

**ANNEXURE-I****Reply of Information sought by MoEF**

The Expert Appraisal Committee-(Industry) for environmental appraisal of Industrial Projects considered the project during its meeting held on 23rd and 24th October, 2009. Based on the consideration of the documents submitted and the presentation made by the project proponent, the committee sought following information which is replied below:

**1. Compliance to the environmental safe guard stipulated in the environmental clearance for the existing refinery.**

Numaligarh Refinery Limited has obtained following environmental Clearance from Ministry of Environment & Forest, MOEF, New Delhi:

Ref No. J011011/16/90-IA.II dated 31.05.1991- ENVIRONMENTAL CLEARANCE FOR THE REFINERY

Ref No. J011011/92/2003-IA.II(I) dated 13.02.2004- ENVIRONMENTAL CLEARANCE FOR THE EURO III MOTOR SPIRIT PROJECT

Ref No. J011011/203/2003-IA.II(I) dated 22.03.2004- ENVIRONMENTAL CLEARANCE FOR THE COKE CALCINATION UNIT

Ref No. J011011/272/2008-IA.II(I) dated 10.11.2008- CLEARANCE FOR THE DIESEL QUALITY UPGRADATION PROJECT (DQUP)

Half yearly compliance report dated 1st December, 2009 to the environmental safe guard stipulated in the Environmental Clearance is enclosed in NRL's report as Annexure-A (i).

**2. Method of calibration for SO<sub>2</sub> analyser**

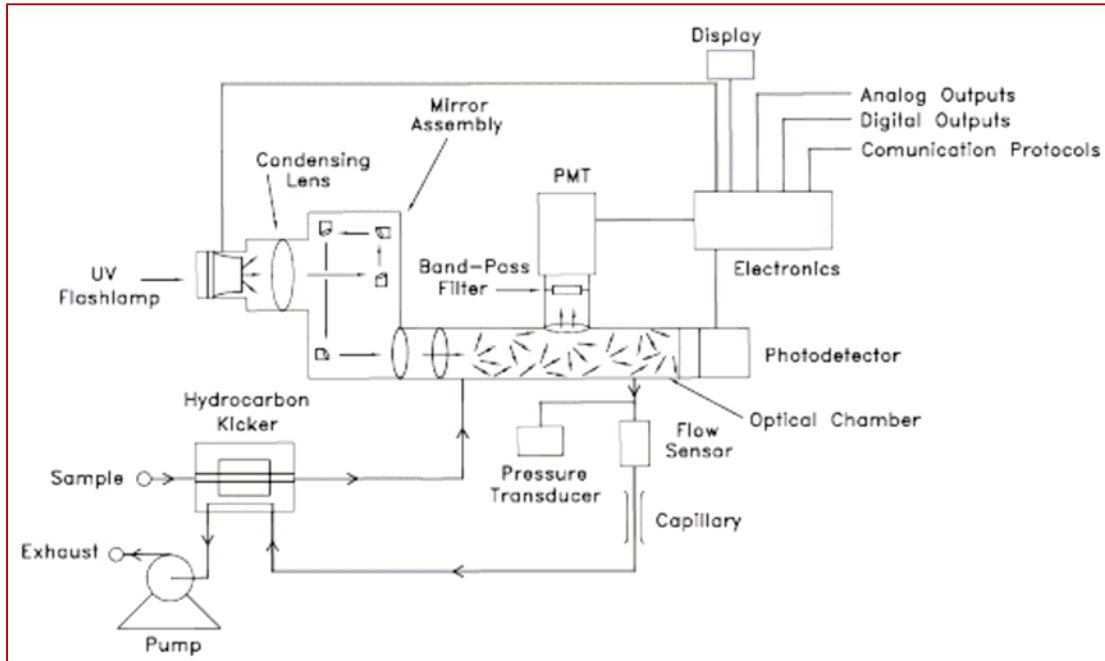
SO<sub>2</sub> online analyzers of M/s Thermo, USA & M/s Seres, USA make are installed in all the furnace stacks as well as in AAQMS. All the SO<sub>2</sub> analysers are calibrated by using standard gases suggested in standard methods.

**Principle of operation:**

As shown in the drawing below the sample is drawn into the analyzer through the SAMPLE bulkhead. The sample flows through a hydrocarbon "kicker," which removes hydrocarbons from the sample by forcing the hydrocarbon molecules to permeate through the tube wall. The SO<sub>2</sub> molecules pass through the hydrocarbon "kicker" unaffected. The sample flows into the fluorescence chamber, where pulsating UV light excites the SO<sub>2</sub> molecules. The condensing lens focuses the pulsating UV light into

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the mirror assembly. The mirror assembly contains four selective mirrors that reflect only the wavelengths which excite SO<sub>2</sub> molecules.



**ANNEXURE-I****3. Action plan to meet the new refinery standard issued by MoEF**

Details of Action Plan initiated by NRL to meet the new refinery standards issued by MOEF are described below:

S.N.	Revised standards	Compliance status/Actions initiated/taken
1.	<p><b>LIQUID EFFLUENTS</b></p> <p>Following effluent quality parameters to be monitored once in a month.</p> <p>-Ammonia as N, TKN, P, Cr(VI), Total Cr, Pb, Hg, Zn, Ni, Cu, V, Benzene, Benzo (<math>\infty</math>) pyrene</p>	<p><b>Complied with</b></p> <p>(In-house monitoring of all the parameters except. TKN, Hg, V, P, Benzene and Benzo (<math>\infty</math>) pyrene which are outsourced with EIA Division of Guwahati University).</p>
2	<p><b>FURNACE/BOILER STACK EMISSIONS</b></p> <p>All furnaces / boilers with heat input of 10 million kilo calories/hour or more shall have continuous monitoring systems for SO<sub>2</sub> and NO<sub>x</sub>. Manual monitoring for all the parameters viz. SO<sub>x</sub>, NO<sub>x</sub>, CO, PM and Ni+V shall be carried out once in two months and for furnaces / boilers with heat input less than 10 million kilo calories/hour shall be done once in a quarter.</p> <p>Sulphur in liquid fuel and H<sub>2</sub>S in FG to be monitored once in a month.</p> <p>Ni+V in liquid fuel to be monitored once in 6 months (if source and composition remains same otherwise with every change)</p> <p><b>Revised standards</b></p>	<p><b>Complied with.</b></p> <p>(All the furnaces with heat input of 10 million kilo calories/hour or more are having on line analyzers.</p> <p>Guwahati University-EIA Division has been engaged for bi monthly/quarterly monitoring of furnace stacks for SO<sub>x</sub>, NO<sub>x</sub>, PM and Ni+V).</p> <p><b>Complied with.</b></p> <p><b>Complied with.</b></p> <p><b>Action initiated/ taken</b></p>

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S.N.	Revised standards	Compliance status/Actions initiated/taken
3	<p><b>STORAGE VESSELS</b></p> <p>a) Capacity 4 to 75m<sup>3</sup> and TVP &gt;10kpa should have FRT with pressure valve vent</p> <p>b) Capacity 75 to 500m<sup>3</sup> and TVP 10kpa to 76kpa should have IFRT or EFRT or FRT with vapour control or vapour balancing system</p> <p>c) Capacity &gt;500m<sup>3</sup> and TVP 10kpa to 76 kpa should have IFRT or EFRT or FRT with vapour control system.</p> <p>d) Capacity &gt; 75m<sup>3</sup> and TVP &gt;76kpa should have Fixed roof tank with vapour control system</p> <p>e) IFRT &amp; EFRT is to be provided with double seals with min. vapour recovery of 96%. Primary seal should be liquid or shoe mounted for EFRT and vapour mounted for IFRT. Maximum seal gap width will be 4cm and maximum gap area will be 20cm<sup>2</sup>/m of tank diameter. Secondary seal shall be rim mounted. Maximum seal gap width will be 1.3cm and maximum gap area will be 20cm<sup>2</sup>/m of tank diameter.</p> <p>f) Fixed roof tank shall have vapour control efficiency of 95% and balancing efficiency of 90%.</p> <p>g) For inspection, API RP 575 may be adopted. In-service inspection with regard to seal gap should be carried out once in every six months and repair to be implemented within short time. In future, possibility of on stream repair of both seals shall be examined.</p> <p><b>Revised standards</b></p>	<p><b>NA</b></p> <p><b>NA</b></p> <p><b>Complied with.</b> <b>(Fixed roof tank with 10-16 kpa to 76kpa like CD &amp; VD tanks provided with PVRV for Nitrogen blanketing.)</b></p> <p><b>NA</b></p> <p>Only 4 nos. of recently constructed tanks are having double seals. Total 38 nos. of IFRT and EFRT tanks spreading over Refinery and Marketing Terminal were constructed almost 10 years back are having single seal. As the job involves lay off of tanks and also calls for lot of other logistic problem, it has been decided to take up the job in a phased manner. Action has been initiated for phase-wise implementation covering crude &amp; naphtha tanks initially.</p> <p>Action has been initiated to engage a professional body to study the requirement.</p> <p><b>Complied with.</b></p> <p><b>Action initiated/taken</b></p>

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S.N.	Revised standards	Compliance status/Actions initiated/taken
4	<p><b>Emissions from Loading of volatile products: Gasoline, Naphtha, BTX</b></p> <p>Type of loading:</p> <p>(i) Road tank truck- bottom loading</p> <p>(ii) Rail tank wagon- top submerged loading</p> <p>(iii) VOC reduction, %</p> <p>(iv) Emission, gm/m<sup>3</sup></p>	<p>All road tank trucks are top submersible loading type. Taken up the matter with Other Marketing Companies (OMCs) for converting tankers from top loading to bottom loading.</p> <p><b>Complied with.</b></p> <p>Action has been initiated to engage a professional body to study the requirement.</p> <p><b>As above</b></p>
5	<p><b>STANDARD FOR EQUIPMENT LEAKS</b></p> <p>Monitoring Requirements and Repair Schedule for equipment leaks as per LDAR program</p>	<p><b>Being practiced.</b></p>
6	<p><b>STANDARD FOR VOC EMISSION FROM WASTE WATER COLLECTION AND TREATMENT</b></p> <p>Oil water separators and equalization tanks should be provided with floating/fixed covers.</p> <p>The off gas generated should be treated to remove at least 90% of VOC and eliminate odour. Installation of LEL detectors, control device, seal drums, detonation arrestors as an added safety measure.</p>	<p>Existing equalization ponds (43m x 28m x 3.5m) in ETP is of open type. This being very huge, putting of covers does not look feasible.</p>

**ANNEXURE-I****4. Execution plan for the proposed project in the existing refinery****i. Objective:**

The Naphtha Splitter Unit (NSU) was incorporated in the original design of the Refinery with an objective to produce Reformer feed Naphtha from full range Naphtha ex Crude Distillation Unit (CDU). However, the implementation of NSU was deferred as immediate requirement of that special cut Naphtha was not envisaged at that time and instead, adequate provisions in CDU were kept for future addition of the Unit.

Subsequently NRL made an agreement with M/s Brahmaputra Crackers & Polymers Limited (BCPL) to supply 160 TMTPA of petrochemical grade naphtha. Thereafter a process package is prepared through EIL.

**ii. Location:**

It has been proposed to locate the Naphtha Splitter Unit (NSU) within the existing CDU/VDU battery limit. The new facilities proposed under the project have been located keeping in view the process sequence, safety & operation requirements, space available and need for future expansion. The proposed tanks for storing the product will be located in a vacant plot in the adjoining Marketing Terminal.

**iii. Equipment details:**

The project involves addition of the following equipments.

Sl.No.	Equipment	Qty	Remarks	Location
1	Column	03	Max. height / dia 28.3 / 1.7 m	CDU/VDU, B/L
2	Reboiler	03	Max. heat duty 2.62 MMKcal/hr	--do--
3	Air Fin Cooler	03	Max. heat duty 2.53 MMKcal/hr	--do--
4	Trim Cooler	02	Max. heat duty 0.4 MMKcal/hr	--do--
5	Pump	07	Max flow rate 51.4 m <sup>3</sup> /hr	--do--
6	Vessel	07	Max. pressure 6.6 kg/cm <sup>2</sup> g	--do--
7	Heat Exchanger	06	Max. heat duty 0.58 MMKcal/hr	--do--
8	Tanks	03	Nominal capacity 8400 m <sup>3</sup> each	Mktg Terminal

**iv. Utilities & Others**

The utility requirements for the proposed NSU project are given below. However, the utility requirements w.r.t. power, fuel, cooling water, raw water etc. are very minimal and will be available from the existing Utility Units.

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SI.No.	Utilities	Quantity
1	Power - LT	200 KW
2	Fuel	40 kg/hr
3	Cooling water	3-4 m <sup>3</sup> /hr
4	Raw water	< 5 m <sup>3</sup> /hr

All utility hook up jobs, piping jobs will be carried out from existing utility battery limits. Electrical hook up will be done from existing substation. Tap off point for the same will be taken after detailed study through EPCM Contractor.

Naphtha blow down, if any, during handing over of equipment for maintenance jobs will be routed through Closed Blow Down (CBD) and will be treated in Effluent Treatment Plant (ETP) which is capable to take care of the additional generation which is very minimal.

**v. Execution Philosophy:**

The project will be executed through a reputed EPCM Consultant under the NRL Project department headed by a General Manager. The Project department has experience of executing Projects like 3.0 MMPTA Refinery, Numaligarh Refinery Marketing Terminal, 10,000 MT LPG Bottling Plant, 225 TMT Motor Spirit Unit (MSU), and revamp jobs of Hydrocracker Unit (HCU), Hydrogen Unit (H<sub>2</sub>U) and associated facilities besides numerous additional facility jobs required for improvement of safety, environment, health, efficiency, reliability, etc. Marketing Terminal at Siliguri is also executed by the same group. The Project department consists of adequately trained & experienced personnel having background of above mentioned successfully implemented projects. The Project involves the following construction activities mainly in three locations i.e. CDU/VDU Battery limit, Marketing Terminal & Offsites –

- Excavation
- Piling
- Civil & Structural
- Erection of Equipments / Equipment Internals
- Pre-fabrication activity
- Erection of Piping including hook up with existing systems
- Electrical & Instrumentation

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- Construction of tankages
- PLC & DCS
- Trial & Commissioning

All the above activities will be carried in two phases i.e. Pre-shutdown & Shutdown. All necessary Pre-fabrication of piping & structural to the extent possible will be done before shutdown in the fabrication shed / yard specifically made for such purpose which is in safe location and away from process units. The rest of the activities of the project will be carried out by taking shutdown of the Unit / Refinery nearer the time. Execution of the proposed NSU project will be carried out in synchronization with the execution of Brahmaputra Crackers & Fertilizers Limited (BCPL) which is projected to be commissioned in April, 2012.

The project also involves addition of three nos. of tanks at Numaligarh Refinery Marketing Terminal (NRMT). The area will be properly barricaded complying with all the safety procedures. Construction of tankages will be carried out during normal operation of the plant taking all proper precautions.

Structures for the air fin coolers and foundation for most of the vessels are already available in the CDU/VDU.

The existing available infrastructure such as roads, construction water network, construction power substation, fabrication shed, fabrication yard, stores, fire fighting facilities, workshop, crane & other such heavy machineries, etc will ease to large extent in executing the construction activities as well as maintaining proper safety measures.

During execution of jobs inside the unit area, work permit systems strictly as per the OISD guidelines which we have been following last ten years very religiously will be strictly adhered to. Job Safety Plans will be developed for critical jobs.

**vi Safety Management System:**

NRL has a Fire & Safety (F&S) Department headed by Chief Manager under whom qualified and trained fire and safety engineers and fire operators are placed. All the manuals and procedures are made and periodically updated. Following are some of the key features of our safety management system –

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- A manual on construction safety had been developed during the commissioning stage.
- F&S training before issue of gate pass
- Tool box meeting before starting of job
- Regular safety meeting involving representatives of Consultant & NRL
- Barricading
- Issue of permit strictly as per OISD guidelines
- Mandatory use of PPE, safety belts, etc.
- Imposition of penalty against violation of safety procedures
- Recognition for showing high safety consciousness
- Regular Safety Committee Meetings
- Safety tour by senior officers and compliance of recommendations
- Job Safety Plan
- Adherence of rules as indicated in annexure G

**vii. Manpower Deployment:**

Dedicated experienced engineer for all the following areas will be put for proper supervision as well as safety aspects of all activities during construction both from EPCM Consultant and NRL will be placed. Three tier reporting will normally be considered.

**- NRL Projects & EPCM Consultant --**

- Civil & Structural
- Mechanical
- Electrical
- Instrumentation
- Planning & Monitoring
- Safety supervisor / engineer

**- NRL Operations, Technical Services (TS) and Fire & Safety --**

- Operations , Maintenance, TS and F&S

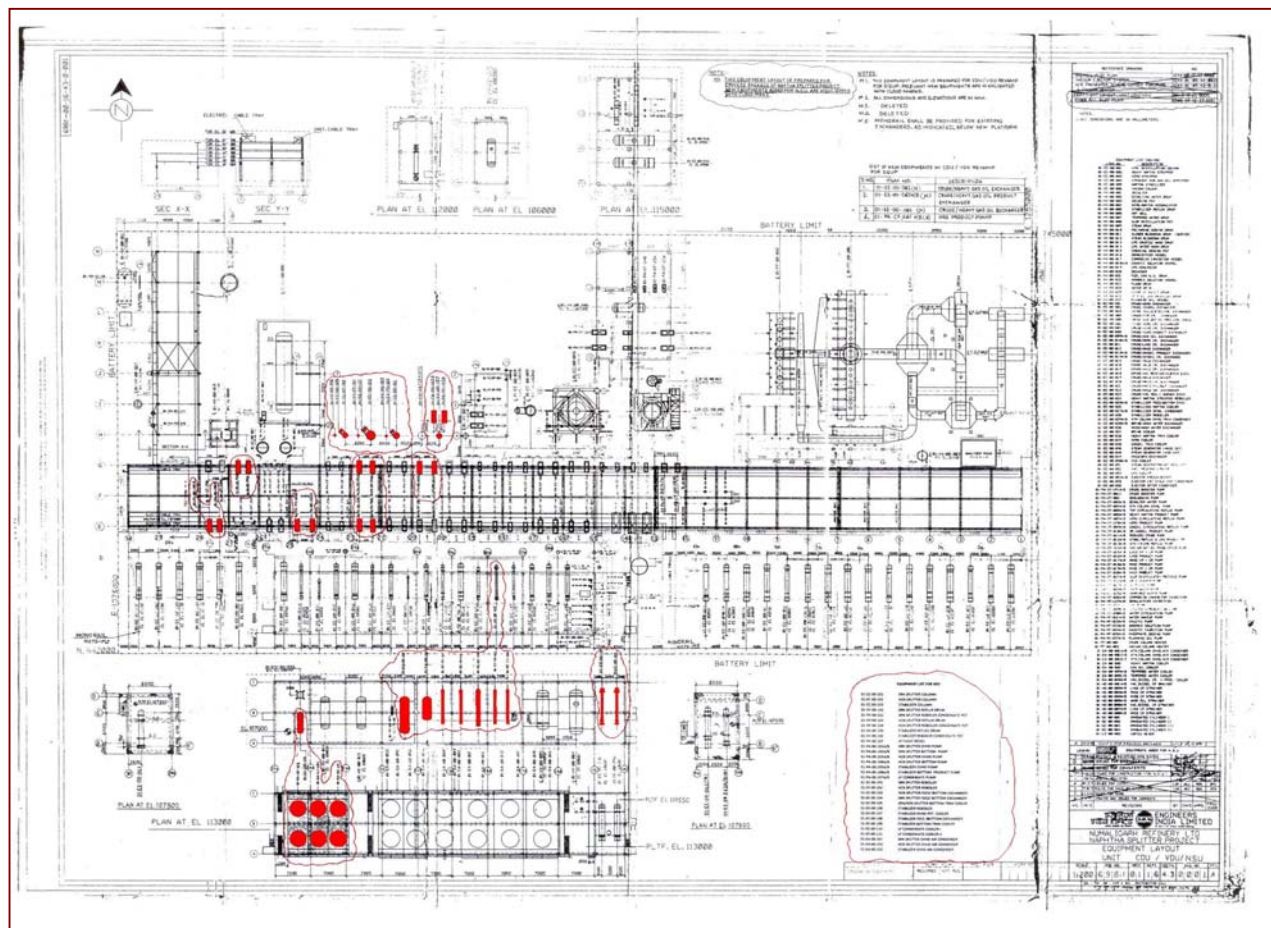
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**viii. Pre-commissioning & commissioning activities:**

Dedicated group will be involved from operations, maintenance, inspection during pre-commissioning and commissioning of the unit which is to be synchronized with the existing unit as final hook-up will be done after taking shut down of the existing unit.

For normal operation of the new unit, one operator per shift will be kept in the field for carrying out the regular activities and one officer will be kept in general shift along with unit manager for close monitoring of the process parameters.

Advance process control of existing unit is to be extended with NSU from the project stage so that quality parameters are maintained strictly from day of commissioning.

**5. Layout plan with marking of the existing & proposed Units**

**ANNEXURE-I****6. Data on HC and VOC in the existing refinery****Hydrocarbon (HC)**

Regular monitoring of Ambient Air Quality is carried out at the five designated locations in and around the Refinery including one at Kaziranga National Park for SO<sub>x</sub>, NO<sub>x</sub>, SPM, CO and HC. As a part of this Hydrocarbon monitoring is being carried out in all the following five locations at a frequency of 9 samples per month, taken twice a week 24 hourly at a 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.

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

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.

**ANNEXURE-I****Hydrocarbon data, last three years**

Location:	Inside refinery			Near Township			Near Water Intake Well			Near NH-39 bypass			Near Kaziranga		
Period	MAX	MIN	AVG	MAX	MIN	AVG	MAX	MIN	AVG	MAX	MIN	AVG	MAX	MIN	AVG
April' 06	800	200	490	BDL	BDL	BDL	BDL	BDL	BDL	850	690	350	BDL	BDL	BDL
May' 06	800	100	490	BDL	BDL	BDL	BDL	BDL	BDL	900	690	300	BDL	BDL	BDL
June' 06	700	200	490	BDL	BDL	BDL	BDL	BDL	BDL	800	530	200	BDL	BDL	BDL
July' 06	800	150	430	BDL	BDL	BDL	BDL	BDL	BDL	950	200	570	BDL	BDL	BDL
Aug' 06	800	450	640	BDL	BDL	BDL	BDL	BDL	BDL	900	450	550	BDL	BDL	BDL
Sept' 06	800	300	560	BDL	BDL	BDL	BDL	BDL	BDL	800	400	610	BDL	BDL	BDL
Oct' 06	800	150	430	BDL	BDL	BDL	BDL	BDL	BDL	950	200	570	BDL	BDL	BDL
Nov' 06	1000	600	930	BDL	BDL	BDL	BDL	BDL	BDL	900	450	720	BDL	BDL	BDL
Dec' 06	800	400	610	BDL	BDL	BDL	BDL	BDL	BDL	800	400	610	BDL	BDL	BDL
Jan' 07	800	400	620	BDL	BDL	BDL	BDL	BDL	BDL	800	300	480	BDL	BDL	BDL
Feb' 07	700	200	460	BDL	BDL	BDL	BDL	BDL	BDL	600	200	390	BDL	BDL	BDL
Mar' 07	800	400	610	BDL	BDL	BDL	BDL	BDL	BDL	700	300	520	BDL	BDL	BDL
April' 06-Mar'07	<b>1000</b>	<b>100</b>	<b>563</b>	<b>BDL</b>	<b>BDL</b>	<b>BDL</b>	<b>BDL</b>	<b>BDL</b>	<b>BDL</b>	<b>950</b>	<b>690</b>	<b>489</b>	<b>BDL</b>	<b>BDL</b>	<b>BDL</b>

Location:	Inside refinery			Near Township			Near Water Intake Well			Near NH-39 bypass			Near Kaziranga		
Period	MAX	MIN	AVG	MAX	MIN	AVG	MAX	MIN	AVG	MAX	MIN	AVG	MAX	MIN	AVG
April' 07	900	400	690	BDL	BDL	BDL	BDL	BDL	BDL	600	200	430	BDL	BDL	BDL
May' 07	1100	500	770	BDL	BDL	BDL	BDL	BDL	BDL	600	250	450	BDL	BDL	BDL
June' 07	600	200	380	BDL	BDL	BDL	BDL	BDL	BDL	400	100	270	BDL	BDL	BDL
July' 07	600	200	420	BDL	BDL	BDL	BDL	BDL	BDL	500	100	300	BDL	BDL	BDL
Aug' 07	800	300	560	BDL	BDL	BDL	BDL	BDL	BDL	500	200	370	BDL	BDL	BDL
Sept' 07	800	200	580	BDL	BDL	BDL	BDL	BDL	BDL	800	100	460	BDL	BDL	BDL
Oct' 07	800	500	640	BDL	BDL	BDL	BDL	BDL	BDL	400	200	310	BDL	BDL	BDL
Nov' 07	900	200	600	BDL	BDL	BDL	BDL	BDL	BDL	600	100	380	BDL	BDL	BDL
Dec' 07	1000	600	960	BDL	BDL	BDL	BDL	BDL	BDL	700	300	500	BDL	BDL	BDL
Jan' 08	800	400	590	BDL	BDL	BDL	BDL	BDL	BDL	400	100	290	BDL	BDL	BDL
Feb' 08	800	300	530	BDL	BDL	BDL	BDL	BDL	BDL	500	200	320	BDL	BDL	BDL
Mar' 08	500	200	390	BDL	BDL	BDL	BDL	BDL	BDL	400	100	230	BDL	BDL	BDL
April' 07-08	<b>1100</b>	<b>200</b>	<b>546</b>	<b>BDL</b>	<b>BDL</b>	<b>BDL</b>	<b>BDL</b>	<b>BDL</b>	<b>BDL</b>	<b>800</b>	<b>100</b>	<b>359</b>	<b>BDL</b>	<b>BDL</b>	<b>BDL</b>

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Location	Inside refinery			Near Township			Near Water Intake Well			Near NH-39 bypass			Near Kaziranga		
Period	MAX	MIN	AVG	MAX	MIN	AVG	MAX	MIN	AVG	MAX	MIN	AVG	MAX	MIN	AVG
April' 08	600	200	380	BDL	BDL	BDL	BDL	BDL	BDL	350	50	BDL	BDL	BDL	BDL
May' 08	600	200	380	BDL	BDL	BDL	BDL	BDL	BDL	350	50	BDL	BDL	BDL	BDL
June' 08	450	220	150	BDL	BDL	BDL	BDL	BDL	BDL	350	100	BDL	BDL	BDL	BDL
July' 08	300	150	230	BDL	BDL	BDL	BDL	BDL	BDL	300	100	BDL	BDL	BDL	BDL
Aug' 08	650	150	350	BDL	BDL	BDL	BDL	BDL	BDL	400	80	BDL	BDL	BDL	BDL
Sept' 08	900	400	690	BDL	BDL	BDL	BDL	BDL	BDL	600	200	BDL	BDL	BDL	BDL
Oct' 08	550	290	330	BDL	BDL	BDL	BDL	BDL	BDL	500	40	BDL	BDL	BDL	BDL
Nov' 08	350	100	280	BDL	BDL	BDL	BDL	BDL	BDL	350	100	BDL	BDL	BDL	BDL
Dec' 08	800	250	540	BDL	BDL	BDL	BDL	BDL	BDL	400	150	BDL	BDL	BDL	BDL
Jan' 09	350	100	280	BDL	BDL	BDL	BDL	BDL	BDL	350	100	BDL	BDL	BDL	BDL
Feb' 09	900	400	740	BDL	BDL	BDL	BDL	BDL	BDL	700	400	BDL	BDL	BDL	BDL
Mar' 09	900	400	700	BDL	BDL	BDL	BDL	BDL	BDL	500	100	BDL	BDL	BDL	BDL
April' 08- Mar'09	900	100	491	BDL	BDL	BDL	BDL	BDL	BDL	600	40	BDL	BDL	BDL	BDL

**Existing Hydrocarbon data (based on manual analysis)**

Location:	Inside refinery			Near Township			Near Water Intake Well			Near NH-39 bypass			Near Kaziranga		
Period	MAX	MIN	AVG	MAX	MIN	AVG	MAX	MIN	AVG	MAX	MIN	AVG	MAX	MIN	AVG
April' 09	900	300	610	BDL	BDL	BDL	BDL	BDL	BDL	500	100	230	BDL	BDL	BDL
May' 09	800	400	610	BDL	BDL	BDL	BDL	BDL	BDL	600	200	410	BDL	BDL	BDL
June' 09	900	500	590	BDL	BDL	BDL	BDL	BDL	BDL	500	100	300	BDL	BDL	BDL
July' 09	800	300	500	BDL	BDL	BDL	BDL	BDL	BDL	600	300	368	BDL	BDL	BDL
Aug' 09	800	400	490	BDL	BDL	BDL	BDL	BDL	BDL	600	400	500	BDL	BDL	BDL
Sept' 09	500	200	320	BDL	BDL	BDL	BDL	BDL	BDL	350	80	190	BDL	BDL	BDL
Oct' 09	800	400	610	BDL	BDL	BDL	BDL	BDL	BDL	500	100	240	BDL	BDL	BDL
Nov' 09	800	450	610	BDL	BDL	BDL	BDL	BDL	BDL	450	100	270	BDL	BDL	BDL
Dec' 09	850	300	610	BDL	BDL	BDL	BDL	BDL	BDL	400	100	220	BDL	BDL	BDL
Jan' 10	700	300	490	BDL	BDL	BDL	BDL	BDL	BDL	500	100	310	BDL	BDL	BDL
Feb' 10	900	200	495	BDL	BDL	BDL	BDL	BDL	BDL	600	80	273	BDL	BDL	BDL
Mar' 10	900	300	610	BDL	BDL	BDL	BDL	BDL	BDL	500	100	230	BDL	BDL	BDL
April' 09-10	800	400	610	BDL	BDL	BDL	BDL	BDL	BDL	600	200	410	BDL	BDL	BDL

**ANNEXURE-I****VOC**

Regular monitoring for any passing valves and fugitive emission by Acoustic Leak Detector and Gas Measuring Instrument (GMI) is carried out as part of loss control measures and timely remedial actions are taken as required. Regular monitoring of fugitive emissions from the storage tanks in refinery and NRMT is carried out by the GMI Gascoseeker.

NRL has started to carry out VOC measurement in the refinery as per the new MOEF notification, GSR 186 (E) dated 18.03.2008. The existing VOC data of the refinery are enclosed as annexure F(b).

**7. Details of safety system and procedures to be adopted during construction phase**

Numaligarh Refinery Limited always strives to give top most priority to Health and Safety which has resulted in safe operation of plant. The Company is firm on continual development of all loss control management tools as adopted in the form of system based management tools such as ISO : 9001, ISO 14001&OHSAS : 18001 etc.

Numaligarh Refinery Limited always strives to give top most priority to Health, Safety and Environment (HSE) that has resulted in safe operation of a plant. The Company is firm on continual development of all loss control management tools as adopted in the form of system based management tools such as ISO : 9001, ISO : 14001& OHSAS: 18001 etc.

NRL has a very strong Fire & Safety Department headed by a Chief Manager who directly reports to the top management. The department consists of adequate skilled and trained manpower along with the latest sophisticated facilities for compliance of all the safety norms. All critical tasks are carried out under the supervision of safety supervisors. Work permit system is being followed as per OISD guidelines. Round the clock vigil by operating personnel is ensured. Mandatory safety training to all contractor personnel entering the refinery is ensured prior to engaging to carry out any job. To increase awareness on safety, tool box meeting is being conducted every morning.

With top priority in Safety & Health, NRL has already achieved Loss Time Accident (LTA) free 8 years and 14 Million LTA free man-hours. In the field of safety NRL

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excelled being the recipient of coveted various prestigious awards and accolades like “Shreshtha Suraksha Puraksar “of National Safety Council, OISD Safety Award, Green Tech Safety Gold Award etc.

Employee’s awareness on Health, Safety and Environment is of prime importance for effective HSE Management System. Safety awareness programmes are being conducted amongst employees, contractors, and security personnel as well the POL drivers. To review the effectiveness of emergency preparedness, mock drills are conducted regularly in the refinery. The Safety Week in March and Fire Service Fortnight in April are observed every year in NRL with involvement of NRL employees, CISF, security staff, contractors and their workers, near by public and school students.

**Job Safety Plan**

To carry out any critical nature of jobs, NRL always committed to the strict adherence to Job Safety Plan in line with International Safety Rating System (ISRS) protocol.

For timely completion of NSU project related jobs, it may become necessary to carry out hot jobs inside the running units. Although, there is potential hazard associated to carry out the hot jobs in running plant, but the hazard potential can be reduced to certain level if the jobs are carried out with control measures under close coordination / supervision by executor as well as Operations coordinator.

The following modalities are practiced in NRL to carry out the hot jobs in Process Units during running condition. However, some relaxation will be allowed while giving permit during shutdown.

- Hazard potential will be discussed in advance among the following officers for execution of hot jobs in line with specific location of the unit :
  - a. Project Supervisor of NRL
  - b. Project Supervisor of Consultant
  - c. Unit Manager
  - d. Safety Officer of Fire & Safety
  - e. Safety Officer of Project
  - f. Consultant’s Safety Officer
  - g. NSU Project Coordinator from Operations.

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The decisions shall be recorded in log book by Consultant's Safety Officer and signed by all members of the above team. Consultant's Safety Officer shall keep the log book in his custody.

- The following personnel will supervise the NSU job with full time availability at job site:
  - a. Project Supervisor from Consultant
  - b. Safety Officer of Consultant

A special identifying jacket shall be worn by the above team members while executing the job in the field.

- During execution of hot job specially welding/grinding , one of the following officer of NRL as given below must be present at site and during the period of job coordination they must report to unit-manager. Hot job is to be stopped if officer as mentioned below are not available at site for any reason.
  - a. Project Supervisor from NRL
  - b. Safety Officer from F&S
  - c. Safety officer of Project

A special identifying jacket shall be worn by the above team members while executing the job in the field.

- The surrounding area where hot job will be done should be surveyed beforehand to see the probable source of inflammable materials like flange, valve, OWS, CRWS, pumps, compressors, etc. Little more care should be given for nearby UG Systems. Suitable action to take care of any eventuality from such sources should be taken. The safest location should preferably be considered for doing the hot job.
- Before issuing permit fitness certificate to be taken from Electrical deptt. for the healthiness of welding machine, its cable and earthing system.
- Hot Permit will be issued for specific location wise after detail discussion as mentioned in the first point. The said permit shall be extended at site at 08.30Hrs on daily basis till the job is completed. Prior to extend of the permit, there will be discussion / review among Shift-in-Charge (SIC), Gas Safety Inspector (GSI), Unit

**ANNEXURE-I**

Manager / Issuing Authority, Performing Authority, Safety Officer of NRL and Safety Officer of Consultant. Endorsement by NRL's Safety Officer in the hot permit will be given at field itself. Any additional issues / actions / precautions are discussed and agreed to be complied shall be recorded by Consultant's Safety Officer in the log book. Permit must be signed by SIC of the unit only (not by any other General Shift officers).

- Job to be carried out from 08.30 Hrs to 12.00Hrs and 13.00Hrs to 16.00Hrs. All the equipment used in the hot job shall be de-energized during lunch break. The job will be started only after the NSU Job Coordinator gives the clearance once all the members mentioned in the Points 2 are present. Multiple hot jobs shall preferably be avoided.
- One Non-Management staff, having experience of the area where hot job is being taken up, will be kept from Operations handling of emergencies, if arises.
- Projects will prepare the area suitable for hot job as per the instruction of SIC and GSI. For each hot job location one casual labour must be available for water spray where welding jobs are involved. This is to be ensured by project supervisor.
- Hot permit to be issued for pavement breaking, excavating, rig placing and boring job. Before breaking the pavement, area to be properly marked and cordoned off with aluminium sheet. Proper sparkles tools are to be used in wet pavement. Extra soil to be shifted to demarcated area and proper house keeping is to be maintained for preventing floor slippery.
- Rigs are to be properly tied so that it will not fall on any equipment. During boring time, equipment vibration monitoring is very essential. Maintenance group especially condition monitoring group is to monitor the same and to co-ordinate with NSU co-ordinator and Project co-ordinator for any abnormality.
- The following guidelines will be followed by Operations and Project is to ensure the following listed jobs before the request for hot permit:
  - i. Area to be cleared of liquid and gaseous hydrocarbon completely.

**ANNEXURE-I**

- ii. OWS/CRWS/CBD manholes are to be plugged completely by asbestos cloth and shall be kept wet. All the catch basins / clean out pits / OWS manholes / CRWS manholes are to be covered with wet asbestos cloths.
- iii. Fugitive analysis is to be carried on request by project coordinator in the surrounding area (at least 10m radius) by Technical Services and any deviation is to be reported to Job Coordinator and Project Supervisor immediately then and there and record in the log book.
- iv. Running water curtain is to be kept plying below the hot job area as per the instruction of SIC and GSI wherever possible.
- v. Metallic scaffolding is to be made in the area where hot job is in higher elevation. Proper platform is to be made so that hot job can be carried out safely with escape facility.
- vi. Proper enclosure is to be made in the hot job area so that spark generated, if any, must not fly sideways. Proper escaping path to be made from enclosure.
- vii. Care to be taken to prevent falling of any tools from elevated work place.
- viii. Before starting the job in every day, Consultant's supervisor/Contractor supervisor is to elaborate to workers about the work procedure, safety of the worker and how to escape for any eventuality and same is to be recorded in project safety supervisor log book.
- ix. Hot job area is to be cordoned off properly by safety barricade taps.
- x. Hazard potential / plant status is to be assessed every hour by NSU project coordinator with SIC & Console Officer.
- xi. Portable Multi-gas Detectors to be kept on-line with NSU project supervisor and Consultant's Safety Officer. If any deviation in the area is observed they will immediately stop the hot job till area gets cleared.
- xii. A register should be kept at site to log the sequential activities including time of starting / stopping hot job / gas test / etc.
- xiii. All people involved with the hot job should wear only cotton clothes.
- xiv. Preparation of equipment for handing over for regular Maintenance should be done in consultation with NSU coordinator from operation side. Non priority job may be avoided just below/nearby area where the hot job is carried out.

**ANNEXURE-I**

- xv. Display of NSU hot job in particular should be done in Central control Room (CCR) , F&S & Field Cabin
- xvi. In case of any alarm generated from gas leakage detection system inside CCR, the same shall be communicated to NSU project supervisor by Console Officer. NSU project co-ordinator shall stop the job. The same shall be recorded in the log book.
- xvii. A separate register should be maintained for all the permits issued/renewed, by NSU project coordinator apart from logging in SIC log book. The observations/comments of by any dept (after fugitive survey, LEL checking etc.), at any time after the visit of the working area, can be written in the register. The register will be available at field cabin of the unit.
- xviii. To avoid delay in signing of hot permit and also for proper monitoring of different NSU related jobs, separate hot permit books shall be used and custodian of the hot permit is SIC.
- xix. In case of siren blown from F&S, welder to be instructed to stop the job by himself and shall report to Job Supervisor / Job Coordinator.
- xx. One fire tender with fire fighting crew shall be placed near hot job location continuous basis. If for any reason, fire tender is to be shifted to other location then hot job is to be stopped immediately.
- xxi. One VHF Handset with dedicated channel is be to provided to each of the following persons:
  - a) Welder
  - b) NSU Job Coordinator
  - c) NRL Project Supervisor
  - d) Consultant's Safety Officer
- xxii. Every day rig condition boring tools are to be checked and also ensure that floor is not slippery. If any cable/pipe is found during boring, job is to be stopped immediately and logged in the log book of consultant safety supervisor log book. The same shall be restarted after discussion with unit manager, project coordinator.

**8. Risk assessment of facilities to be installed:**

Risk Analysis of the facilities is enclosed in Chapter-6.