S Flange	0	0	0	0.000	0.000
186	Discharge line I/V Gland	0	0	0	0.000	0.000
187	Discharge line I/V D/S Flange	0	0	0	0.000	0.000
188	01-PA-105B Suction line I/V U/S Flange	0	0	0	0.000	0.000
189	01-PA-105B Suction line I/V U/S Gland	0	0	0	0.000	0.000
190	01-PA-105B Suction line I/V D/S Flange	0	0	0	0.000	0.000
191	Stainer Top Flange	0	0	0	0.000	0.000
192	Stainer Top Flange Drain line I/V Gland	0	0	0	0.000	0.000
193	Stainer Top Flange Drain line Safety Flange	0	0	0	0.000	0.000
194	Suction line Flange	0	0	0	0.000	0.000
195	Pump seal	0	0	0	0.000	0.000
196	Discharge line flange	0	0	0	0.000	0.000
197	Meter line 1st I/V Gland	0	0	0	0.000	0.000
198	Meter line 2nd I/V Gland	0	0	0	0.000	0.000
199	Meter line Sampling I/V Gland	0	0	0	0.000	0.000
200	NRV I/V U/S Flange	0	0	0	0.000	0.000
201	NRV Top Flange	0	0	0	0.000	0.000
202	NRV I/V D/S Flange	0	0	0	0.000	0.000
203	Discharge line I/V U/S Flange	0	0	0	0.000	0.000
204	Discharge line I/V Gland	0	0	0	0.000	0.000
205	Discharge line I/V D/S Flange	0	0	0	0.000	0.000
Area: Pump						
1	01-PA-103B Suction line I/V U/S Flange	0	0	0	0.000	0.000
2	01-PA-103B Suction line I/V U/S Gland	0	0	0	0.000	0.000
3	01-PA-103B Suction line I/V D/S Flange	0	0	0	0.000	0.000
4	Stainer Top Flange	0	0	0	0.000	0.000
5	Stainer Top Flange Drain line I/V Gland	0	0	0	0.000	0.000

FUGITIVE EMISSIONS SURVEY REPORT

[August 2021]



Client : NRL

ETS

Work Order No: 4300058771-BOR/12.04.2019		ETS/NRL/FUGITIVE/004/21				
S/N	Component ID	AVERAGE READING LEL %	READING (%NG)	READING (ppm)	EPA Correlation Kg/Hr/Source	Total Emission kg/annum
6	Stainer Top Flange Drain line Safety Flange	0	0	0	0.000	0.000
7	Suction line Flange	0	0	0	0.000	0.000
8	Pump seal	0	0	0	0.000	0.000
9	Discharge line flange	0	0	0	0.000	0.000
10	Meter line 1st I/V Gland	0	0	0	0.000	0.000
11	Meter line 2nd I/V Gland	0	0	0	0.000	0.000
12	Meter line Sampling I/V Gland	0	0	0	0.000	0.000
13	NRV I/V U/S Flange	0	0	0	0.000	0.000
14	NRV Top Flange	0	0	0	0.000	0.000
15	NRV I/V D/S Flange	0	0	0	0.000	0.000
16	Discharge line I/V U/S Flange	0	0	0	0.000	0.000
17	Discharge line I/V Gland	0	0	0	0.000	0.000
18	Discharge line I/V D/S Flange	0	0	0	0.000	0.000
19	Suction Line to Outside Line 1st I/V U/S Flange	0	0	0	0.000	0.000
20	Suction Line to Outside Line 1st I/V Gland	0	0	0	0.000	0.000
21	Suction Line to Outside Line 1st I/V D/S Flange	0	0	0	0.000	0.000
22	Suction Line to Outside Line 2nd I/V U/S Flange	0	0	0	0.000	0.000
23	Suction Line to Outside Line 2nd I/V Gland	0	0	0	0.000	0.000
24	Suction Line to Outside Line 2nd I/V D/S Flange	0	0	0	0.000	0.000
25	Suction Line to Outside Line 3rd I/V U/S Flange	0	0	0	0.000	0.000
26	Suction Line to Outside Line 3rd I/V Gland	0	0	0	0.000	0.000
27	Suction Line to Outside Line 3rd I/V D/S Flange	0	0	0	0.000	0.000
28	Stainer Flange	0	0	0	0.000	0.000
29	OWS point	0	0	0	0.000	0.000
30	01-PA-103A Suction line I/V U/S Flange	0	0	0	0.000	0.000
31	01-PA-103A Suction line I/V U/S Gland	0	0	0	0.000	0.000
32	01-PA-103A Suction line I/V D/S Flange	0	0	0	0.000	0.000
33	Stainer Top Flange	0	0	0	0.000	0.000
34	Stainer Top Flange Drain line I/V Gland	0	0	0	0.000	0.000
35	Stainer Top Flange Drain line Safety Flange	0	0	0	0.000	0.000
36	Suction line Flange	0	0	0	0.000	0.000
37	Pump seal	0	0	0	0.000	0.000
38	Discharge line flange	0	0	0	0.000	0.000
39	Meter line 1st I/V Gland	0	0	0	0.000	0.000
40	Meter line 2nd I/V Gland	0	0	0	0.000	0.000
41	Meter line Sampling I/V Gland	0	0	0	0.000	0.000
42	NRV I/V U/S Flange	0	0	0	0.000	0.000
43	NRV Top Flange	0	0	0	0.000	0.000
44	NRV I/V D/S Flange	0	0	0	0.000	0.000
45	Discharge line I/V U/S Flange	0	0	0	0.000	0.000
46	Discharge line I/V Gland	0	0	0	0.000	0.000
47	Discharge line I/V D/S Flange	0	0	0	0.000	0.000
48	Pump to Drain Line 1st I/V Gland	0	0	0	0.000	0.000
49	Pump to Drain Line 2nd I/V Gland	0	0	0	0.000	0.000
50	Pump to Drain Line 3rd I/V Gland	0	0	0	0.000	0.000
51	Stainer Flange	0	0	0	0.000	0.000
52	OWS point	0	0	0	0.000	0.000
53	01-FV-4003 U/S Line I/V U/S Flange	0	0	0	0.000	0.000
54	01-FV-4003 U/S Line I/V Gland	0	0	0	0.000	0.000
55	01-FV-4003 U/S Line I/V D/S Flange	0	0	0	0.000	0.000
56	Drain line I/V Gland	0	0	0	0.000	0.000
57	Drain line Safety Flange	0	0	0	0.000	0.000
58	01-FV-4003 C/V U/S Flange	0	0	0	0.000	0.000
59	01-FV-4003 C/V Gland	0	0	0	0.000	0.000
60	01-FV-4003 C/V D/S Flange	0	0	0	0.000	0.000
61	Drain line I/V Gland	0	0	0	0.000	0.000
62	Drain line Safety Flange	0	0	0	0.000	0.000
63	01-FV-4003 D/S Line I/V U/S Flange	0	0	0	0.000	0.000
64	01-FV-4003 D/S Line I/V Gland	0	0	0	0.000	0.000
65	01-FV-4003 D/S Line I/V D/S Flange	0	0	0	0.000	0.000
66	Bypass line I/V U/S Flange	0	0	0	0.000	0.000
67	Bypass line I/V Gland	0	0	0	0.000	0.000
68	Bypass line I/V D/S Flange	0	0	0	0.000	0.000
69	01-FV-3803 U/S Line I/V U/S Flange	0	0	0	0.000	0.000
70	01-FV-3803 U/S Line I/V Gland	0	0	0	0.000	0.000
71	01-FV-3803 U/S Line I/V D/S Flange	0	0	0	0.000	0.000
72	Drain line I/V Gland	0	0	0	0.000	0.000
73	Drain line Safety Flange	0	0	0	0.000	0.000
74	01-FV-3803 C/V U/S Flange	0	0	0	0.000	0.000
75	01-FV-3803 C/V Gland	0	0	0	0.000	0.000
76	01-FV-3803 C/V D/S Flange	0	0	0	0.000	0.000
77	Drain line I/V Gland	0	0	0	0.000	0.000
78	Drain line Safety Flange	0	0	0	0.000	0.000
79	01-FV-3803 D/S Line I/V U/S Flange	0	0	0	0.000	0.000
80	01-FV-3803 D/S Line I/V Gland	0	0	0	0.000	0.000
81	01-FV-3803 D/S Line I/V D/S Flange	0	0	0	0.000	0.000
82	Bypass line I/V U/S Flange	0	0	0	0.000	0.000
83	Bypass line I/V Gland	0	0	0	0.000	0.000
84	Bypass line I/V D/S Flange	0	0	0	0.000	0.000
85	01-FV-3901 U/S Line I/V U/S Flange	0	0	0	0.000	0.000
86	01-FV-3901 U/S Line I/V Gland	0	0	0	0.000	0.000
87	01-FV-3901 U/S Line I/V D/S Flange	0	0	0	0.000	0.000
88	Drain line I/V Gland	0	0	0	0.000	0.000
89	Drain line Safety Flange	0	0	0	0.000	0.000
90	01-FV-3901 C/V U/S Flange	0	0	0	0.000	0.000
91	01-FV-3901 C/V Gland	0	0	0	0.000	0.000
92	01-FV-3901 C/V D/S Flange	0	0	0	0.000	0.000
93	Drain line I/V Gland	0	0	0	0.000	0.000

FUGITIVE EMISSIONS SURVEY REPORT

[August 2021]



Client : NRL

ETS

Work Order No: 4300058771-BOR/12.04.2019

ETS/NRL/FUGITIVE/004/21

S/N	Component ID	AVERAGE READING LEL %	READING (%NG)	READING (ppm)	EPA Correlation Kg/Hr/Source	Total Emission kg/annum
94	Drain line Safety Flange	0	0	0	0.000	0.000
95	01-FV-3901 D/S Line I/V U/S Flange	0	0	0	0.000	0.000
96	01-FV-3901 D/S Line I/V Gland	0	0	0	0.000	0.000
97	01-FV-3901 D/S Line I/V D/S Flange	0	0	0	0.000	0.000
98	Bypass line I/V U/S Flange	0	0	0	0.000	0.000
99	Bypass line I/V Gland	0	0	0	0.000	0.000
100	Bypass line I/V D/S Flange	0	0	0	0.000	0.000
101	3.P.01.3916.A14 To EE-108Line I/V	0	0	0	0.000	0.000
102	3.P.01.3916.A14 To EE-108Line I/V	0	0	0	0.000	0.000
103	3.P.01.3916.A14 To EE-108Line I/V	0	0	0	0.000	0.000
104	3.P.01.3916.A14 To Naptha Pool	0	0	0	0.000	0.000
105	3.P.01.3916.A14 To Naptha Pool	0	0	0	0.000	0.000
106	3.P.01.3916.A14 To Naptha Pool	0	0	0	0.000	0.000
107	01-PR-101B Suction Line I/V U/S Flange	0	0	0	0.000	0.000
108	01-PR-101B Suction Line I/V Gland	0	0	0	0.000	0.000
109	01-PR-101B Suction Line I/V D/S Flange	0	0	0	0.000	0.000
110	Stainer Top Flange	0	0	0	0.000	0.000
111	Stainer Top Flange Drain line I/V Gland	0	0	0	0.000	0.000
112	Stainer Top Flange Drain line Safety Flange	0	0	0	0.000	0.000
113	Suction line Flange	0	0	0	0.000	0.000
114	Pump seal	0	0	0	0.000	0.000
115	Discharge line flange	0	0	0	0.000	0.000
116	Meter line 1st I/V Gland	0	0	0	0.000	0.000
117	Meter line 2nd I/V Gland	0	0	0	0.000	0.000
118	Meter line Sampling I/V Gland	0	0	0	0.000	0.000
119	NRV I/V U/S Flange	0	0	0	0.000	0.000
120	NRV Top Flange	0	0	0	0.000	0.000
121	NRV I/V D/S Flange	0	0	0	0.000	0.000
122	Discharge line I/V U/S Flange	0	0	0	0.000	0.000
123	Discharge line I/V Gland	0	0	0	0.000	0.000
124	Discharge line I/V D/S Flange	0	0	0	0.000	0.000
125	Pump to Drain Line 1st I/V Gland	0	0	0	0.000	0.000
126	Pump to Drain Line 2nd I/V Gland	0	0	0	0.000	0.000
127	Pump to Drain Line 3rd I/V Gland	0	0	0	0.000	0.000
128	Stainer Flange	0	0	0	0.000	0.000
129	OVS point	0	0	0	0.000	0.000
130	01-PA-101A Suction Line I/V U/S Flange	0	0	0	0.000	0.000
131	01-PA-101A Suction Line I/V Gland	0	0	0	0.000	0.000
132	01-PA-101A Suction Line I/V D/S Flange	0	0	0	0.000	0.000
133	Stainer Top Flange	0	0	0	0.000	0.000
134	Stainer Top Flange I/V Gland	0	0	0	0.000	0.000
135	Stainer Top Flange Safety Flange	0	0	0	0.000	0.000
136	Suction line Flange	0	0	0	0.000	0.000
137	Pump seal	0	0	0	0.000	0.000
138	Discharge line flange	0	0	0	0.000	0.000
139	Meter line 1st I/V Gland	0	0	0	0.000	0.000
140	Meter line 2nd I/V Gland	0	0	0	0.000	0.000
141	Meter line Sampling I/V Gland	0	0	0	0.000	0.000
142	Discharge line I/V U/S Flange	0	0	0	0.000	0.000
143	Discharge line I/V Gland	0	0	0	0.000	0.000
144	Discharge line I/V D/S Flange	0	0	0	0.000	0.000
145	Suction Line to Outside Line 1st I/V U/S Flange	0	0	0	0.000	0.000
146	Suction Line to Outside Line 1st I/V Gland	0	0	0	0.000	0.000
147	Suction Line to Outside Line 1st I/V D/S Flange	0	0	0	0.000	0.000
148	Suction Line to Outside Line 2nd I/V U/S Flange	0	0	0	0.000	0.000
149	Suction Line to Outside Line 2nd I/V Gland	0	0	0	0.000	0.000
150	Suction Line to Outside Line 2nd I/V D/S Flange	0	0	0	0.000	0.000
151	Suction Line to Outside Line 3rd I/V U/S Flange	0	0	0	0.000	0.000
152	Suction Line to Outside Line 3rd I/V Gland	0	0	0	0.000	0.000
153	Suction Line to Outside Line 3rd I/V D/S Flange	0	0	0	0.000	0.000
154	Pump to Drain Line 1st I/V Gland	0	0	0	0.000	0.000
155	Pump to Drain Line 2nd I/V Gland	0	0	0	0.000	0.000
156	Pump to Drain Line 3rd I/V Gland	0	0	0	0.000	0.000
157	Stainer Flange	0	0	0	0.000	0.000
158	OVS point	0	0	0	0.000	0.000
159	01-FV-3701 U/S Line I/V U/S Flange	0	0	0	0.000	0.000
160	01-FV-3701 U/S Line I/V Gland	0	0	0	0.000	0.000
161	01-FV-3701 U/S Line I/V D/S Flange	0	0	0	0.000	0.000
162	Drain line I/V Gland	0	0	0	0.000	0.000
163	Drain line Safety Flange	0	0	0	0.000	0.000
164	01-FV-3701 C/V U/S Flange	0	0	0	0.000	0.000
165	01-FV-3701 C/V Gland	0	0	0	0.000	0.000
166	01-FV-3701 C/V D/S Flange	0	0	0	0.000	0.000
167	Drain line I/V Gland	0	0	0	0.000	0.000
168	Drain line Safety Flange	0	0	0	0.000	0.000
169	01-FV-3701 D/S Line I/V U/S Flange	0	0	0	0.000	0.000
170	01-FV-3701 D/S Line I/V Gland	0	0	0	0.000	0.000
171	01-FV-3701 D/S Line I/V D/S Flange	0	0	0	0.000	0.000
172	Bypass line I/V U/S Flange	0	0	0	0.000	0.000
173	To Naptha PoolEx-PA-101 Line I/V	0	0	0	0.000	0.000
174	To Naptha PoolEx-PA-101 Line I/V	0	0	0	0.000	0.000
175	To Naptha PoolEx-PA-101 Line I/V	0	0	0	0.000	0.000
176	Naptha To EE-109 Ex-PA-101 Line I/V	0	0	0	0.000	0.000
177	Naptha To EE-109 Ex-PA-101 Line I/V	0	0	0	0.000	0.000
178	Naptha To EE-109 Ex-PA-101 Line I/V	0	0	0	0.000	0.000
179	01-FV-4005 U/S Line I/V U/S Flange	0	0	0	0.000	0.000
180	01-FV-4005 U/S Line I/V Gland	0	0	0	0.000	0.000
181	01-FV-4005 U/S Line I/V D/S Flange	0	0	0	0.000	0.000

FUGITIVE EMISSIONS SURVEY REPORT

[August 2021]



Client : NRL

ETS

Work Order No: 4300058771-BOR/12.04.2019		ETS/NRL/FUGITIVE/004/21				
S/N	Component ID	AVERAGE READING LEL %	READING (%NG)	READING (ppm)	EPA Correlation Kg/Hr/Source	Total Emission kg/annum
182	Drain line I/V Gland	0	0	0	0.000	0.000
183	Drain line Safety Flange	0	0	0	0.000	0.000
184	01-FV-4005 C/V U/S Flange	0	0	0	0.000	0.000
185	01-FV-4005 C/V Gland	0	0	0	0.000	0.000
186	01-FV-4005 C/V D/S Flange	0	0	0	0.000	0.000
187	Drain line I/V Gland	0	0	0	0.000	0.000
188	Drain line Safety Flange	0	0	0	0.000	0.000
189	01-FV-4005 D/S Line I/V U/S Flange	0	0	0	0.000	0.000
190	01-FV-4005 D/S Line I/V Gland	0	0	0	0.000	0.000
191	01-FV-4005 D/S Line I/V D/S Flange	0	0	0	0.000	0.000
192	Bypass line I/V U/S Flange	0	0	0	0.000	0.000
193	01-PA-CF-012A Suction Line I/V U/S Flange	0	0	0	0.000	0.000
194	01-PA-CF-012A Suction Line I/V Gland	0	0	0	0.000	0.000
195	01-PA-CF-012A Suction Line I/V D/S Flange	0	0	0	0.000	0.000
196	Stainer Top Flange	0	0	0	0.000	0.000
197	Stainer Top Flange I/V Gland	0	0	0	0.000	0.000
198	Stainer Top Flange Safety Flange	0	0	0	0.000	0.000
199	Suction line Flange	0	0	0	0.000	0.000
200	Pump seal	0	0	0	0.000	0.000
201	Discharge line flange	0	0	0	0.000	0.000
202	Meter line 1st I/V Gland	0	0	0	0.000	0.000
203	Meter line 2nd I/V Gland	0	0	0	0.000	0.000
204	Meter line Sampling I/V Gland	0	0	0	0.000	0.000
205	NRV I/V U/S Flange	0	0	0	0.000	0.000
206	NRV Top Flange	0	0	0	0.000	0.000
207	NRV I/V D/S Flange	0	0	0	0.000	0.000
208	Discharge line I/V U/S Flange	0	0	0	0.000	0.000
209	Discharge line I/V Gland	0	0	0	0.000	0.000
210	Discharge line I/V D/S Flange	0	0	0	0.000	0.000
211	Pump to Drain Line 1st I/V Gland	0	0	0	0.000	0.000
212	Pump to Drain Line 2nd I/V Gland	0	0	0	0.000	0.000
213	Pump to Drain Line 3rd I/V Gland	0	0	0	0.000	0.000
214	Stainer Flange	0	0	0	0.000	0.000
215	OWS point	0	0	0	0.000	0.000
216	01-PV-04 Suction Line I/V U/S Flange	0	0	0	0.000	0.000
217	01-PV-04 Suction Line I/V Gland	0	0	0	0.000	0.000
218	01-PV-04 Suction Line I/V D/S Flange	0	0	0	0.000	0.000
219	Stainer Top Flange	0	0	0	0.000	0.000
220	Stainer Top Flange I/V Gland	0	0	0	0.000	0.000
221	Stainer Top Flange Safety Flange	0	0	0	0.000	0.000
222	Suction line Flange	0	0	0	0.000	0.000
223	Discharge Line 1st Flange	0	0	0	0.000	0.000
224	Discharge Line 2nd Flange	0	0	0	0.000	0.000
225	Meter line I/V Gland	0	0	0	0.000	0.000
226	Meter line Sampling Point I/v Gland	0	0	0	0.000	0.000
227	NRV I/V U/S Flange	0	0	0	0.000	0.000
228	NRV Top Flange	0	0	0	0.000	0.000
229	NRV I/V D/S Flange	0	0	0	0.000	0.000
230	Discharge line I/V U/S Flange	0	0	0	0.000	0.000
231	Discharge line I/V Gland	0	0	0	0.000	0.000
232	Discharge line I/V D/S Flange	0	0	0	0.000	0.000
233	Drain line I/V Gland	0	0	0	0.000	0.000
234	Drain line Safety Flange	0	0	0	0.000	0.000
235	Pump to Drain Line 1st I/V Gland	0	0	0	0.000	0.000
236	Pump to Drain Line 2nd I/V Gland	0	0	0	0.000	0.000
237	Stainer Flange	0	0	0	0.000	0.000
238	OWS point	0	0	0	0.000	0.000
239	01-PV-04A Suction Line I/V U/S Flange	0	0	0	0.000	0.000
240	01-PV-04A Suction Line I/V Gland	0	0	0	0.000	0.000
241	01-PV-04A Suction Line I/V D/S Flange	0	0	0	0.000	0.000
242	Stainer Top Flange	0	0	0	0.000	0.000
243	Stainer Top Flange I/V Gland	0	0	0	0.000	0.000
244	Stainer Top Flange Safety Flange	0	0	0	0.000	0.000
245	Suction line Flange	0	0	0	0.000	0.000
246	Pump seal	0	0	0	0.000	0.000
247	Discharge Line 1st Flange	0	0	0	0.000	0.000
248	Discharge Line 2nd Flange	0	0	0	0.000	0.000
249	Meter line I/V Gland	0	0	0	0.000	0.000
250	Meter line Sampling Point I/v Gland	0	0	0	0.000	0.000
251	NRV I/V U/S Flange	0	0	0	0.000	0.000
252	NRV Top Flange	0	0	0	0.000	0.000
253	NRV I/V D/S Flange	0	0	0	0.000	0.000
254	Drain line I/V Gland	0	0	0	0.000	0.000
255	Drain line Safety Flange	0	0	0	0.000	0.000
256	Discharge line I/V U/S Flange	0	0	0	0.000	0.000
257	Discharge line I/V Gland	0	0	0	0.000	0.000
258	Discharge line I/V D/S Flange	0	0	0	0.000	0.000
259	Pump to Drain Line 1st I/V Gland	0	0	0	0.000	0.000
260	Pump to Drain Line 2nd I/V Gland	0	0	0	0.000	0.000
261	Stainer Flange	0	0	0	0.000	0.000
262	OWS point	0	0	0	0.000	0.000
263	01-PA-CF-013-B Suction Line I/V U/S Flange	0	0	0	0.000	0.000
264	01-PA-CF-013-B Suction Line I/V Gland	0	0	0	0.000	0.000
265	01-PA-CF-013-B Suction Line I/V D/S Flange	0	0	0	0.000	0.000
266	Stainer Top Flange	0	0	0	0.000	0.000
267	Stainer Top Flange I/V Gland	0	0	0	0.000	0.000
268	Stainer Top Flange Safety Flange	0	0	0	0.000	0.000
269	Suction line Flange	0	0	0	0.000	0.000

FUGITIVE EMISSIONS SURVEY REPORT

[August 2021]



Client : NRL

ETS

Work Order No: 4300058771-BOR/12.04.2019

ETS/NRL/FUGITIVE/004/21

S/N	Component ID	AVERAGE READING LEL %	READING (%NG)	READING (ppm)	EPA Correlation Kg/Hr/Source	Total Emission kg/annum
270	Pump seal	0	0	0	0.000	0.000
271	Dischage Line 1st Flange	0	0	0	0.000	0.000
272	Dischage Line 2nd Flange	0	0	0	0.000	0.000
273	Meter line I/V Gland	0	0	0	0.000	0.000
274	Meter line Sampling Point I/v Gland	0	0	0	0.000	0.000
275	NRV I/V U/S Flange	0	0	0	0.000	0.000
276	NRV Top Flange	0	0	0	0.000	0.000
277	NRV I/V D/S Flange	0	0	0	0.000	0.000
278	Discharge line I/V U/S Flange	0	0	0	0.000	0.000
279	Discharge line I/V Gland	0	0	0	0.000	0.000
280	Discharge line I/V D/S Flange	0	0	0	0.000	0.000
281	Pump to Drain Line 1st I/V Gland	0	0	0	0.000	0.000
282	Pump to Drain Line 2nd I/V Gland	0	0	0	0.000	0.000
283	Pump to Drain Line 3rd I/V Gland	0	0	0	0.000	0.000
284	Stainer Flange	0	0	0	0.000	0.000
285	OWS point	0	0	0	0.000	0.000
286	01-PA-CF-013-A Suction Line I/V U/S Flange	0	0	0	0.000	0.000
287	01-PA-CF-013-A Suction Line I/V Gland	0	0	0	0.000	0.000
288	01-PA-CF-013-A Suction Line I/V D/S Flange	0	0	0	0.000	0.000
289	Stainer Top Flange	0	0	0	0.000	0.000
290	Stainer Top Flange I/V Gland	0	0	0	0.000	0.000
291	Stainer Top Flange Safety Flange	0	0	0	0.000	0.000
292	Suction line Flange	0	0	0	0.000	0.000
293	Pump seal	0	0	0	0.000	0.000
294	Dischage Line 1st Flange	0	0	0	0.000	0.000
295	Dischage Line 2nd Flange	0	0	0	0.000	0.000
296	Meter line I/V Gland	0	0	0	0.000	0.000
297	Meter line Sampling Point I/v Gland	0	0	0	0.000	0.000
298	NRV I/V U/S Flange	0	0	0	0.000	0.000
299	NRV Top Flange	0	0	0	0.000	0.000
300	NRV I/V D/S Flange	0	0	0	0.000	0.000
301	Discharge line I/V U/S Flange	0	0	0	0.000	0.000
302	Discharge line I/V Gland	0	0	0	0.000	0.000
303	Discharge line I/V D/S Flange	0	0	0	0.000	0.000
304	Pump to Drain Line 1st I/V Gland	0	0	0	0.000	0.000
305	Pump to Drain Line 2nd I/V Gland	0	0	0	0.000	0.000
306	Pump to Drain Line 3rd I/V Gland	0	0	0	0.000	0.000
307	Stainer Flange	0	0	0	0.000	0.000
308	OWS point	0	0	0	0.000	0.000
309	01-FV-1505 U/S Line I/V U/S Flange	0	0	0	0.000	0.000
310	01-FV-1505 U/S Line I/V Gland	0	0	0	0.000	0.000
311	01-FV-1505 U/S Line I/V D/S Flange	0	0	0	0.000	0.000
312	Drain line I/V Gland	0	0	0	0.000	0.000
313	Drain line Safety Flange	0	0	0	0.000	0.000
314	01-FV-1505 C/V U/S Flange	0	0	0	0.000	0.000
315	01-FV-1505 C/V Gland	0	0	0	0.000	0.000
316	01-FV-1505 C/V D/S Flange	0	0	0	0.000	0.000
317	01-FV-1505 D/S Line I/V U/S Flange	0	0	0	0.000	0.000
318	01-FV-1505 D/S Line I/V Gland	0	0	0	0.000	0.000
319	01-FV-1505 D/S Line I/V D/S Flange	0	0	0	0.000	0.000
320	Bypass line I/V U/S Flange	0	0	0	0.000	0.000
321	Bypass line I/V U/S Gland	0	0	0	0.000	0.000
322	Bypass line I/V D/S Flange	0	0	0	0.000	0.000
323	01-PV-2002 U/S line I/V Gland	0	0	0	0.000	0.000
324	Drain line I/V Gland	0	0	0	0.000	0.000
325	Drain line Safety Flange	0	0	0	0.000	0.000
326	01-PV-2002 D/S line I/V Gland	0	0	0	0.000	0.000
327	Drain line I/V Gland	0	0	0	0.000	0.000
328	Drain line Safety Flange	0	0	0	0.000	0.000
329	Bypass line I/V Gland	0	0	0	0.000	0.000
330	01-PV-1402 U/S line I/V Gland	0	0	0	0.000	0.000
331	Drain line I/V Gland	0	0	0	0.000	0.000
332	Drain line Safety Flange	0	0	0	0.000	0.000
333	01-PV-1402 C/V Gland	0	0	0	0.000	0.000
334	01-PV-1402 D/S line I/V Gland	0	0	0	0.000	0.000
335	Drain line I/V Gland	0	0	0	0.000	0.000
336	Drain line Safety Flange	0	0	0	0.000	0.000
337	Bypass line I/V Gland	0	0	0	0.000	0.000
338	01-PV-1401 U/S line I/V Gland	0	0	0	0.000	0.000
339	Drain line I/V Gland	0	0	0	0.000	0.000
340	Drain line Safety Flange	0	0	0	0.000	0.000
341	01-PV-1401 C/V U/S Flange	0	0	0	0.000	0.000
342	01-PV-1401 C/V Gland	0	0	0	0.000	0.000
343	01-PV-1401 C/V D/S Flange	0	0	0	0.000	0.000
344	01-PV-1401 D/S line I/V Gland	0	0	0	0.000	0.000
345	Drain line I/V Gland	0	0	0	0.000	0.000
346	Drain line Safety Flange	0	0	0	0.000	0.000
347	Bypass line I/V Gland	0	0	0	0.000	0.000
348	01-SDV-1401 C/V U/S Flange	0	0	0	0.000	0.000
349	01-SDV-1401 C/V Gland	0	0	0	0.000	0.000
350	01-SDV-1401 C/V D/S Flange	0	0	0	0.000	0.000
351	Drain line I/V Gland	0	0	0	0.000	0.000
352	Drain line Safety Flange	0	0	0	0.000	0.000
353	01-FV-3804 D/S Line I/V U/S Flange	0	0	0	0.000	0.000
354	01-FV-3804 D/S Line I/V Gland	0	0	0	0.000	0.000
355	01-FV-3804 D/S Line I/V D/S Flange	0	0	0	0.000	0.000
356	01-FV-3804 C/V U/S Flange	0	0	0	0.000	0.000
357	01-FV-3804 C/V Gland	0	0	0	0.000	0.000

FUGITIVE EMISSIONS SURVEY REPORT

[August 2021]



Client : NRL

ETS

Work Order No: 4300058771-BOR/12.04.2019

ETS/NRL/FUGITIVE/004/21

S/N	Component ID	AVERAGE READING LEL %	READING (%NG)	READING (ppm)	EPA Correlation Kg/Hr/Source	Total Emission kg/annum
358	01-FV-3804 C/V D/S Flange	0	0	0	0.000	0.000
359	01-FV-2702 C/V U/S Flange	0	0	0	0.000	0.000
360	01-FV-2702 C/V Gland	0	0	0	0.000	0.000
361	01-FV-2702 C/V D/S Flange	0	0	0	0.000	0.000
362	01-FV-1702 C/V U/S Flange	0	0	0	0.000	0.000
363	01-FV-1702 C/V Gland	0	0	0	0.000	0.000
364	01-FV-1702 C/V D/S Flange	0	0	0	0.000	0.000
365	Drain line I/V Gland	0	0	0	0.000	0.000
366	Drain line Safety Flange	0	0	0	0.000	0.000
Area: Furnace						
1	B. No. -1-Fuel Gas line I/V U/S Flange	0	0	0	0.000	0.000
2	B. No. -1-Fuel Gas line I/V Gland	0	0	0	0.000	0.000
3	B. No. -1-Fuel Gas line I/V D/S Flange	0	0	0	0.000	0.000
4	Pilot Gas line I/V U/S Flange	0	0	0	0.000	0.000
5	Pilot Gas line I/V Gland	0	0	0	0.000	0.000
6	Pilot Gas line I/V D/S Flange	0	0	0	0.000	0.000
7	B. No. -2-Fuel Gas line I/V U/S Flange	0	0	0	0.000	0.000
8	B. No. -2-Fuel Gas line I/V Gland	0	0	0	0.000	0.000
9	B. No. -2-Fuel Gas line I/V D/S Flange	0	0	0	0.000	0.000
10	Pilot Gas line I/V Gland	0	0	0	0.000	0.000
11	B. No. -3-Fuel Gas line I/V Gland	0	0	0	0.000	0.000
12	Pilot Gas line I/V Gland	0	0	0	0.000	0.000
13	B. No. -4-Fuel Gas line I/V U/S Flange	0	0	0	0.000	0.000
14	B. No. -4-Fuel Gas line I/V Gland	0	0	0	0.000	0.000
15	B. No. -4-Fuel Gas line I/V D/S Flange	0	0	0	0.000	0.000
16	Pilot Gas line I/V U/S Flange	0	0	0	0.000	0.000
17	Pilot Gas line I/V Gland	0	0	0	0.000	0.000
18	Pilot Gas line I/V D/S Flange	0	0	0	0.000	0.000
19	B. No. -5-Fuel Gas line I/V U/S Flange	0	0	0	0.000	0.000
20	B. No. -5-Fuel Gas line I/V Gland	0	0	0	0.000	0.000
21	B. No. -5-Fuel Gas line I/V D/S Flange	0	0	0	0.000	0.000
22	Pilot Gas line I/V U/S Flange	0	0	0	0.000	0.000
23	Pilot Gas line I/V Gland	0	0	0	0.000	0.000
24	Pilot Gas line I/V D/S Flange	0	0	0	0.000	0.000
25	B. No. -6-Fuel Gas line I/V Gland	0	0	0	0.000	0.000
26	Pilot Gas line I/V Gland	0	0	0	0.000	0.000
27	B. No. -7-Fuel Gas line I/V U/S Flange	0	0	0	0.000	0.000
28	B. No. -7-Fuel Gas line I/V Gland	0	0	0	0.000	0.000
29	B. No. -7-Fuel Gas line I/V D/S Flange	0	0	0	0.000	0.000
30	Pilot Gas line I/V U/S Flange	0	0	0	0.000	0.000
31	Pilot Gas line I/V Gland	0	0	0	0.000	0.000
32	Pilot Gas line I/V D/S Flange	0	0	0	0.000	0.000
33	B. No. -8-Fuel Gas line I/V U/S Flange	0	0	0	0.000	0.000
34	B. No. -8-Fuel Gas line I/V Gland	0	0	0	0.000	0.000
35	B. No. -8-Fuel Gas line I/V D/S Flange	0	0	0	0.000	0.000
36	Pilot Gas line I/V U/S Flange	0	0	0	0.000	0.000
37	Pilot Gas line I/V Gland	0	0	0	0.000	0.000
38	Pilot Gas line I/V D/S Flange	0	0	0	0.000	0.000
39	B. No. -1-Pilot Gas line I/V U/S Flange	0	0	0	0.000	0.000
40	B. No. -1-Pilot Gas line I/V Gland	0	0	0	0.000	0.000
41	B. No. -1-Pilot Gas line I/V D/S Flange	0	0	0	0.000	0.000
42	B. No. -1-Fuel Gas line I/V U/S Flange	0	0	0	0.000	0.000
43	B. No. -1-Fuel Gas line I/V Gland	0	0	0	0.000	0.000
44	B. No. -1-Fuel Gas line I/V D/S Flange	0	0	0	0.000	0.000
45	B. No. -2-Pilot Gas line I/V Gland	0	0	0	0.000	0.000
46	B. No. -2-Fuel Gas line I/V U/S Flange	0	0	0	0.000	0.000
47	B. No. -2-Fuel Gas line I/V Gland	0	0	0	0.000	0.000
48	B. No. -2-Fuel Gas line I/V D/S Flange	0	0	0	0.000	0.000
49	B. No. -3-Pilot Gas line I/V U/S Flange	0	0	0	0.000	0.000
50	B. No. -3-Pilot Gas line I/V Gland	0	0	0	0.000	0.000
51	B. No. -3-Pilot Gas line I/V D/S Flange	0	0	0	0.000	0.000
52	B. No. -3-Fuel Gas line I/V Gland	0	0	0	0.000	0.000
53	B. No. -4-Pilot Gas line I/V Gland	0	0	0	0.000	0.000
54	B. No. -4-Fuel Gas line I/V Gland	0	0	0	0.000	0.000
55	B. No. -5-Pilot Gas line I/V U/S Flange	0	0	0	0.000	0.000
56	B. No. -5-Pilot Gas line I/V Gland	0	0	0	0.000	0.000
57	B. No. -5-Pilot Gas line I/V D/S Flange	0	0	0	0.000	0.000
58	B. No. -5-Fuel Gas line I/V Gland	0	0	0	0.000	0.000
59	B. No. -6-Pilot Gas line I/V U/S Flange	0	0	0	0.000	0.000
60	B. No. -6-Pilot Gas line I/V Gland	0	0	0	0.000	0.000
61	B. No. -6-Pilot Gas line I/V D/S Flange	0	0	0	0.000	0.000
62	B. No. -6-Fuel Gas line I/V U/S Flange	0	0	0	0.000	0.000
63	B. No. -6-Fuel Gas line I/V Gland	0	0	0	0.000	0.000
64	B. No. -6-Fuel Gas line I/V D/S Flange	0	0	0	0.000	0.000
65	B. No. -7-Pilot Gas line I/V U/S Flange	0	0	0	0.000	0.000
66	B. No. -7-Pilot Gas line I/V Gland	0	0	0	0.000	0.000
67	B. No. -7-Pilot Gas line I/V D/S Flange	0	0	0	0.000	0.000
68	B. No. -7-Fuel Gas line I/V U/S Flange	0	0	0	0.000	0.000
69	B. No. -7-Fuel Gas line I/V Gland	0	0	0	0.000	0.000
70	B. No. -7-Fuel Gas line I/V D/S Flange	0	0	0	0.000	0.000
71	B. No. -8-Pilot Gas line I/V U/S Flange	0	0	0	0.000	0.000
72	B. No. -8-Pilot Gas line I/V Gland	0	0	0	0.000	0.000
73	B. No. -8-Pilot Gas line I/V D/S Flange	0	0	0	0.000	0.000
74	B. No. -8-Fuel Gas line I/V U/S Flange	0	0	0	0.000	0.000
75	B. No. -8-Fuel Gas line I/V Gland	0	0	0	0.000	0.000
76	B. No. -8-Fuel Gas line I/V D/S Flange	0	0	0	0.000	0.000
77	B. No. -9-Pilot Gas line I/V U/S Flange	0	0	0	0.000	0.000
78	B. No. -9-Pilot Gas line I/V Gland	0	0	0	0.000	0.000

FUGITIVE EMISSIONS SURVEY REPORT

[August 2021]



Client : NRL

ETS

Work Order No: 4300058771-BOR/12.04.2019

ETS/NRL/FUGITIVE/004/21

S/N	Component ID	AVERAGE READING LEL %	READING (%NG)	READING (ppm)	EPA Correlation Kg/Hr/Source	Total Emission kg/annum
79	B. No. -9-Pilot Gas line I/V D/S Flange	0	0	0	0.000	0.000
80	B. No. -9-Fuel Gas line I/V U/S Flange	0	0	0	0.000	0.000
81	B. No. -9-Fuel Gas line I/V Gland	0	0	0	0.000	0.000
82	B. No. -9-Fuel Gas line I/V D/S Flange	0	0	0	0.000	0.000
83	B. No. -10-Pilot Gas line I/V U/S Flange	0	0	0	0.000	0.000
84	B. No. -10-Pilot Gas line I/V Gland	0	0	0	0.000	0.000
85	B. No. -10-Pilot Gas line I/V D/S Flange	0	0	0	0.000	0.000
86	B. No. -10-Fuel Gas line I/V U/S Flange	0	0	0	0.000	0.000
87	B. No. -10-Fuel Gas line I/V Gland	0	0	0	0.000	0.000
88	B. No. -10-Fuel Gas line I/V D/S Flange	0	0	0	0.000	0.000
89	B. No. -11-Pilot Gas line I/V U/S Flange	0	0	0	0.000	0.000
90	B. No. -11-Pilot Gas line I/V Gland	0	0	0	0.000	0.000
91	B. No. -11-Pilot Gas line I/V D/S Flange	0	0	0	0.000	0.000
92	B. No. -11-Fuel Gas line I/V U/S Flange	0	0	0	0.000	0.000
93	B. No. -11-Fuel Gas line I/V Gland	0	0	0	0.000	0.000
94	B. No. -11-Fuel Gas line I/V D/S Flange	0	0	0	0.000	0.000
95	B. No. -12-Pilot Gas line I/V U/S Flange	0	0	0	0.000	0.000
96	B. No. -12-Pilot Gas line I/V Gland	0	0	0	0.000	0.000
97	B. No. -12-Pilot Gas line I/V D/S Flange	0	0	0	0.000	0.000
98	B. No. -12-Fuel Gas line I/V U/S Flange	0	0	0	0.000	0.000
99	B. No. -12-Fuel Gas line I/V Gland	0	0	0	0.000	0.000
100	B. No. -12-Fuel Gas line I/V D/S Flange	0	0	0	0.000	0.000
101	B. No. -13-Pilot Gas line I/V U/S Flange	0	0	0	0.000	0.000
102	B. No. -13-Pilot Gas line I/V Gland	0	0	0	0.000	0.000
103	B. No. -13-Pilot Gas line I/V D/S Flange	0	0	0	0.000	0.000
104	B. No. -13-Fuel Gas line I/V U/S Flange	0	0	0	0.000	0.000
105	B. No. -13-Fuel Gas line I/V Gland	0	0	0	0.000	0.000
106	B. No. -13-Fuel Gas line I/V D/S Flange	0	0	0	0.000	0.000
107	B. No. -14-Pilot Gas line I/V U/S Flange	0	0	0	0.000	0.000
108	B. No. -14-Pilot Gas line I/V Gland	0	0	0	0.000	0.000
109	B. No. -14-Pilot Gas line I/V D/S Flange	0	0	0	0.000	0.000
110	B. No. -14-Fuel Gas line I/V U/S Flange	0	0	0	0.000	0.000
111	B. No. -14-Fuel Gas line I/V Gland	0	0	0	0.000	0.000
112	B. No. -14-Fuel Gas line I/V D/S Flange	0	0	0	0.000	0.000
113	B. No. -15-Pilot Gas line I/V U/S Flange	0	0	0	0.000	0.000
114	B. No. -15-Pilot Gas line I/V Gland	0	0	0	0.000	0.000
115	B. No. -15-Pilot Gas line I/V D/S Flange	0	0	0	0.000	0.000
116	B. No. -15-Fuel Gas line I/V U/S Flange	0	0	0	0.000	0.000
117	B. No. -15-Fuel Gas line I/V Gland	0	0	0	0.000	0.000
118	B. No. -15-Fuel Gas line I/V D/S Flange	0	0	0	0.000	0.000
119	B. No. -16-Pilot Gas line I/V U/S Flange	0	0	0	0.000	0.000
120	B. No. -16-Pilot Gas line I/V Gland	0	0	0	0.000	0.000
121	B. No. -16-Pilot Gas line I/V D/S Flange	0	0	0	0.000	0.000
122	B. No. -16-Fuel Gas line I/V U/S Flange	0	0	0	0.000	0.000
123	B. No. -16-Fuel Gas line I/V Gland	0	0	0	0.000	0.000
124	B. No. -16-Fuel Gas line I/V D/S Flange	0	0	0	0.000	0.000
125	B. No. -17-Pilot Gas line I/V U/S Flange	0	0	0	0.000	0.000
126	B. No. -17-Pilot Gas line I/V Gland	0	0	0	0.000	0.000
127	B. No. -17-Pilot Gas line I/V D/S Flange	0	0	0	0.000	0.000
128	B. No. -17-Fuel Gas line I/V U/S Flange	0	0	0	0.000	0.000
129	B. No. -17-Fuel Gas line I/V Gland	0	0	0	0.000	0.000
130	B. No. -17-Fuel Gas line I/V D/S Flange	0	0	0	0.000	0.000
131	B. No. -18-Pilot Gas line I/V U/S Flange	0	0	0	0.000	0.000
132	B. No. -18-Pilot Gas line I/V Gland	0	0	0	0.000	0.000
133	B. No. -18-Pilot Gas line I/V D/S Flange	0	0	0	0.000	0.000
134	B. No. -18-Fuel Gas line I/V U/S Flange	0	0	0	0.000	0.000
135	B. No. -18-Fuel Gas line I/V Gland	0	0	0	0.000	0.000
136	B. No. -18-Fuel Gas line I/V D/S Flange	0	0	0	0.000	0.000
137	B. No. -19-Pilot Gas line I/V U/S Flange	0	0	0	0.000	0.000
138	B. No. -19-Pilot Gas line I/V Gland	0	0	0	0.000	0.000
139	B. No. -19-Pilot Gas line I/V D/S Flange	0	0	0	0.000	0.000
140	B. No. -19-Fuel Gas line I/V U/S Flange	0	0	0	0.000	0.000
141	B. No. -19-Fuel Gas line I/V Gland	0	0	0	0.000	0.000
142	B. No. -19-Fuel Gas line I/V D/S Flange	0	0	0	0.000	0.000
143	B. No. -20-Pilot Gas line I/V U/S Flange	0	0	0	0.000	0.000
144	B. No. -20-Pilot Gas line I/V Gland	0	0	0	0.000	0.000
145	B. No. -20-Pilot Gas line I/V D/S Flange	0	0	0	0.000	0.000
146	B. No. -20-Fuel Gas line I/V U/S Flange	0	0	0	0.000	0.000
147	B. No. -20-Fuel Gas line I/V Gland	0	0	0	0.000	0.000
148	B. No. -20-Fuel Gas line I/V D/S Flange	0	0	0	0.000	0.000
Unit: WAX						
Area:pump-18PA109A Wax Scripper Bottom Pump						
	1) Suction line I/V U/S Flange	0	0	0	0.000	0.000
	2) I/V Gland	0	0	0	0.000	0.000
	3) I/V D/S Flange	0	0	0	0.000	0.000
	4) Drain line I/V Gland	0	0	0	0.000	0.000
	5) Drain line Safety Flange	0	0	0	0.000	0.000
	6) Discharge line I/V U/S Flange	0	0	0	0.000	0.000
	7) I/V Gland	0	0	0	0.000	0.000
	8) I/V D/S Flange	0	0	0	0.000	0.000
	9) Pump seal	0	0	0	0.000	0.000
	10) Meter line I/V Gland	0	0	0	0.000	0.000
	11) OWS point	0	0	0	0.000	0.000
	12) 18PA109B Suction line I/V U/S Flange	0	0	0	0.000	0.000
	13) I/V Gland	0	0	0	0.000	0.000
	14) I/V D/S Flange	0	0	0	0.000	0.000
	15) Drain line I/V Gland	0	0	0	0.000	0.000

FUGITIVE EMISSIONS SURVEY REPORT

[August 2021]



Client : NRL

ETS

Work Order No: 4300058771-BOR/12.04.2019

ETS/NRL/FUGITIVE/004/21

S/N	Component ID	AVERAGE READING LEL %	READING (%NG)	READING (ppm)	EPA Correlation Kg/Hr/Source	Total Emission kg/annum
16	Drain line Safety Flange	0	0	0	0.000	0.000
17	Discharge line I/V U/S Flange	0	0	0	0.000	0.000
18	I/V Gland	0	0	0	0.000	0.000
19	I/V D/S Flange	0	0	0	0.000	0.000
20	Pump seal	0	0	0	0.000	0.000
21	Meter line 1st I/V Gland	0	0	0	0.000	0.000
22	Meter line 2nd I/V Gland	0	0	0	0.000	0.000
23	OWS point	0	0	0	0.000	0.000
24	18PA105A Suction line I/V U/S Flange	0	0	0	0.000	0.000
25	I/V Gland	0	0	0	0.000	0.000
26	I/V D/S Flange	0	0	0	0.000	0.000
27	Drain line I/V Gland	0	0	0	0.000	0.000
28	Drain line Safety Flange	0	0	0	0.000	0.000
29	Meter line 1st I/V Gland	0	0	0	0.000	0.000
30	Meter line 2nd I/V Gland	0	0	0	0.000	0.000
31	OWS point	0	0	0	0.000	0.000
32	18PA105B Suction line I/V U/S Flange	0	0	0	0.000	0.000
33	I/V Gland	0	0	0	0.000	0.000



NUMALIGARH REFINERY LIMITED

(Quality Control Department)

Analysis of ground water around secured land fills

Date of sampling: 13.07.2021

Tested by: Prabhas Kumar Thakur

SI No.	Parameters	Results of piezometric tubes
1	Odour	Odourless
2	pH Value	7.0
3	Iron , mg/lit	0.35
4	Copper , mg/lit	0.000
5	Nickel , mg/lit	0.000
6	Cadmium , mg/lit	0.000
7	Arsenic. mg/lit	0.000
8	Lead , mg/lit	0.000
9	Zinc, mg/lit	0.060
10	Chromium,mg/lit	0.001
11	Magnesium, mg/lit	1.6
12	Calcium, mg/lit	9.2
13	Selenium, mg/lit	0.040
14	Sodium	12.26

Certified by: Dr. Bedobrat Barhai
Officer(Quality Control)
For Numaligarh Refinery Limited



NUMALIGARH REFINERY LIMITED

(Quality Control Department)

Analysis of ground water around secured land fills

Date of sampling: 13.09.2021

Tested by: Prabhas Kumar Thakur

Sl No.	Parameters	UOM	Results of Piezometric tubes
1	Odour	--	Odourless
2	pH Value	--	7.0
3	Iron	ppm	0.32
4	Copper	ppm	0.000
5	Nickel	ppm	0.001
6	Cadmium	ppm	0.000
7	Arsenic	ppm	0.000
8	Lead	ppm	0.000
9	Zinc	ppm	0.012
10	Chromium	ppm	0.001
11	Magnesium	ppm	1.8
12	Calcium	ppm	9.67
13	Selenium	ppm	0.018
14	Sodium	ppm	14.2

Certified by: Dr. Bedobrat Barhai

Officer(Quality Control)

For Numaligarh Refinery Limited

VOC MONITORING REPORT [June -2021]



Client : NRL

ETS

Work Order No: 4300058771-BOR/12.04.2019

ETS/NRL/VOC/001/20

Plant-	Numaligarh Refinery	Instrument Used-Firstcheck5000 VOC Meter
S.No.	Location	Concentration PPM(Limit)
		Emission Load Kg/hr/Source
		Emission Load Kg/Annum

Unit :	MSP		
Area :	B/L, Pump Area		
1	Fuel gas Inlet line U/S I/V U/S flange	0	0.00
2	Fuel gas Inlet line U/S I/V Gland	0	0.00
3	Fuel gas Inlet line U/S I/V D/S flange	0	0.00
4	Fuel gas Inlet line D/S I/V U/S flange	0	0.00
5	Fuel gas Inlet line D/S I/V Gland	0	0.00
6	Fuel gas Inlet line D/S I/V D/S flange	0	0.00
7	Sour gas outlet line U/S I/V U/S flange	0	0.00
8	Sour gas outlet line U/S I/V Gland	0	0.00
9	Sour gas outlet line U/S I/V D/S flange	0	0.00
10	Drain line I/V Gland	0	0.00
11	Drain line safety Flange	0	0.00
12	Sour gas outlet line D/S I/V U/S flange	0	0.00
13	Sour gas outlet line D/S I/V Gland	0	0.00
14	Sour gas outlet line D/S I/V D/S flange	0	0.00
15	LPG R/D outlet line U/S I/V U/S flange	0	0.00
16	LPG R/D outlet line U/S I/V Gland	0	0.00
17	LPG R/D outlet line U/S I/V D/S flange	0	0.00
18	Drain line I/V Gland	0	0.00
19	LPG R/D First I/V gland	0	0.00
20	LPG R/D outlet line D/S I/V U/S flange	0	0.00
21	LPG R/D outlet line D/S I/V Gland	0	0.00
22	LPG R/D outlet line D/S I/V D/S flange	0	0.00
23	Hydrogen Rich Gas To PSA outlet	0	0.00
24	Hydrogen Rich Gas To PSA outlet	0	0.00
25	Hydrogen Rich Gas To PSA outlet	0	0.00
26	Drain line I/V Gland	0	0.00
27	Drain line safety Flange	0	0.00
28	NRV U/S Flange	0	0.00
29	NRV Top Flange	0	0.00
30	NRV D/S Flange	0	0.00
31	Hydrogen Rich Gas To PSA outlet line U/S I/V U/S Flange	0	0.00
32	Hydrogen Rich Gas To PSA outlet line U/S I/V Gland	0	0.00
33	Hydrogen Rich Gas To PSA outlet line U/S I/V D/S Flange	0	0.00
34	Hydrogen from PSA Inlet line U/S I/V U/S Flange	0	0.00
35	Hydrogen from PSA Inlet line U/S I/V Gland	0	0.00
36	Hydrogen from PSA Inlet line U/S I/V D/S Flange	0	0.00
37	NRV U/S Flange	0	0.00
38	NRV Top Flange	0	0.00
39	NRV D/S Flange	0	0.00
40	Drain line I/V Gland	0	0.00
41	Drain line safety Flange	0	0.00
42	Hydrogen from PSA Inlet line D/S I/V U/S Flange	0	0.00
43	Hydrogen from PSA Inlet line D/S I/V Gland	0	0.00
44	Hydrogen from PSA Inlet line D/S I/V D/S Flange	0	0.00
45	To 14-VV-01 S/U H. NAPTHA To	0	0.00
46	To 14-VV-01 S/U H. NAPTHA To	0	0.00
47	To 14-VV-01 S/U H. NAPTHA To	0	0.00

48	NRV U/S Flange	0	0.00
49	NRV Top Flange	0	0.00
50	NRV D/S Flange	0	0.00
51	Drain line I/V Gland	0	0.00
52	Drain line safety Flange	0	0.00
53	To 14-VV-01 S/U H. NAPTHA To	0	0.00
54	To 14-VV-01 S/U H. NAPTHA To	0	0.00
55	To 14-VV-01 S/U H. NAPTHA To	0	0.00
56	To 14-VV-01 S/U H. NAPTHA To	0	0.00
57	To 14-VV-01 S/U H. NAPTHA To	0	0.00
58	To 14-VV-01 S/U H. NAPTHA To	0	0.00
59	NRV U/S Flange	0	0.00
60	NRV Top Flange	0	0.00
61	NRV D/S Flange	0	0.00
62	Drain line I/V Gland	0	0.00
63	Drain line safety Flange	0	0.00
64	To 14-VV-01 S/U H. NAPTHA To	0	0.00
65	To 14-VV-01 S/U H. NAPTHA To	0	0.00
66	To 14-VV-01 S/U H. NAPTHA To	0	0.00
67	14-LV-1701 U/S line I/V U/S Flange	0	0.00
68	14-LV-1701 U/S line I/V Gland	0	0.00
69	14-LV-1701 U/S line I/V D/S Flange	0	0.00
70	CDE line 1st I/V Gland	0	0.00
71	CDE line 2nd I/V Gland	0	0.00
72	stainer Flange	0	0.00
73	CDE line 3rd I/V Gland	0	0.00
74	14-LV-1701 C/V line U/S Flange	0	0.00
75	14-LV-1701 C/V line Gland	0	0.00
76	14-LV-1701 C/V line D/S Flange	0	0.00
77	14-LV-1701 D/S line I/V U/S Flange	0	0.00
78	14-LV-1701 D/S line I/V Gland	0	0.00
79	14-LV-1701 D/S line I/V D/S Flange	0	0.00
80	Bypass line I/V U/S Flange	0	0.00
81	Bypass line I/V Gland	0	0.00
82	Bypass line I/V D/S Flange	0	0.00
83	15-FV-1401 U/S line I/V U/S Flange	0	0.00
84	15-FV-1401 U/S line I/V Gland	0	0.00
85	15-FV-1401 U/S line I/V D/S Flange	0	0.00
86	CDE line 1st I/V Gland	0	0.00
87	CDE line 2nd I/V Gland	0	0.00
88	stainer Flange	0	0.00
89	CBD Drain line Top Flange	0	0.00
90	15-FV-1401 C/V line U/S Flange	0	0.00
91	15-FV-1401 C/V line Gland	0	0.00
92	15-FV-1401 C/V line D/S Flange	0	0.00
93	15-FV-1401 D/S line I/V U/S Flange	0	0.00
94	15-FV-1401 D/S line I/V Gland	0	0.00
95	15-FV-1401 D/S line I/V D/S Flange	0	0.00
96	Bypass line I/V U/S Flange	0	0.00
97	Bypass line I/V Gland	0	0.00
98	Bypass line I/V D/S Flange	0	0.00
99	15-PV-1401 U/S line I/V U/S Flange	0	0.00
100	15-PV-1401 U/S line I/V Gland	0	0.00
101	15-PV-1401 U/S line I/V D/S Flange	0	0.00
102	15-PV-1401 C/V line U/S Flange	0	0.00
103	15-PV-1401 C/V line Gland	0	0.00
104	15-PV-1401 C/V line D/S Flange	0	0.00
105	15-PV-1401 D/S line I/V U/S Flange	0	0.00
106	15-PV-1401 D/S line I/V Gland	0	0.00

107	15-PV-1401 D/S line I/V D/S Flange	0		0.00
108	To flare line 1st I/V U/S Flange	0		0.00
109	To flare line 1st I/V Gland	0		0.00
110	To flare line 1st I/V D/S Flange	0		0.00
111	NRV U/S Flange	0		0.00
112	NRV Top Flange	0		0.00
113	NRV D/S Flange	0		0.00
114	Drain line I/V Gland	0		0.00
115	Drain line safety Flange	0		0.00
116	To flare line 2nd I/V U/S Flange	0		0.00
117	To flare line 2nd I/V Gland	0		0.00
118	To flare line 2nd I/V D/S Flange	0		0.00
119	To FG Header line 1st I/V U/S Flange	0		0.00
120	To FG Header line 1st I/V Gland	0		0.00
121	To FG Header line 1st I/V D/S Flange	0		0.00
122	NRV Top Flange	0		0.00
123	NRV D/S Flange	0		0.00
124	Drain line I/V Gland	0		0.00
125	Drain line safety Flange	0		0.00
126	To FG Header line 2nd I/V U/S Flange	0		0.00
127	To FG Header line 2nd I/V Gland	0		0.00
128	To FG Header line 2nd I/V D/S Flange	0		0.00
129	15-PA-CF-001A	0		0.00
130	Suction line I/V U/S Flange	0		0.00
131	Suction line I/V Gland	0		0.00
132	Suction line I/V D/S Flange	0		0.00
133	stainer Top Flange	0		0.00
134	P.G. Meter line I/V Gland	0		0.00
135	Suction line Flange	0		0.00
136	Pump Seal	0		0.00
137	CBD line 1st I/V Gland	0		0.00
138	stainer Flange	0		0.00
139	CBD line 2nd I/V Gland	0		0.00
140	Drain line I/V Gland	0		0.00
141	OWS Point	0		0.00
142	Discharge line U/S Flange	0		0.00
143	Meter line Flange	0		0.00
144	NRV U/S Flange	0		0.00
145	NRV Top Flange	0		0.00
146	NRV D/S Flange	0		0.00
147	Discharge line I/V U/S Flange	0		0.00
148	Discharge line I/V Gland	0		0.00
149	Discharge line I/V D/S Flange	0		0.00
150	15-PA-CF-001B	0		0.00
151	Suction line I/V U/S Flange	0		0.00
152	Suction line I/V Gland	0		0.00
153	Suction line I/V D/S Flange	0		0.00
154	stainer Top Flange	0		0.00
155	P.G. Meter line I/V Gland	0		0.00
156	Suction line Flange	0		0.00
157	Pump Seal	0		0.00
158	CBD line 1st I/V Gland	0		0.00
159	stainer Flange	0		0.00
160	CBD line 2nd I/V Gland	0		0.00
161	Drain line I/V Gland	0		0.00
162	OWS Point	0		0.00
163	Discharge line U/S Flange	0		0.00
164	Meter line Flange	0		0.00
165	NRV U/S Flange	0		0.00

166	NRV Top Flange	0	0.00
167	NRV D/S Flange	0	0.00
168	Discharge line I/V U/S Flange	0	0.00
169	Discharge line I/V Gland	0	0.00
170	Discharge line I/V D/S Flange	0	0.00
171	15-PV-1301A U/S line I/V U/S Flange	0	0.00
172	15-PV-1301A U/S line I/V Gland	0	0.00
173	15-PV-1301A U/S line I/V D/S Flange	0	0.00
174	15-PV-1301A C/V line U/S Flange	0	0.00
175	15-PV-1301A C/V line Gland	0	0.00
176	15-PV-1301A C/V line D/S Flange	0	0.00
177	15-PV-1301A D/S line I/V U/S Flange	0	0.00
178	15-PV-1301A D/S line I/V Gland	0	0.00
179	15-PV-1301A D/S line I/V D/S Flange	0	0.00
180	Bypass line I/V U/S Flange	0	0.00
181	Bypass line I/V Gland	0	0.00
182	Bypass line I/V D/S Flange	0	0.00
183	15-PA-CF-002A	0	0.00
184	Suction line I/V U/S Flange	0	0.00
185	Suction line I/V Gland	0	0.00
186	Suction line I/V D/S Flange	0	0.00
187	stainer Top Flange	0	0.00
188	P.G. Meter line I/V Gland	0	0.00
189	Suction line Flange	0	0.00
190	Pump Seal	0	0.00
191	CBD line 1st I/V Gland	0	0.00
192	stainer Flange	0	0.00
193	CBD line 2nd I/V Gland	0	0.00
194	Drain line I/V Gland	0	0.00
195	OWS Point	0	0.00
196	Discharge line Flange	0	0.00
197	Meter line I/V Flange	0	0.00
198	NRV U/S Flange	0	0.00
199	NRV Top Flange	0	0.00
200	Discharge line I/V U/S Flange	0	0.00
201	Discharge line I/V Gland	0	0.00
202	Discharge line I/V D/S Flange	0	0.00
203	15-PA-CF-002B	0	0.00
204	Suction line I/V U/S Flange	0	0.00
205	Suction line I/V Gland	0	0.00
206	Suction line I/V D/S Flange	0	0.00
207	stainer Top Flange	0	0.00
208	P.G. Meter line I/V Gland	0	0.00
209	Suction line Flange	0	0.00
210	Pump Seal	0	0.00
211	CBD line 1st I/V Gland	0	0.00
212	stainer Flange	0	0.00
213	CBD line 2nd I/V Gland	0	0.00
214	Drain line I/V Gland	0	0.00
215	OWS Point	0	0.00
216	Discharge line Flange	0	0.00
217	Meter line I/V Flange	0	0.00
218	NRV U/S Flange	0	0.00
219	NRV Top Flange	0	0.00
220	Discharge line I/V U/S Flange	0	0.00
221	Discharge line I/V Gland	0	0.00
222	Discharge line I/V D/S Flange	0	0.00
223	15-FV-1503 U/S line I/V Gland	0	0.00
224	CBD line 1st I/V Gland	0	0.00



225	CBD line 2nd I/V Gland	0	0.00
226	stainer Flange	0	0.00
227	CBD line 3rd I/V Gland	0	0.00
228	15-FV-1503 line c/v U/S flange	0	0.00
229	15-FV-1503 line c/v Gland	0	0.00
230	15-FV-1503 line c/v D/S flange	0	0.00
231	15-FV-1503 D/S line I/V Gland	0	0.00
232	Bypass line I/V Gland	0	0.00
233	14-PACF-004A	0	0.00
234	Suction line I/V U/S Flange	0	0.00
235	Suction line I/V Gland	0	0.00
236	Suction line I/V D/S Flange	0	0.00
237	stainer Top Flange	0	0.00
238	Suction line Flange	0	0.00
239	Pump Seal	0	0.00
240	Discharge line Flange	0	0.00
241	Meter line I/V Flange	0	0.00
242	NRV U/S Flange	0	0.00
243	NRV Top Flange	0	0.00
244	NRV D/S Flange	0	0.00
245	Discharge line I/V U/S Flange	0	0.00
246	Discharge line I/V Gland	0	0.00
247	Discharge line I/V D/S Flange	0	0.00
248	CBD line 1st I/V Gland	0	0.00
249	CBD line 2nd I/V Gland	0	0.00
250	Drain line I/V Gland	0	0.00
251	OWS Point	0	0.00
252	stainer Flange	0	0.00
253	14-PACF-004B	0	0.00
254	Suction line I/V U/S Flange	0	0.00
255	Suction line I/V Gland	0	0.00
256	Suction line I/V D/S Flange	0	0.00
257	stainer Top Flange	0	0.00
258	Suction line Flange	0	0.00
259	Pump Seal	0	0.00
260	Discharge line Flange	0	0.00
261	Meter line I/V Flange	0	0.00
262	NRV U/S Flange	0	0.00
263	NRV Top Flange	0	0.00
264	NRV D/S Flange	0	0.00
265	Discharge line I/V U/S Flange	0	0.00
266	Discharge line I/V Gland	0	0.00
267	Discharge line I/V D/S Flange	0	0.00
268	CBD line 1st I/V Gland	0	0.00
269	CBD line 2nd I/V Gland	0	0.00
270	stainer flange	0	0.00
271	CBD line 3rd I/V Gland	0	0.00
272	Drain line I/V Gland	0	0.00
273	OWS Point	0	0.00
274	14-PACF-006A	0	0.00
275	Suction line I/V U/S Flange	0	0.00
276	Suction line I/V Gland	0	0.00
277	Suction line I/V D/S Flange	0	0.00
278	stainer Top Flange	0	0.00
279	Suction line Flange	0	0.00
280	Pump Seal	0	0.00
281	Discharge line Flange	0	0.00
282	Meter line I/V gland	0	0.00
283	NRV U/S Flange	0	0.00

284	NRV Top Flange	0	0.00
285	NRV D/S Flange	0	0.00
286	Drain line I/V Gland	0	0.00
287	Drain line safety Flange	0	0.00
288	Discharge line I/V U/S Flange	0	0.00
289	Discharge line I/V Gland	0	0.00
290	Discharge line I/V D/S Flange	0	0.00
291	Pump To CBD line 1st I/V U/S Flange	0	0.00
292	Pump To CBD line 1st I/V Gland	0	0.00
293	Pump To CBD line 1st I/V D/S Flange	0	0.00
294	Pump To CBD line 2nd I/V Gland	0	0.00
295	stainer Flange	0	0.00
296	Pump To CBD line 3rd I/V Gland	0	0.00
297	OWS Point	0	0.00
298	14-PACF-OO6B	0	0.00
299	Suction line I/V U/S Flange	0	0.00
300	Suction line I/V Gland	0	0.00
301	Suction line I/V D/S Flange	0	0.00
302	stainer Top Flange	0	0.00
303	Suction line Flange	0	0.00
304	Pump Seal	0	0.00
305	Discharge line Flange	0	0.00
306	Meter line I/V gland	0	0.00
307	NRV U/S Flange	0	0.00
308	NRV Top Flange	0	0.00
309	NRV D/S Flange	0	0.00
310	Drain line I/V Gland	0	0.00
311	Drain line safety Flange	0	0.00
312	Discharge line I/V U/S Flange	0	0.00
313	Discharge line I/V Gland	0	0.00
314	Discharge line I/V D/S Flange	0	0.00
315	Pump To CBD line 1st I/V U/S Flange	0	0.00
316	Pump To CBD line 1st I/V Gland	0	0.00
317	Pump To CBD line 1st I/V D/S Flange	0	0.00
318	Pump To CBD line 2nd I/V Gland	0	0.00
319	stainer Flange	0	0.00
320	Pump To CBD line 3rd I/V Gland	0	0.00
321	OWS Point	0	0.00
322	14-FV-1103 U/S line I/V U./S Flange	0	0.00
323	14-FV-1103 U/S line I/V Gland	0	0.00
324	14-FV-1103 U/S line I/V D/S Flange	0	0.00
325	Drain line 1st I/V Gland	0	0.00
326	Drain line 2nd I/V Gland	0	0.00
327	stainer Flange	0	0.00
328	Drain line 3rd I/V Gland	0	0.00
329	14-FV-1103 C/V line U/S Flange	0	0.00
330	14-FV-1103 C/V line Gland	0	0.00
331	14-FV-1103 C/V line D/S Flange	0	0.00
332	14-FV-1103 D/S line I/V U./S Flange	0	0.00
333	14-FV-1103 D/S line I/V Gland	0	0.00
334	14-FV-1103 D/S line I/V D/S Flange	0	0.00
335	Bypass line I/V U/S Flange	0	0.00
336	Bypass line I/V Gland	0	0.00
337	Bypass line I/V D/S Flange	0	0.00
338	14-UV-1101 CV U/S Flange	0	0.00
339	14-UV-1101 CV Gland	0	0.00
340	14-UV-1101 CV D/S Flange	0	0.00
341	14-PA-CF-OO1A	0	0.00
342	Suction line I/V U/S Flange	0	0.00



343	Suction line I/V Gland	0	0.00
344	Suction line I/V D/S Flange	0	0.00
345	stainer Top Flange	0	0.00
346	Drain line I/V Gland	0	0.00
347	Drain line stainer Flange	0	0.00
348	Suction line Flange	0	0.00
349	Pump Seal	0	0.00
350	Discharge line Flange	0	0.00
351	Meter line I/V gland	0	0.00
352	NRV U/S Flange	0	0.00
353	NRV Top Flange	0	0.00
354	NRV D/S Flange	0	0.00
355	Drain line I/V Gland	0	0.00
356	Drain line stainer Flange	0	0.00
357	Discharge line I/V U/S Flange	0	0.00
358	Discharge line I/V Gland	0	0.00
359	Discharge line I/V D/S Flange	0	0.00
360	Pump To CBD line 1st I/V Gland	0	0.00
361	Pump To CBD line 2nd I/V Gland	0	0.00
362	stainer flange	0	0.00
363	Pump To CBD line 3rd I/V Gland	0	0.00
364	OWS Point	0	0.00
365	14-PA-CF-001B	0	0.00
366	Suction line I/V U/S Flange	0	0.00
367	Suction line I/V Gland	0	0.00
368	Suction line I/V D/S Flange	0	0.00
369	stainer Top Flange	0	0.00
370	Drain line I/V Gland	0	0.00
371	Drain line stainer Flange	0	0.00
372	Suction line Flange	0	0.00
373	Pump Seal	0	0.00
374	Discharge line Flange	0	0.00
375	Meter line I/V gland	0	0.00
376	NRV U/S Flange	0	0.00
377	NRV Top Flange	0	0.00
378	NRV D/S Flange	0	0.00
379	Drain line I/V Gland	0	0.00
380	Drain line stainer Flange	0	0.00
381	Discharge line I/V U/S Flange	0	0.00
382	Discharge line I/V Gland	0	0.00
383	Discharge line I/V D/S Flange	0	0.00
384	Pump To CBD line 1st I/V Gland	0	0.00
385	Pump To CBD line 2nd I/V Gland	0	0.00
386	stainer flange	0	0.00
387	Pump To CBD line 3rd I/V Gland	0	0.00
388	OWS Point	0	0.00
389	NAPTHA to SLOP U/S line I/V U/S Flange	0	0.00
390	NAPTHA to SLOP U/S line I/V Gland	0	0.00
391	NAPTHA to SLOP U/S line I/V D/S Flange	0	0.00
392	NRV U/S Flange	0	0.00
393	NRV Top Flange	0	0.00
394	NRV D/S Flange	0	0.00
395	Drain line I/V Gland	0	0.00
396	Drain line safety Flange	0	0.00
397	NAPTHA to SLOP D/S line I/V U/S Flange	0	0.00
398	NAPTHA to SLOP D/S line I/V Gland	0	0.00
399	NAPTHA to SLOP D/S line I/V D/S Flange	0	0.00
400	Splitter Reflux To SLOP U/S line	0	0.00
401	Splitter Reflux To SLOP U/S line	0	0.00

402	Splitter Reflux To SLOP U/S line	0	0.00
403	NRV U/S Flange	0	0.00
404	NRV Top Flange	0	0.00
405	NRV D/S Flange	0	0.00
406	Drain line I/V Gland	0	0.00
407	Drain line safety Flange	0	0.00
408	Splitter Reflux To SLOP D/S line	0	0.00
409	Splitter Reflux To SLOP D/S line	0	0.00
410	Splitter Reflux To SLOP D/S line	0	0.00
411	2nd I/V U/S Flange	0	0.00
412	2nd I/V gland	0	0.00
413	2nd I/V D/S Flange	0	0.00
414	Splitter Reflux To SLOP U/S line	0	0.00
415	Splitter Reflux To SLOP U/S line	0	0.00
416	Splitter Reflux To SLOP U/S line	0	0.00
417	Splitter Reflux To SLOP U/S line	0	0.00
418	Splitter Reflux To SLOP U/S line	0	0.00
419	Splitter Reflux To SLOP U/S line	0	0.00
420	NRV U/S Flange	0	0.00
421	NRV Top Flange	0	0.00
422	NRV D/S Flange	0	0.00
423	Drain line I/V Gland	0	0.00
424	Drain line safety Flange	0	0.00
425	Splitter Reflux To SLOP D/S line	0	0.00
426	Splitter Reflux To SLOP D/S line	0	0.00
427	Splitter Reflux To SLOP D/S line	0	0.00
428	Hydrogen Rich gas From unit 15	0	0.00
429	Hydrogen Rich gas From unit 15	0	0.00
430	Hydrogen Rich gas From unit 15	0	0.00
431	NRV U/S Flange	0	0.00
432	NRV Top Flange	0	0.00
433	NRV D/S Flange	0	0.00
434	Drain line I/V Gland	0	0.00
435	Drain line safety Flange	0	0.00
436	Hydrogen Rich gas From unit 15	0	0.00
437	Hydrogen Rich gas From unit 15	0	0.00
438	Hydrogen Rich gas From unit 15	0	0.00
439	Hydrogen From PSA To 16-VV-2	0	0.00
440	Hydrogen From PSA To 16-VV-2	0	0.00
441	Hydrogen From PSA To 16-VV-2	0	0.00
442	NRV U/S Flange	0	0.00
443	NRV Top Flange	0	0.00
444	NRV D/S Flange	0	0.00
445	Drain line I/V Gland	0	0.00
446	Drain line safety Flange	0	0.00
447	Hydrogen From PSA To 16-VV-2	0	0.00
448	Hydrogen From PSA To 16-VV-2	0	0.00
449	Hydrogen From PSA To 16-VV-2	0	0.00
450	14-FV-1501-CV U/S I/V U/S Flange	0	0.00
451	14-FV-1501-CV U/S I/V Gland	0	0.00
452	14-FV-1501-CV U/S I/V D/S Flange	0	0.00
453	CBD line 1st I/V Gland	0	0.00
454	CBD line 2ND I/V Gland	0	0.00
455	CBD line 3RD I/V Gland	0	0.00
456	stainer flange	0	0.00
457	14-FV-1501-CV U/S Flange	0	0.00
458	14-FV-1501-CV Gland	0	0.00
459	14-FV-1501-CV D/S Flange	0	0.00
460	14-FV-1501-CV D/S I/V U/S Flange	0	0.00

461	14-FV-1501-CV D/S I/V Gland	0	0.00
462	14-FV-1501-CV D/S I/V D/S Flange	0	0.00
463	Bypass line I/V U/S Flange	0	0.00
464	Bypass line I/V Gland	0	0.00
465	Bypass line I/V D/S Flange	0	0.00
466	From 14-PA-4 A/B to SLOP 1st I/V	0	0.00
467	From 14-PA-4 A/B to SLOP 1st I/V	0	0.00
468	From 14-PA-4 A/B to SLOP 1st I/V	0	0.00
469	From 14-PA-4 A/B to SLOP 2nd I/V	0	0.00
470	From 14-PA-4 A/B to SLOP 2nd I/V	0	0.00
471	14-FV-1701 U/S I/V U/S Flange	0	0.00
472	14-FV-1701 U/S I/V Gland	0	0.00
473	14-FV-1701 U/S I/V D/S Flange	0	0.00
474	CBD line 1st I/V Gland	0	0.00
475	CBD line 2ND I/V Gland	0	0.00
476	CBD line 3RD I/V Gland	0	0.00
477	stainer flange	0	0.00
478	14-FV-1701 C/V U/S Flange	0	0.00
479	14-FV-1701 C/V Gland	0	0.00
480	14-FV-1701 C/V D/S Flange	0	0.00
481	14-FV-1701 D/S I/V U/S Flange	0	0.00
482	14-FV-1701 D/S I/V Flange	0	0.00
483	14-FV-1701 D/S I/V D/S Flange	0	0.00
484	Bypass line I/V U/S Flange	0	0.00
485	14-FV-1401 U/S I/V U/S Flange	0	0.00
486	14-FV-1401 U/S I/V Gland	0	0.00
487	14-FV-1401 U/S I/V D/S Flange	0	0.00
488	CBD line 1st I/V Gland	0	0.00
489	CBD line 2ND I/V Gland	0	0.00
490	CBD line 3RD I/V Gland	0	0.00
491	stainer flange	0	0.00
492	14-FV-1401 C/V U/S Flange	0	0.00
493	14-FV-1401 C/V Gland	0	0.00
494	14-FV-1401 C/V D/S Flange	0	0.00
495	14-FV-1401 D/S I/V U/S Flange	0	0.00
496	14-FV-1401 D/S I/V Flange	0	0.00
497	14-FV-1401 D/S I/V D/S Flange	0	0.00
498	Bypass line I/V U/S Flange	0	0.00
499	Bypass line I/V Gland	0	0.00
500	Bypass line I/V D/S Flange	0	0.00
501	From 14-PA-CF-001 Start Up line	0	0.00
502	From 14-PA-CF-001 Start Up line	0	0.00
503	From 14-PA-CF-001 Start Up line	0	0.00
504	Hydrogen From unit 15 1st I/V	0	0.00
505	stainer flange	0	0.00
506	Top flange	0	0.00
507	Drain line I/V Gland	0	0.00
508	Drain line safety Flange	0	0.00
509	Hydrogen From unit 15 2nd I/V	0	0.00
510	14-FV-1402 U/S Line I/V Gland	0	0.00
511	CBD line I/V Gland	0	0.00
512	14-FV-1402 C/V U/S Gland	0	0.00
513	14-FV-1402 C/V Gland	0	0.00
514	CBD line I/V Gland	0	0.00
515	14-FV-1402 D/S I/V Gland	0	0.00
516	Bypass line I/V Gland	0	0.00
517	Heavy Naptha From Unit 14 line	0	0.00
518	Heavy Naptha From Unit 14 line	0	0.00
519	Heavy Naptha From Unit 14 line	0	0.00

520	Heavy Naptha From Unit 14 line	0	0.00
521	Heavy Naptha From Unit 14 line	0	0.00
522	Feed Naptha To Unit 15 line U/S	0	0.00
523	Feed Naptha To Unit 15 line U/S	0	0.00
524	Feed Naptha To Unit 15 line U/S	0	0.00
525	NRV U/S Flange	0	0.00
526	NRV Top Flange	0	0.00
527	NRV D/S Flange	0	0.00
528	Drain line I/V Gland	0	0.00
529	Drain line safety Flange	0	0.00
530	Feed Naptha To Unit 15 line D/S	0	0.00
531	Feed Naptha To Unit 15 line D/S	0	0.00
532	Feed Naptha To Unit 15 line D/S	0	0.00
533	S/U line (Reaction Section BP) line	0	0.00
534	S/U line (Reaction Section BP) line	0	0.00
535	S/U line (Reaction Section BP) line	0	0.00
536	S/U line (Reaction Section BP) line	0	0.00
537	S/U line (Reaction Section BP) line	0	0.00
538	Hydrogen From PSA To 15-KA-0	0	0.00
539	Hydrogen From PSA To 15-KA-0	0	0.00
540	Hydrogen From PSA To 15-KA-0	0	0.00
540	NRV U/S Flange	0	0.00
542	NRV Top Flange	0	0.00
543	NRV D/S Flange	0	0.00
544	Drain line I/V Gland	0	0.00
545	Drain line safety Flange	0	0.00
546	Hydrogen From PSA To 15-KA-0	0	0.00
547	Hydrogen From PSA To 15-KA-0	0	0.00
548	Hydrogen From PSA To 15-KA-0	0	0.00
549	From 16-KA-001 A/B To 15-KA-0	0	0.00
550	From 16-KA-001 A/B To 15-KA-0	0	0.00
551	From 16-KA-001 A/B To 15-KA-0	0	0.00
552	NRV U/S Flange	0	0.00
553	NRV Top Flange	0	0.00
554	NRV D/S Flange	0	0.00
555	Vrain line I/V Gland	0	0.00
556	Vrain line Safety Gland	0	0.00
557	From 16-KA-001 A/B To 15-KA-0	0	0.00
558	From 16-KA-001 A/B To 15-KA-0	0	0.00
559	From 16-KA-001 A/B To 15-KA-0	0	0.00
560	To-15-KA-001 Seal line U/S I/V U/S Flange	0	0.00
561	To-15-KA-001 Seal line U/S I/V Gland	0	0.00
562	To-15-KA-001 Seal line U/S I/V D/S Flange	0	0.00
563	NRV U/S Flange	0	0.00
564	NRV Top Flange	0	0.00
565	NRV D/S Flange	0	0.00
566	To-15-KA-001 Seal line D/S I/V U/S Flange	0	0.00
567	To-15-KA-001 Seal line D/S I/V Gland	0	0.00
568	To-15-KA-001 Seal line D/S I/V D/S Flange	0	0.00
569	16-PA-CF-0011A Suction line I/V	0	0.00
570	16-PA-CF-0011A Suction line I/V	0	0.00
571	16-PA-CF-0011A Suction line I/V	0	0.00
572	stainer flange	0	0.00
573	Drain line 1st I/V Gland	0	0.00
574	stainer flange	0	0.00
575	Drain line 2nd I/V Gland	0	0.00
576	Suction line Flange	0	0.00
577	Pump Seal	0	0.00
578	Discharge line Flange	0	0.00



579	Drain line I/V Gland	0	0.00
580	Drain line safety Gland	0	0.00
581	Meter line I/V Gland	0	0.00
582	NRV U/S Flange	0	0.00
583	NRV Top Flange	0	0.00
584	NRV D/S Flange	0	0.00
585	Drain line 1st I/V Gland	0	0.00
586	Drain line 2nd I/V Gland	0	0.00
587	OWS Point	0	0.00
588	Suction line Outlet line to 1st I/V	0	0.00
589	Suction line Outlet line to 1st I/V	0	0.00
590	Suction line Outlet line to 1st I/V	0	0.00
591	Drain line I/V Gland	0	0.00
592	Drain line safety Flange	0	0.00
593	Suction line Outlet line to 2nd I/V	0	0.00
594	Suction line Outlet line to 2nd I/V	0	0.00
595	Suction line Outlet line to 2nd I/V	0	0.00
596	16-PA-CF-0011B Suction line I/V	0	0.00
597	16-PA-CF-0011B Suction line I/V	0	0.00
598	16-PA-CF-0011B Suction line I/V	0	0.00
599	stainer Top Flange	0	0.00
600	Drain line 1st I/V Gland	0	0.00
601	stainer flange	0	0.00
602	Drain line 2nd I/V Gland	0	0.00
603	Suction line Flange	0	0.00
604	Pump Seal	0	0.00
605	Discharge line Flange	0	0.00
606	Drain line I/V Gland	0	0.00
607	Drain line safety Gland	0	0.00
608	P.G. Meter I/V Gland	0	0.00
609	NRV U/S Flange	0	0.00
610	NRV Top Flange	0	0.00
611	NRV D/S Flange	0	0.00
612	Drain line 1st I/V Gland	0	0.00
613	Drain line 2nd I/V Gland	0	0.00
614	OWS Point	0	0.00
615	Discharge line I/V U/S Flange	0	0.00
616	Discharge line I/V Gland	0	0.00
617	Discharge line I/V D/S Flange	0	0.00
618	Discharge line to outlet line I/V	0	0.00
619	Discharge line to outlet line Top	0	0.00
620	Drain line I/V Gland	0	0.00
621	Drain line safety Flange	0	0.00
622	16-PA-CF-013A	0	0.00
623	Suction line I/V U/S Flange	0	0.00
624	Suction line I/V Gland	0	0.00
625	Suction line I/V D/S Flange	0	0.00
626	stainer Top Flange	0	0.00
627	Suction line To Outlet line 1st I/V	0	0.00
628	Suction line To Outlet line 1st I/V	0	0.00
629	Suction line To Outlet line 1st I/V	0	0.00
630	Suction line To Outlet line 2nd I/V	0	0.00
631	Suction line To Outlet line 2nd I/V	0	0.00
632	Suction line To Outlet line 2nd I/V	0	0.00
633	Suction line To Outlet line 3rd I/V	0	0.00
634	Suction line To Outlet line 3rd I/V	0	0.00
635	Suction line To Outlet line 3rd I/V	0	0.00
636	OWS Point	0	0.00
637	Drain line 1st I/V Gland	0	0.00

638	Steamer Flange	0	0.00
639	Drain line 2nd I/V Gland	0	0.00
640	Suction line Flange	0	0.00
641	Discharge line Flange	0	0.00
642	P.G. Meter I/V Gland	0	0.00
643	NRV U/S Flange	0	0.00
644	NRV Top Flange	0	0.00
645	NRV D/S Flange	0	0.00
646	Drain line 1st I/V Gland	0	0.00
647	Drain line 2nd I/V Gland	0	0.00
648	OWS Point	0	0.00
649	Discharge line I/V U/S Flange	0	0.00
650	Discharge line I/V Gland	0	0.00
651	Discharge line I/V D/S Flange	0	0.00
652	16-PA-CF-013B	0	0.00
653	Suction line I/V U/S Flange	0	0.00
654	Suction line I/V Gland	0	0.00
655	Suction line I/V D/S Flange	0	0.00
656	stainer Top Flange	0	0.00
657	Drain line 1st I/V Gland	0	0.00
658	Steamer Flange	0	0.00
659	Drain line 2nd I/V Gland	0	0.00
660	Suction line Flange	0	0.00
661	Discharge line Flange	0	0.00
662	P.G. Meter I/V Gland	0	0.00
663	NRV U/S Flange	0	0.00
664	NRV Top Flange	0	0.00
665	NRV D/S Flange	0	0.00
666	Drain line 1st I/V Gland	0	0.00
667	Drain line 2nd I/V Gland	0	0.00
668	OWS Point	0	0.00
669	Discharge line I/V U/S Flange	0	0.00
670	Discharge line I/V Gland	0	0.00
671	Discharge line I/V D/S Flange	0	0.00
672	16-FV-2201 U/S line I/V U/S Flange	0	0.00
673	16-FV-2201 U/S line I/V Gland	0	0.00
674	16-FV-2201 U/S line I/V D/S Flange	0	0.00
675	Drain line I/V Gland	0	0.00
676	16-FV-2201 C/V line U/S Flange	0	0.00
677	16-FV-2201 C/V line Gland	0	0.00
678	16-FV-2201 C/V line D/S Flange	0	0.00
679	Drain line I/V Gland	0	0.00
680	16-FV-2201 D/S line I/V U/S Flange	0	0.00
681	16-FV-2201 D/S line I/V Gland	0	0.00
682	16-FV-2201 D/S line I/V D/S Flange	0	0.00
683	Bypass line I/V U/S Flange	0	0.00
684	Bypass line I/V Gland	0	0.00
685	Bypass line I/V D/S Flange	0	0.00
686	16-FV-2103 U/S LINE I/V U/S Flange	0	0.00
687	16-FV-2103 U/S LINE I/V Gland	0	0.00
688	16-FV-2103 U/S LINE I/V D/S Flange	0	0.00
689	Drain line I/V Gland	0	0.00
690	16-FV-2103 line C/V U/S Flange	0	0.00
691	16-FV-2103 line C/V Gland	0	0.00
692	16-FV-2103 line C/V D/S Flange	0	0.00
693	Drain line I/V Gland	0	0.00
694	16-FV-2103 D/S LINE I/V U/S Flange	0	0.00
695	16-FV-2103 D/S LINE I/V Gland	0	0.00
696	16-FV-2103 D/S LINE I/V D/S Flange	0	0.00

697	Bypass line I/V U/S Flange	0	0.00
698	Bypass line I/V Gland	0	0.00
699	Bypass line I/V D/S Flange	0	0.00
700	16-FV-2205 U/S LINE I/V U/S Flange	0	0.00
701	16-FV-2205 U/S LINE I/V Gland	0	0.00
702	16-FV-2205 U/S LINE I/V D/S Flange	0	0.00
703	Drain line I/V Gland	0	0.00
704	16-FV-2205 line C/V U/S Flange	0	0.00
705	16-FV-2205 line C/V Gland	0	0.00
706	16-FV-2205 line C/V D/S Flange	0	0.00
707	Drain line I/V Gland	0	0.00
708	16-FV-2205 D/S LINE I/V U/S Flange	0	0.00
709	16-FV-2205 D/S LINE I/V Gland	0	0.00
710	16-FV-2205 D/S LINE I/V D/S Flange	0	0.00
711	Bypass line I/V U/S Flange	0	0.00
712	Bypass line I/V Gland	0	0.00
713	Bypass line I/V D/S Flange	0	0.00
714	16-PA-CF-010A	0	0.00
715	Suction line I/V U/S Flange	0	0.00
716	Suction line I/V Gland	0	0.00
717	Suction line I/V D/S Flange	0	0.00
718	stainer Top Flange	0	0.00
719	Suction line To Outlet line 1st I/V	0	0.00
720	Suction line To Outlet line 1st I/V	0	0.00
721	Suction line To Outlet line 1st I/V	0	0.00
722	Suction line To Outlet line 2nd I/V	0	0.00
723	Suction line To Outlet line 2nd I/V	0	0.00
724	Suction line To Outlet line 2nd I/V	0	0.00
725	Suction line To Outlet line 3rd I/V	0	0.00
726	Suction line To Outlet line 3rd I/V	0	0.00
727	Suction line To Outlet line 3rd I/V	0	0.00
728	OWS Point	0	0.00
729	Drain line 1st I/V Gland	0	0.00
730	Steamer Flange	0	0.00
731	Drain line 2nd I/V Gland	0	0.00
732	Suction line Flange	0	0.00
733	Pump Seal	0	0.00
734	Discharge line Flange	0	0.00
735	P.G. Meter I/V Gland	0	0.00
736	NRV U/S Flange	0	0.00
737	NRV Top Flange	0	0.00
738	NRV D/S Flange	0	0.00
739	Drain line 1st I/V Gland	0	0.00
740	Drain line 2nd I/V Gland	0	0.00
741	OWS Point	0	0.00
742	Discharge line I/V U/S Flange	0	0.00
743	Discharge line I/V Gland	0	0.00
744	Discharge line I/V D/S Flange	0	0.00
745	16-PA-CF-010B	0	0.00
746	Suction line I/V U/S Flange	0	0.00
747	Suction line I/V Gland	0	0.00
748	Suction line I/V D/S Flange	0	0.00
749	stainer Top Flange	0	0.00
750	Drain line 1st I/V Gland	0	0.00
751	Steamer Flange	0	0.00
752	Drain line 2nd I/V Gland	0	0.00
753	Suction line Flange	0	0.00
754	Pump Seal	0	0.00
755	Discharge line Flange	0	0.00

756	P.G. Meter I/V Gland	0	0.00
757	NRV U/S Flange	0	0.00
758	NRV Top Flange	0	0.00
759	NRV D/S Flange	0	0.00
760	Drain line 1st I/V Gland	0	0.00
761	Drain line 2nd I/V Gland	0	0.00
762	OWS Point	0	0.00
763	Discharge line I/V U/S Flange	0	0.00
764	Discharge line I/V Gland	0	0.00
765	Discharge line I/V D/S Flange	0	0.00
766	16-PA-CF-012A	0	0.00
767	Suction line I/V U/S Flange	0	0.00
768	Suction line I/V Gland	0	0.00
769	Suction line I/V D/S Flange	0	0.00
770	stainer Top Flange	0	0.00
771	Drain line 1st I/V Gland	0	0.00
772	Steamer Flange	0	0.00
773	Drain line 2nd I/V Gland	0	0.00
774	Suction line Flange	0	0.00
775	Discharge line Flange	0	0.00
776	Meter line I/V Gland	0	0.00
777	Top Flange	0	0.00
778	Drain line 1st I/V Gland	0	0.00
779	Drain line 2nd I/V Gland	0	0.00
780	OWS Point	0	0.00
781	Discharge line I/V Gland	0	0.00
782	16-PA-CF-012B	0	0.00
783	Suction line I/V U/S Flange	0	0.00
784	Suction line I/V Gland	0	0.00
785	Suction line I/V D/S Flange	0	0.00
786	stainer Top Flange	0	0.00
787	Drain line 1st I/V Gland	0	0.00
788	Steamer Flange	0	0.00
789	Drain line 2nd I/V Gland	0	0.00
790	Suction line Flange	0	0.00
791	Discharge line Flange	0	0.00
792	Meter line I/V Gland	0	0.00
793	Top Flange	0	0.00
794	Drain line 1st I/V Gland	0	0.00
795	Drain line 2nd I/V Gland	0	0.00
796	OWS Point	0	0.00
797	Discharge line I/V Gland	0	0.00
798	16-FV-2204 D/S line I/V Gland	0	0.00
799	Drain line 1st I/V Gland	0	0.00
800	stainer Flange	0	0.00
801	Drain line 2nd I/V Gland	0	0.00
802	16-FV-2204 line C/V U/S Flange	0	0.00
803	16-FV-2204 line C/V Gland	0	0.00
804	16-FV-2204 line C/V D/S Flange	0	0.00
805	Drain line I/V Gland	0	0.00
806	D/S line I/V Gland	0	0.00
807	Bypass line I/V Gland	0	0.00
808	16-FV-2206 U/S line I/V Gland	0	0.00
809	Drain line 1st I/V Gland	0	0.00
810	stainer Flange	0	0.00
811	Drain line 2nd I/V Gland	0	0.00
812	16-FV-2206 C/V U/S Flange	0	0.00
813	16-FV-2206 C/V Gland	0	0.00
814	16-FV-2206 C/V D/S Flange	0	0.00



815	Drain line I/V Gland	0	0.00
816	D/S line I/V Gland	0	0.00
817	Bypass line stainer Flange	0	0.00
818	Bypass line I/V Gland	0	0.00
819	16-PA-CF-006A	0	0.00
820	Suction line I/V U/S Flange	0	0.00
821	Suction line I/V Gland	0	0.00
822	Suction line I/V D/S Flange	0	0.00
823	stainer Top Flange	0	0.00
824	Drain line 1st I/V Gland	0	0.00
825	Steamer Flange	0	0.00
826	Drain line 2nd I/V Gland	0	0.00
827	Suction line Flange	0	0.00
828	Pump Seal	0	0.00
829	Discharge line Flange	0	0.00
830	Vrain line I/V Gland	0	0.00
831	Vrain line safety Gland	0	0.00
832	Meter line I/V Gland	0	0.00
833	NRV U/S Flange	0	0.00
834	NRV Top Flange	0	0.00
835	NRV D/S Flange	0	0.00
836	Drain line 1st I/V Gland	0	0.00
837	Drain line 2nd I/V Gland	0	0.00
838	OWS Point	0	0.00
839	Discharge line I/V U/S Flange	0	0.00
840	Discharge line I/V Gland	0	0.00
841	Discharge line I/V D/S Flange	0	0.00
842	16-PA-CF-006B	0	0.00
843	Suction line I/V U/S Flange	0	0.00
844	Suction line I/V Gland	0	0.00
845	Suction line I/V D/S Flange	0	0.00
846	stainer Top Flange	0	0.00
847	Drain line 1st I/V Gland	0	0.00
848	Steamer Flange	0	0.00
849	Drain line 2nd I/V Gland	0	0.00
850	Suction line Flange	0	0.00
851	Pump Seal	0	0.00
852	Discharge line Flange	0	0.00
853	Vrain line I/V Gland	0	0.00
854	Vrain line safety Gland	0	0.00
855	Meter line I/V Gland	0	0.00
856	NRV U/S Flange	0	0.00
857	NRV Top Flange	0	0.00
858	NRV D/S Flange	0	0.00
859	Drain line 1st I/V Gland	0	0.00
860	Drain line 2nd I/V Gland	0	0.00
861	OWS Point	0	0.00
862	Discharge line I/V U/S Flange	0	0.00
863	Discharge line I/V Gland	0	0.00
864	Discharge line I/V D/S Flange	0	0.00
865	MIN FLOW to 16 VV-06 U/S line	0	0.00
866	MIN FLOW to 16 VV-06 U/S line	0	0.00
867	MIN FLOW to 16 VV-06 U/S line	0	0.00
868	NRV U/S Flange	0	0.00
869	NRV Top Flange	0	0.00
870	NRV D/S Flange	0	0.00
871	Drain line I/V Gland	0	0.00
872	Drain line safety flange	0	0.00
873	Heavy Reformat to Storage U/S	0	0.00

874	Top Flange	0	0.00
875	Drain line I/V Gland	0	0.00
876	Drain line safety flange	0	0.00
877	D/S line stainer Flange	0	0.00
878	D/S line I/V Gland	0	0.00
879	16-PV-2102 U/S line I/V Flange	0	0.00
880	Drain line I/V Gland	0	0.00
881	16-PV-2102 line C/V U/S Flange	0	0.00
882	16-PV-2102 line C/V Gland	0	0.00
883	16-PV-2102 line C/V D/S Flange	0	0.00
884	Drain line I/V Gland	0	0.00
885	D/S line I/V Gland	0	0.00
886	Bypass line stainer Flange	0	0.00
887	Bypass line I/V Gland	0	0.00
888	16-PA-CF-003A	0	0.00
889	Suction line I/V U/S Flange	0	0.00
890	Suction line I/V Gland	0	0.00
891	Suction line I/V D/S Flange	0	0.00
892	stainer Top Flange	0	0.00
893	Suction line To Outlet line 1st I/V	0	0.00
894	Suction line To Outlet line 1st I/V	0	0.00
895	Suction line To Outlet line 1st I/V	0	0.00
896	Suction line To Outlet line 2nd I/V	0	0.00
897	Suction line To Outlet line 2nd I/V	0	0.00
898	Suction line To Outlet line 2nd I/V	0	0.00
899	Vrain line I/V Gland	0	0.00
900	Vrain line safety Gland	0	0.00
901	Suction line To Outlet line 3rd I/V	0	0.00
902	Suction line To Outlet line 3rd I/V	0	0.00
903	Suction line To Outlet line 3rd I/V	0	0.00
904	Drain line 1st I/V Gland	0	0.00
905	Drain line 2nd I/V Gland	0	0.00
906	Steamer Flange	0	0.00
907	Suction line Flange	0	0.00
908	Discharge line Flange	0	0.00
909	P.G. Meter I/V Gland	0	0.00
910	Meter line to Drain line I/V Gland	0	0.00
911	Meter line to Drain line Safety Flange	0	0.00
912	NRV U/S Flange	0	0.00
913	NRV Top Flange	0	0.00
914	NRV D/S Flange	0	0.00
915	Drain line 1st I/V Gland	0	0.00
916	Drain line 2nd I/V Gland	0	0.00
917	OWS Point	0	0.00
918	Discharge line I/V U/S Flange	0	0.00
919	Discharge line I/V Gland	0	0.00
920	Discharge line I/V D/S Flange	0	0.00
921	16-PA-CF-003B	0	0.00
922	Suction line I/V U/S Flange	0	0.00
923	Suction line I/V Gland	0	0.00
924	Suction line I/V D/S Flange	0	0.00
925	stainer Top Flange	0	0.00
926	Drain line 1st I/V Gland	0	0.00
927	Steamer Flange	0	0.00
928	Drain line 2nd I/V Gland	0	0.00
929	Suction line Flange	0	0.00
930	Discharge line Flange	0	0.00
931	Meter line I/V Gland	0	0.00
932	Meter line to Drain line I/V Gland	0	0.00

933	Meter line to Drain line Safety Flange	0	0.00
934	NRV U/S Flange	0	0.00
935	NRV Top Flange	0	0.00
936	NRV D/S Flange	0	0.00
937	Drain line 1st I/V Gland	0	0.00
938	Drain line 2nd I/V Gland	0	0.00
939	OWS Point	0	0.00
940	Discharge line I/V U/S Flange	0	0.00
941	Discharge line I/V Gland	0	0.00
942	Discharge line I/V D/S Flange	0	0.00
943	16-FV-1803 U/S line I/V Gland	0	0.00
944	Drain line I/V Gland	0	0.00
945	16-FV-1803 C/V U/S Flange	0	0.00
946	16-FV-1803 C/V Gland	0	0.00
947	16-FV-1803 C/V D/S Flange	0	0.00
948	Drain line I/V Gland	0	0.00
949	D/S line I/V Gland	0	0.00
950	Bypass line I/V Gland	0	0.00
951	16-FV-1802 U/S line I/V U/S Flange	0	0.00
952	16-FV-1802 U/S line I/V Gland	0	0.00
953	16-FV-1802 U/S line I/V D/S Flange	0	0.00
954	Drain line I/V Gland	0	0.00
955	16-FV-1802 C/V U/S Flange	0	0.00
956	16-FV-1802 C/V Gland	0	0.00
957	16-FV-1802 C/V D/S Flange	0	0.00
958	Drain line I/V Gland	0	0.00
959	16-FV-1802 D/S line I/V U/S Flange	0	0.00
960	16-FV-1802 D/S line I/V Gland	0	0.00
961	16-FV-1802 D/S line I/V D/S Flange	0	0.00
962	Bypass line I/V U/S Flange	0	0.00
963	Bypass line I/V Gland	0	0.00
964	Bypass line I/V D/S Flange	0	0.00
965	16-PA-CF-005A	0	0.00
966	Suction line I/V U/S Flange	0	0.00
967	Suction line I/V Gland	0	0.00
968	Suction line I/V D/S Flange	0	0.00
969	stainer Top Flange	0	0.00
970	Drain line I/V Gland	0	0.00
971	Suction line Flange	0	0.00
972	Discharge line Flange	0	0.00
973	Meter line I/V Gland	0	0.00
974	Top Flange	0	0.00
975	Drain line 1st I/V Gland	0	0.00
976	Steamer Flange	0	0.00
977	Drain line 2nd I/V Gland	0	0.00
978	OWS Point	0	0.00
979	Discharge line I/V Gland	0	0.00
980	16-PA-CF-005B	0	0.00
981	Suction line I/V U/S Flange	0	0.00
982	Suction line I/V Gland	0	0.00
983	Suction line I/V D/S Flange	0	0.00
984	stainer Top Flange	0	0.00
985	Drain line I/V Gland	0	0.00
986	Suction line Flange	0	0.00
987	Discharge line Flange	0	0.00
988	P.G. Meter I/V Gland	0	0.00
989	Drain line 1st I/V Gland	0	0.00
990	Steamer Flange	0	0.00
991	Drain line 2nd I/V Gland	0	0.00

992	OWS Point	0	0.00
993	Top Flange	0	0.00
994	Discharge line I/V Gland	0	0.00
995	16-PV-2301 U/S line I/V U/S Flange	0	0.00
996	16-PV-2301 U/S line I/V Glnad	0	0.00
997	16-PV-2301 U/S line I/V D/S Flange	0	0.00
998	Drain line 1st I/V Gland	0	0.00
999	stainer Flange	0	0.00
1000	Drain line 2nd I/V Gland	0	0.00
1001	Drain line 3rd I/V Gland	0	0.00
1002	16-PV-2301 C/V U/S Flange	0	0.00
1003	16-PV-2301 C/V Glnad	0	0.00
1004	16-PV-2301 C/V D/S Flange	0	0.00
1005	Drain line I/V Gland	0	0.00
1006	16-PV-2301 D/S line I/V U/S Flange	0	0.00
1007	16-PV-2301 D/S line I/V Glnad	0	0.00
1008	16-PV-2301 D/S line I/V D/S Flange	0	0.00
1009	Bypass line I/V U/S Flange	0	0.00
1010	Bypass line I/V Gland	0	0.00
1011	Bypass line I/V D/S Flange	0	0.00
1012	16-FV-1701 U/S line I/V U/S Flange	0	0.00
1013	16-FV-1701 U/S line I/V Gland	0	0.00
1014	16-FV-1701 U/S line I/V D/S Flange	0	0.00
1015	16-FV-1701 C/V U/S Flange	0	0.00
1016	16-FV-1701 C/V Gland	0	0.00
1017	16-FV-1701 C/V D/S Flange	0	0.00
1018	16-FV-1701 D/S line I/V U/S Flange	0	0.00
1019	16-FV-1701 D/S line I/V Gland	0	0.00
1020	16-FV-1701 D/S line I/V D/S Flange	0	0.00
1021	Bypass line I/V U/S Flange	0	0.00
1022	Bypass line I/V Gland	0	0.00
1023	Bypass line I/V D/S Flange	0	0.00
1024	16-FV-1102 U/S line I/V U/S Flange	0	0.00
1025	16-FV-1102 U/S line I/V Gland	0	0.00
1026	16-FV-1102 U/S line I/V D/S Flange	0	0.00
1027	Drain line 1st I/V Gland	0	0.00
1028	stainer Flange	0	0.00
1029	Drain line 2nd I/V Gland	0	0.00
1030	16-FV-1102 C/V U/S Flange	0	0.00
1031	16-FV-1102 C/V Gland	0	0.00
1032	16-FV-1102 C/V D/S Flange	0	0.00
1033	Drain line I/V Gland	0	0.00
1034	16-FV-1102 D/S line I/V U/S Flange	0	0.00
1035	16-FV-1102 D/S line I/V Gland	0	0.00
1036	16-FV-1102 D/S line I/V D/S Flange	0	0.00
1037	Bypass line I/V U/S Flange	0	0.00
1038	Bypass line I/V Gland	0	0.00
1039	Bypass line I/V D/S Flange	0	0.00
1040	16-FV-1703 U/S line I/V Gland	0	0.00
1041	Drain line I/V Gland	0	0.00
1042	16-FV-1703 C/V U/S Flange	0	0.00
1043	16-FV-1703 C/V Gland	0	0.00
1044	16-FV-1703 C/V D/S Flange	0	0.00
1045	Drain line 1st I/V Gland	0	0.00
1046	stainer Flange	0	0.00
1047	Drain line 2nd I/V Gland	0	0.00
1048	16-FV-1703 D/S line I/V Gland	0	0.00
1049	Bypass line I/V Gland	0	0.00
1050	16-PA-CF-001A	0	0.00

1051	Suction line I/V U/S Flange	0	0.00
1052	Suction line I/V Gland	0	0.00
1053	Suction line I/V D/S Flange	0	0.00
1054	stainer Top Flange	0	0.00
1055	Drain line 1st I/V Gland	0	0.00
1056	Drain line 2nd I/V Gland	0	0.00
1057	OWS Point	0	0.00
1058	Suction line Flange	0	0.00
1059	Pump Seal	0	0.00
1060	Discharge line Flange	0	0.00
1061	P.G. Meter I/V Gland	0	0.00
1062	NRV U/S Flange	0	0.00
1063	NRV Top Flange	0	0.00
1064	NRV D/S Flange	0	0.00
1065	Steamer Flange	0	0.00
1066	Drain line 1st I/V Gland	0	0.00
1067	Steamer Flange	0	0.00
1068	Drain line 2nd I/V Gland	0	0.00
1069	Discharge line I/V U/S Flange	0	0.00
1070	Discharge line I/V Gland	0	0.00
1071	Discharge line I/V D/S Flange	0	0.00
1072	16-PA-CF-001B	0	0.00
1073	Suction line I/V U/S Flange	0	0.00
1074	Suction line I/V Gland	0	0.00
1075	Suction line I/V D/S Flange	0	0.00
1076	stainer Top Flange	0	0.00
1077	Drain line 1st I/V Gland	0	0.00
1078	Drain line 2nd I/V Gland	0	0.00
1079	OWS Point	0	0.00
1080	Suction line Flange	0	0.00
1081	Pump Seal	0	0.00
1082	Discharge line Flange	0	0.00
1083	P.G. Meter I/V Gland	0	0.00
1084	NRV U/S Flange	0	0.00
1085	NRV Top Flange	0	0.00
1086	NRV D/S Flange	0	0.00
1087	Drain line 1st I/V Gland	0	0.00
1088	Steamer Flange	0	0.00
1089	Drain line 2nd I/V Gland	0	0.00
1090	Discharge line I/V U/S Flange	0	0.00
1091	Discharge line I/V Gland	15	0.00
1092	Discharge line I/V D/S Flange	0	0.00
1093	From FEED DRYER line D/S I/V U/S	0	0.00
1094	Top Flange	0	0.00
1095	stainer Flange	0	0.00
1096	D/S line I/V Gland	0	0.00
1097	Drain line I/V Gland	0	0.00
1098	Drain line safety flange	0	0.00
1099	From 16-C-01 Bottom line 1st I/V	0	0.00
1100	From 16-C-01 Bottom line 1st I/V	0	0.00
1101	From 16-C-01 Bottom line 1st I/V	0	0.00
1102	NRV U/S Flange	0	0.00
1103	NRV Top Flange	0	0.00
1104	From 16-C-01 Bottom line 1st I/V	0	0.00
1105	From 16-C-01 Bottom line 1st I/V	0	0.00
1106	From 16-C-01 Bottom line 1st I/V	0	0.00
1107	NRV U/S Flange	0	0.00
1108	NRV Top Flange	0	0.00
1109	16-FV-1804 U/S line I/V U/S Flange	0	0.00

1110	16-FV-1804 U/S line I/V Gland	0		0.00
1111	16-FV-1804 U/S line I/V D/S Flange	0		0.00
1112	Drain line 1st I/V Gland	0		0.00
1113	stainer Flange	0		0.00
1114	Drain line 2nd I/V Gland	0		0.00
1115	16-FV-1804 C/V U/S Flange	0		0.00
1116	16-FV-1804 C/V Gland	0		0.00
1117	16-FV-1804 C/V D/S Flange	0		0.00
1118	Drain line I/V Gland	0		0.00
1119	16-FV-1804 D/S line I/V U/S Flange	0		0.00
1120	16-FV-1804 D/S line I/V Gland	0		0.00
1121	16-FV-1804 D/S line I/V D/S Flange	0		0.00
1122	Bypass line I/V U/S Flange	0		0.00
1123	Bypass line I/V Gland	0		0.00
1124	Bypass line I/V D/S Flange	0		0.00
1125	ISOMER From DRYER DEGASSER	0		0.00
1126	ISOMER From DRYER DEGASSER	0		0.00
1127	ISOMER From DRYER DEGASSER	0		0.00

Unit: WAX

Area:pump-18PA109A Wax Scripper Bottom Pump				
1	Suction line I/V U/S Flange	0	0	0.00
2	I/V Gland	0	0	0.00
3	I/V D/S Flange	0	0	0.00
4	Drain line I/V Gland	0	0	0.00
5	Drain line Safety Flange	0	0	0.00
6	Discharge line I/V U/S Flange	0	0	0.00
7	I/V Gland	0	0	0.00
8	I/V D/S Flange	0	0	0.00
9	Pump seal	0	0	0.00
10	Meter line I/V Gland	0	0	0.00
11	OWS point	0	0	0.00
12	18PA109B Suction line I/V U/S Flange	0	0	0.00
13	I/V Gland	0	0	0.00
14	I/V D/S Flange	0	0	0.00
15	Drain line I/V Gland	0	0	0.00
16	Drain line Safety Flange	0	0	0.00
17	Discharge line I/V U/S Flange	0	0	0.00
18	I/V Gland	0	0	0.00
19	I/V D/S Flange	0	0	0.00
20	Pump seal	0	0	0.00
21	Meter line 1st I/V Gland	0	0	0.00
22	Meter line 2nd I/V Gland	0	0	0.00
23	OWS point	0	0	0.00
24	18PA105A Suction line I/V U/S Flange	0	0	0.00
25	I/V Gland	0	0	0.00
26	I/V D/S Flange	0	0	0.00
27	Drain line I/V Gland	0	0	0.00
28	Drain line Safety Flange	0	0	0.00
29	Meter line 1st I/V Gland	0	0	0.00
30	Meter line 2nd I/V Gland	0	0	0.00
31	OWS point	0	0	0.00
32	18PA105B Suction line I/V U/S Flange	0	0	0.00
33	I/V Gland	0	0	0.00
34	I/V D/S Flange	0	0	0.00
35	Discharge line I/V Gland	0	0	0.00
36	I/V D/S Flange	0	0	0.00
37	Drain line I/V Gland	0	0	0.00
38	Drain line Safety Flange	0	0	0.00

39	Meter line 1st I/V Gland	0	0	0.00
40	Meter line 2nd I/V Gland	0	0	0.00
41	OWS point	0	0	0.00
42	18PA105C Suction line I/V U/S Flange	0	0	0.00
43	I/V Gland	0	0	0.00
44	I/V D/S Flange	0	0	0.00
45	Discharge line I/V U/S Flange	0	0	0.00
46	I/V Gland	0	0	0.00
47	I/V D/S Flange	0	0	0.00
48	Pump seal	0	0	0.00
49	Drain line I/V Gland	0	0	0.00
50	Drain line Safety Flange	0	0	0.00
51	Meter line 1st I/V Gland	0	0	0.00
52	Meter line 2nd I/V Gland	0	0	0.00
53	OWS point	0	0	0.00
54	18PA105D Suction line I/V U/S Flange	0	0	0.00
55	I/V Gland	0	0	0.00
56	I/V D/S Flange	0	0	0.00
57	Pump seal	0	0	0.00
58	Drain line I/V Gland	0	0	0.00
59	Drain line Safety Flange	0	0	0.00
60	Meter line 1st I/V Gland	0	0	0.00
61	Meter line 2nd I/V Gland	0	0	0.00
62	OWS point	0	0	0.00
63	LV1902 Suction line I/V U/S Flange	0	0	0.00
64	I/V Gland	0	0	0.00
65	I/V D/S Flange	0	0	0.00
66	Drain line I/V Gland	0	0	0.00
67	Drain line Safety Flange	0	0	0.00
68	1902CV Gland	0	0	0.00
69	Discharge line I/V Gland	0	0	0.00
70	Discharge line Drain line I/V Gland	0	0	0.00
71	Drain line Safety Flange	0	0	0.00
72	LV2002 Suction line I/V U/S Flange	0	0	0.00
73	I/V Gland	0	0	0.00
74	I/V D/S Flange	0	0	0.00
75	Drain line I/V Gland	0	0	0.00
76	Drain line Safety Flange	0	0	0.00
77	LV2002 CV Gland	0	0	0.00
78	Discharge line I/V Gland	0	0	0.00
79	Discharge line Drain line I/V Gland	0	0	0.00
80	Drain line Safety Flange	0	0	0.00
81	LV1802 Suction line I/V Gland	0	0	0.00
82	LV1802 CV Gland	0	0	0.00
83	Discharge line I/V Gland	0	0	0.00
84	Drain line I/V Gland	0	0	0.00
85	Drain line Safety Flange	0	0	0.00
86	PV2401 Suction line I/V U/S Flange	0	0	0.00
87	I/V Gland	0	0	0.00
88	I/V D/S Flange	0	0	0.00
89	Drain line I/V Gland	0	0	0.00
90	Drain line Safety Flange	0	0	0.00
91	PV2401 Suction line I/V U/S Flange	0	0	0.00
92	PV2401 CV Gland	0	0	0.00
93	CV D/S Flange	0	0	0.00
94	Discharge line I/V U/S Flange	0	0	0.00
95	I/V Gland	0	0	0.00
96	I/V D/S Flange	0	0	0.00
97	Drain line I/V Gland	0	0	0.00

98	Drain line Safety Flange	0	0	0.00
99	NRV U/S Flange	0	0	0.00
100	NRV D/S Flange	0	0	0.00
101	Meter line 1st I/V Gland	0	0	0.00
102	Meter line 2nd I/V Gland	0	0	0.00
103	LV1702 Suction line I/V Gland	0	0	0.00
104	Drain line I/V Gland	0	0	0.00
105	Drain line Safety Flange	0	0	0.00
106	LV1702 CV Gland	0	0	0.00
107	CV D/S Flange	0	0	0.00
108	Discharge line I/V Gland	0	0	0.00
109	Discharge line flange	0	0	0.00
110	Drain line I/V Gland	0	0	0.00
111	Drain line Safety Flange	0	0	0.00
112	LV1602 Suction line I/V Gland	0	0	0.00
113	Drain line I/V Gland	0	0	0.00
114	Drain line Safety Flange	0	0	0.00
115	LV1602 CV Gland	0	0	0.00
116	CV D/S Flange	0	0	0.00
117	Discharge line I/V Gland	0	0	0.00
118	Drain line I/V Gland	0	0	0.00
119	Drain line Safety Flange	0	0	0.00
120	18PA114A Suction line I/V U/S Flange	0	0	0.00
121	I/V Gland	0	0	0.00
122	I/V D/S Flange	0	0	0.00
123	Discharge line I/V U/S Flange	0	0	0.00
124	I/V Gland	0	0	0.00
125	I/V D/S Flange	0	0	0.00
126	NRV U/S Flange	0	0	0.00
127	NRV D/S Flange	0	0	0.00
128	Pump seal	0	0	0.00
129	Meter line 1st I/V Gland	0	0	0.00
130	Meter line 2nd I/V Gland	0	0	0.00
131	18PA114B Suction line I/V U/S Flange	0	0	0.00
132	I/V Gland	0	0	0.00
133	I/V D/S Flange	0	0	0.00
134	Discharge line I/V U/S Flange	0	0	0.00
135	I/V Gland	0	0	0.00
136	I/V D/S Flange	0	0	0.00
137	NRV U/S Flange	0	0	0.00
138	NRV D/S Flange	0	0	0.00
139	Pump seal	0	0	0.00
140	Meter line 1st I/V Gland	0	0	0.00
141	Meter line 2nd I/V Gland	0	0	0.00
142	18PA104A Suction line I/V U/S Flange	0	0	0.00
143	I/V Gland	0	0	0.00
144	I/V D/S Flange	0	0	0.00
145	Drain line I/V Gland	0	0	0.00
146	Drain line Safety Flange	0	0	0.00
147	Discharge line I/V U/S Flange	0	0	0.00
148	I/V Gland	0	0	0.00
149	I/V D/S Flange	0	0	0.00
150	Pump seal	0	0	0.00
151	Meter line 1st I/V Gland	0	0	0.00
152	Meter line 2nd I/V Gland	0	0	0.00
153	18PA104B Suction line I/V U/S Flange	0	0	0.00
154	I/V Gland	0	0	0.00
155	I/V D/S Flange	0	0	0.00
156	Drain line I/V Gland	0	0	0.00

157	Drain line Safety Flange	0	0	0.00
158	Discharge line I/V U/S Flange	0	0	0.00
159	I/V Gland	0	0	0.00
160	I/V D/S Flange	0	0	0.00
161	Pump seal	0	0	0.00
162	Meter line 1st I/V Gland	0	0	0.00
163	Meter line 2nd I/V Gland	0	0	0.00
164	18PA104C Suction line I/V U/S Flange	0	0	0.00
165	I/V Gland	0	0	0.00
166	I/V D/S Flange	0	0	0.00
167	Drain line I/V Gland	0	0	0.00
168	Drain line Safety Flange	0	0	0.00
169	Discharge line I/V U/S Flange	0	0	0.00
170	I/V Gland	0	0	0.00
171	I/V D/S Flange	0	0	0.00
172	Pump seal	0	0	0.00
173	Meter line 1st I/V Gland	0	0	0.00
174	Meter line 2nd I/V Gland	0	0	0.00
175	18PA104D Suction line I/V U/S Flange	0	0	0.00
176	I/V Gland	0	0	0.00
177	I/V D/S Flange	0	0	0.00
178	Drain line I/V Gland	0	0	0.00
179	Drain line Safety Flange	0	0	0.00
180	Discharge line I/V U/S Flange	0	0	0.00
181	I/V Gland	0	0	0.00
182	I/V D/S Flange	0	0	0.00
183	Pump seal	0	0	0.00
184	Meter line 1st I/V Gland	0	0	0.00
185	Meter line 2nd I/V Gland	0	0	0.00
186	18PA104E Suction line I/V U/S Flange	0	0	0.00
187	I/V Gland	0	0	0.00
188	I/V D/S Flange	0	0	0.00
189	Drain line I/V Gland	0	0	0.00
190	Drain line Safety Flange	0	0	0.00
191	Discharge line I/V U/S Flange	0	0	0.00
192	I/V Gland	0	0	0.00
193	I/V D/S Flange	0	0	0.00
194	Pump seal	0	0	0.00
195	Meter line 1st I/V Gland	0	0	0.00
196	Meter line 2nd I/V Gland	0	0	0.00
197	18PA104F Suction line I/V U/S Flange	0	0	0.00
198	I/V Gland	0	0	0.00
199	I/V D/S Flange	0	0	0.00
200	Drain line I/V Gland	0	0	0.00
201	Drain line Safety Flange	0	0	0.00
202	Discharge line I/V U/S Flange	0	0	0.00
203	I/V Gland	0	0	0.00
204	I/V D/S Flange	0	0	0.00
205	Pump seal	0	0	0.00
206	Meter line 1st I/V Gland	0	0	0.00
207	Meter line 2nd I/V Gland	0	0	0.00
T.No.43TTCR101A (Service MVGO)				
208	Level Indicator connecting Point	0	0	0.00
209	US line IV gland	0	0	0.00
210	US line IV flange	0	0	0.00
211	Drain line I/V Gland	0	0	0.00
212	Drain line Safety Flange	0	0	0.00
213	D/S line IV gland	0	0	0.00
214	D/S line IV Flange	0	0	0.00

215	Meter line I/V Gland	0	0	0.00
T.No.43TTCR101B(Service MVGO)				
216	Level Indicator connecting Point	0	0	0.00
217	US line IV gland	0	0	0.00
218	US line IV flange	0	0	0.00
219	Drain line I/V Gland	0	0	0.00
220	Drain line Safety Flange	0	0	0.00
221	D/S line IV gland	0	0	0.00
222	D/S line IV Flange	0	0	0.00
223	Meter line I/V Gland	0	0	0.00
T.No.43TTCR102(Service HVGO)				
224	Level Indicator connecting Point	0	0	0.00
225	US line IV gland	0	0	0.00
226	US line IV flange	0	0	0.00
227	Drain line I/V Gland	0	0	0.00
228	Drain line Safety Flange	0	0	0.00
229	D/S line IV gland	0	0	0.00
230	D/S line IV Flange	0	0	0.00
231	Meter line I/V Gland	0	0	0.00