

CHAPTER – IV

ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

4.0 ENVIRONMENTAL IMPACT ASSESSMENT

The impact assessment focuses on the study area within 10 km. radius around the site. The five basic environmental components likely to be affected are:

- ❖ Air Environment
- ❖ Water Environment
- ❖ Noise Environment
- ❖ Land Environment
- ❖ Socio-economic Environment

For each of the above components of environment the impacts identified through cause-condition network, predict the environmental evaluation system.

The impacts on different environmental parameters due to this project are discussed below:

4.1 IMPACT ON AIR ENVIRONMENT & MITIGATION MEASURES

4.1.1 Impact during construction phase

Air pollution due to the proposed plant will mainly include gaseous pollution (SO₂, NO_x and CO) and suspended particulate matter. The sources of air emissions during construction phase will include site clearing, emission from vehicles used for transportation of man and material to the site and from construction equipment. These emissions are expected to have temporary adverse impact on ambient air quality of surroundings of the construction site.

Traffic at the site during construction will be more intensive and much heavier than at present and in normal operating conditions. In turn, it will subject roads to more stress. The prevailing soil surface particles within the proposed plant area shall have a tendency to become airborne by vehicular tyres once the area is disturbed by construction activities. This dust will lead to an increase in the background SPM concentration of the area if proper control measures are not adopted. However this will be temporary and reversible in nature and restricted to small area for short duration. Proper upkeep and maintenance of vehicles, sprinkling of water on roads and construction site, providing sufficient vegetation etc. are some of the measures that would greatly reduce the impacts during the construction phase.

4.1.2 Impact during Operation Phase

The main sources of Air Pollution in the proposed project are the Boiler and the DG sets.

A) BOILER

The capacity of the Boiler shall be 65 TPH on Rice Husk/ Coal/ Pet Coke/PNG. However emission from the boiler will be taken care by providing adequate stack height as per the CPCB guidelines. The details regarding the boiler are given below:

TABLE 4.1
BOILER DETAILS

S. No.	DESCRIPTION	DETAILS
1.	Number of Boilers	1
2.	Capacities	65 TPH
3.	Fuel	Rice Husk/ Coal/ Pet Coke/ PNG
4.	Stack Height	45 m
5.	Pollution Control Equipments	Bag Filters / ESP

B) D.G. Set

There will be four D G Sets (Two D.G. sets of 2000 KVA and two of 1000 KVA) for power back up.

The safe stack height calculated is as under: -

$$\begin{aligned} \text{D.G. set Capacity} &= 2000 \text{ KVA} \\ H &= h + 0.2 \sqrt{2000} \\ &= h + 8.94 \end{aligned}$$

Hence, a safe stack 9.0 metres above the roof will be provided for D.G. set of 2000 KVA respectively.

Two D.G. sets of 1000 KVA capacity are to be installed. The safe stack height calculated is as under:-

$$\begin{aligned} \text{D. G. set capacity} &= 1000 \text{ KVA} \\ H &= h + 0.2\sqrt{1000} \\ &= h + 6.32 \end{aligned}$$

Hence a safe stack height of 7 meters above the roof top will be provided.

Table 4.2
D.G. SET DETAILS

S. No.	DESCRIPTION	DETAILS
1.	Number of D.G. Sets	4
2.	Capacities	2 x 2000 KVA 2 X 1000 KVA
3.	Fuel	HSD
4.	Stack Height	9.0 m for 2000 KVA 7.0 m for 1000 KVA
5.	Pollution Control Equipments	Adequate Stack Height/ Acoustic

The sources of air pollution are not having much significance as little fuel is utilized in DG sets only operating during emergencies and major power generation coming from own Steam Turbines.

4.1.3 Cumulative Impact through Mathematical Modelling for The Project

4.1.3.1 Introduction

The present study assesses the impact on air environment due to the proposed operations of distillery at village Bartezpur, PO Vijayanagar, District Kamrup, Assam. This report gives the concentrations of SO₂, NO_x, SPM and RSPM upto a distance of 10 km from center of the Distillery in all directions, covering various stability conditions in the months of March 2009 to May 2009. Spatial distributions of all the pollutants are also presented.

4.1.3.2 Emission Sources and Characteristics

The emission sources identified are the boiler of 65 TPH and four D G Sets (two DG Sets of 2000 KVA each and two DG Sets of 1000 KVA).

4.1.3.3 Meteorological Data

The IMD observatory data for the period March to May 2009 in respect of wind speed, wind direction, temperature and cloud amount are utilized in this study.

4.1.3.4 Modelling Procedure

Methodology:

Prediction of ground level concentrations (GLC's) due to proposed Distillery unit has been made by **Industrial Source Complex, Short Term (ISCST3)** as per **CPCB** guidelines. ISCST3 is US-EPA approved model to predict the air quality. The model uses rural dispersion and regulatory defaults options as per guidelines on air quality models (PROBES/70/1997-1998). The model assumes receptors on flat terrain.

Meteorological inputs required are hourly wind speed and direction ambient temperature, stability class and mixing height and wind exponents. The model details follow.

A) Gaussian Plume Model

Ground Level Concentration χ , from a point source at any receptor under unlimited mixing is given by (USEPA ISCST3, 1987).

$$\chi = \frac{Qg_1g_2}{(2\pi\sigma_y\sigma_zu)}$$

where,

$$g_1 = \exp(-y^2/2\sigma_y^2)$$

$$g_2 = \exp[-(z-H)^2/2\sigma_z^2] + \exp[-(z+H)^2/2\sigma_z^2]$$

In unstable or neutral conditions if $\sigma_z > 1.6 L$ (limited mixing) the distribution below the mixing height is uniform with height provided that both the effective height h , and the receptor height z are below the mixing height

$$\chi = \frac{Qg_1}{(\sigma_y Lu \sqrt{2\pi})}$$

In unstable case or neutral conditions when $\sigma_z < 1.6 L$

$$\chi = \frac{Qg_1}{(2\pi\sigma_y\sigma_zu)}$$

where,

Q = source strength

Z = receptor height above the ground

H_e = effective stack height (Plume rise + Physical stack height)

u = wind speed at stack level

L = mixing height and

σ_y & σ_z = dispersion parameters

$$g_3 = \sum \exp[-(z-H+2NL)^2/2\sigma_z^2] + \exp[-(z+H+2NL)^2/2\sigma_z^2]$$

Evaluation with n the number of reflections, varying from -4 to +4 is usually sufficient.

B) Plume Rise

Plume Rise ΔH Has Been Determined According To Brigg's Formula (CPCB Guideline)

$$\Delta h = \frac{21.425 F^{3.4}}{U_s} \quad \text{for } F < 55$$

and

$$\Delta h = \frac{38.71 F^{3.5}}{U_s} \quad \text{for } F > 55$$

$$F = g V_s D^2 (T_s - T_a) / 4 T_s$$

Where,

U_s = wind speed at stack level (m/s)

V_s = stack gas velocity (m/s)

T_s = stack gas temperature ($^{\circ}$ K)

T_a = ambient temperature ($^{\circ}$ K)

F = Buoyancy flux parameter (m^4/s^3)

Δh = Plume rise (m)

D = Diameter of the stack (m)

g = acceleration due to gravity, 9.807 (m/s^2)

❖ Extrapolation of Wind Speed

Wind speed at stack level is calculated by power law as given below.

$$U_{\text{stack}} = U_{10} (\text{Stack height}/10)^p$$

Where U_{10} is the wind speed at 10 meter level and p is the power law coefficient (0.07, 0.07, 0.10, 0.15, 0.35 and 0.55 for stability classes A,B,C,D,E and F respectively) as per Irwin for rural areas (USEPA, 1987).

❖ Stability Classification

Hourly stability is determined by wind direction fluctuation method as suggested by Slade (1965) and recommended by CPCB (PROBES/70/1997-1998).

$$\sigma_{\theta} = Wd_r/6$$

σ_{θ} , is standard deviation of wind direction fluctuation, Wd_r is the overall wind direction fluctuation or width of the wind direction in degrees. The table for stability classes is given as under.

Stability Class	σ_{θ} (Degree)
A	> 22.5
B	22.4 – 17.5
C	17.4 – 12.5
D	12.4 – 7.5
E	7.4 – 3.5
F	< 3.5

❖ Dispersion Parameters

Dispersion parameters σ_y and σ_z for open country conditions (Briggs, 1974) are used as the project is located on a flat terrain in a rural area. Atmospheric dispersion coefficients vary with downwind distance (x) from emission sources for different atmospheric stability conditions. (CPCB – PROBES/70/1997-98).

RURAL CONDITIONS

Stability Class	σ_y	σ_z
A	$0.22x(1+0.0001x)^{-0.5}$	$0.20x$
B	$0.16x(1+0.0001x)^{-0.5}$	$0.12x$
C	$0.11x(1+0.0001x)^{-0.5}$	$0.08x(1+0.0002x)^{-0.5}$
D	$0.08x(1+0.0001x)^{-0.5}$	$0.06(1+0.0015x)^{-0.5}$
E	$0.06x(1+0.0001x)^{-0.5}$	$0.03x(1+0.0003x)^{-1}$
F	$0.04x(1+0.0001x)^{-0.5}$	$0.16x(1+0.0003x)^{-1}$

4.1.3.5 Plan and Frame Work of Computations

Selection of Locations

The locations have been selected around the proposed distillery covering an area of 10 km radius from the centre of proposed distillery project. The entire area has been put on grid network and grid spacing has been taken as 500 m.

Plan of Computation

The emission rate, dispersion coefficients and other input data being now available it was planned to compute the following:

- The 24 hourly averaged incremental concentration with hourly data.
- The identification of grid point having peak concentration for the incremental values.
- Preparation of isopleths of various pollutants.

4.1.3.6 Results and Discussion

In the present case model simulations have been carried using the hourly Triple Joint Frequency data. Short-term simulations were carried to estimate concentrations at the receptors to obtain an optimum description of variations in concentrations over the site in 20-km radius covering 16 directions. The incremental concentrations are estimated for the monitoring period. For each time scale, i.e. for 24 hr (short term) the model computes the highest concentrations observed during the period over all the measurement points.

The maximum incremental GLCs due to the proposed distillery plant for SPM are superimposed on the maximum baseline SPM concentrations recorded at the monitoring locations during the field monitoring period. The cumulative concentrations (baseline + incremental) after implementation of the project are tabulated below in **Table-42**. The maximum GLCs for SPM after implementation of the proposed project are likely to be within the prescribed NAAQ standards for Rural and Residential areas.

TABLE – 4.3

**PREDICTION OF INCREMENTAL GLC IN RESPECT OF SPM DUE TO
PROPOSED PROJECT**

S. No.	24 Hrs. Concentrations	SPM ($\mu\text{g}/\text{m}^3$)	RSPM ($\mu\text{g}/\text{m}^3$)	SO ₂ ($\mu\text{g}/\text{m}^3$)	NO _x ($\mu\text{g}/\text{m}^3$)
1.	Background Concentrations (24 Hrs.)	178.0	61.3	7.1	12.8
2.	Predicted Max. GLC (24 Hrs.)	12.6	3.9	1.8	2.7
3.	Total Concentration	190.6	65.2	8.9	15.5
4.	NAAQS - Industrial Limits	500	150	120	120

4.2 IMPACT ON WATER ENVIRONMENT & MITIGATION MEASURES

4.2.1 Impact due to construction phase

During construction stage, initially water will be drawn from tube-wells till the permanent water system is laid. The extraction of water from the ground water reserves of the area may not lead to any major adverse impact on ground water table, as there is sufficient ground water availability in the vicinity of the plant. Hydrological investigations have ascertained the ground water potential.

The construction workers colony will be provided with drinking water taps and sanitation discharge through septic tanks into soak pits. The exploitation of ground water resources during the construction phase will not have a significant impact on the ground water availability in the area.

4.2.2 Impact due to operation phase

- Water requirement of the plant is proposed to be met by ground water & recycle water.
- The proposed grain based distillery would have “zero discharge”.
- There are no sources of surface water or accumulation of water with in the study area hence there will be no significant adverse impact on water sources.
- A regular monitoring of the water quality around the NV Distilleries & Breweries (North East) Pvt. Ltd. project site shall be included in the Environmental Monitoring Plan.

4.3 IMPACT DUE TO NOISE AND MITIGATION MEASURES

4.3.1 Impact due to construction phase

The general noise levels due to construction activities may go sometime up to 80 dB (A) at the work sites in daytime during construction phase. The workers in general are likely to be exposed to an equivalent noise level of 75-80 dB (A) for which all statutory precautions as per the law will be implemented. Use of proper personal protective equipment shall further mitigate any adverse impact of noise to the workers.

Present noise levels at Proposed Project site during day time and night time are 48 Leq dB (A) and 41 Leq dB (A), respectively.

Impacts on the noise levels of the area will be temporary in nature.

4.3.2 Impact due to operation phase

- Source of noise will be various components of industrial operations, power plant, D G Sets and vehicular movement.
- It will be controlled by proper maintenance and compact technology.
- A high standard of maintenance will be practiced for plant machinery and equipments, which helps to avert potential noise problems.

Future maintenance and installation of the plant machinery will be after- due consideration to design noise levels and noise mitigation measures.

- D.G. Sets will be placed in an acoustic enclosure.
- As per the observations, the noise level in the buffer zone is found to be very low. Regular monitoring of noise level will be carried out and corrective measures in concerned machinery will be adopted accordingly.
- Vehicles and machinery will be maintained properly.
- The green belt development will help in reducing noise levels in the campus as a result of attenuation of noise generated due to plant operations, and transportation.

4.4 SOLID WASTE GENERATION AND MANAGEMENT FOR DISPOSAL

4.4.1 Impact due to construction phase

During construction phase, solid waste such as excavated soil, debris, some metal waste, municipal waste and very small amount of oil & grease from construction machines will be generated. This waste may contaminate soil at plant site temporarily and would be restricted to a small area. Excavated topsoil will be used for plantation. The solid waste generated by labour as municipal waste will be collected and segregated and disposed at appropriate site. Metal waste and oil & grease will be disposed as per the norms.

4.4.2 Impact due to operation phase

- Fly ash will be generated from the Boiler which will be sent for brick manufacturing.
- The Solid waste from the Grain based operations generally comprises the Fibres and proteins along with moisture in Wet Cake, ideal as Cattle Feed.

- The Yeast sludge will be sent to the Sludge Drying Beds or will be added to the Wet Cake.

4.5 IMPACT ON LAND USE PATTERN & MITIGATION MEASURES

The evaluation of impacts on the land environment indicates no detrimental effect due to proposed activity, as activities will contribute insignificantly towards soil erosion and fertility. In fact, the existing pattern of land use would improve by green belt development in 8 acres of area.

4.6 IMPACT ON SOCIO – ECONOMIC CONDITIONS

NV Distilleries & Breweries (North East) Pvt. Ltd. will be actively contributing to improve the socio – economic conditions of the area and also actively participating in implementing government schemes for welfare of the society of the area. The overall impact of the proposed project will be positive and beneficial as the company is committed to continue its efforts for improving the socio economic conditions of the area.

4.7 CONCLUSION

As discussed, it is safe to say that the project is not likely to cause any significant impact on the ecology of the area, as adequate preventive measures will be adopted to contain the various pollutants within permissible limits. Green belt development around the area will be taken up as an effective pollution mitigating technique. Community impacts will be beneficial, as the project will generate significant economic benefits for the region. With the effective implementation of the Environment Management Plan (EMP) during the plant activities, the proposed project can proceed without any significant negative impact on environment.

