7.3 POTENTIAL AND MAJOR HAZARDS IN SUGAR MANUFACTURING PLANT

The process for manufacturing and refining sugar is a standard process. Areas of concern from hazard and risk points of view in the plant manufacturing of sugar are as follows-

- Bagasse Storage
- Sulphur Storage
- \( \text{SO}_2 \) Generation and handling
- Molasses storage- Toxic gas leakage
- Distillery
- Mechanical operations and unit processes in sugar production

7.3.1. Bagasse Storage

Large quantity of bagasse stored poses the serious hazard of fire as it is easily ignitable and fire spreads rapidly. Serious fire accidents may take place.

Mitigation Measures

Following precautions should be taken to minimize risk of fire and for fire fighting to curtail fire in case of accident

a. It should be ensured while routing high tension voltage lines to avoid storage of bagasse storage below & near high voltage (H.T.) transmission lines.
b. Avoidation of route of electric supply cables & AC cable trenches far away from stored bagasse or bagasse heaps.
c. Raw & useful material has already been stored away from fire prone area and the same will be followed for the storage of bagasse Installation of Fire Hydrant (self auto-mode fire fighting) system around the area of bagasse yard has already been employed and the same will be followed. (copy of fire hydrant layout covering bagasse storage area is enclosed in annex…1)
d. Proper supervision staff will be done with necessary communication facility.
e. Hot work, like welding, gas cutting will not be carried out near bagasse storage.
f. Daily record of bagasse storage data, proper review of conditions will be taken by higher authority.
g. Training of all the involved staff in normal & emergency operating system.
h. Proper planning & installation of fire hydrant system around the bagasse storage yard and not depending exclusively on fire tender for firefighting will be implemented. Extra provision of Modern fire tender has been employed in the presence of any emergency.
i. Awareness will be created among workers about sudden bagasse fire and emergency action plan will definitely avoid risks of heavy fire.
j. Separate fire hydrant point covering maximum area has been already employed on plot.
k. In case of fire assembly points will be clearly shown with the help of sign boards.

7.3.2. Sulphur Storage

1. Dust Explosion
2. Fire
1. Dust Explosion

As Sulphur is stored and handled in granular form, there is always some dust formation, which can lead to dust explosion. A dust explosion occurs when a fine dust in suspension in air is ignited, resulting in a very rapid burning, and the release of large quantities of gaseous products. This in turn creates a subsequent pressure rise of explosive force capable of damaging plant and buildings and injuring people. It is generally considered that a dust explosion can only be initiated by dust particles less than 500 microns diameter.

Conditions for Dust Explosion

Under the following conditions dust explosion can take place in the industry.

1. The dust must be combustible like sulphur, phosphorous.
2. The dust cloud must be of explosive concentration, i.e. between the lower and upper explosion limits for the dusts.
3. There must be sufficient oxygen in the atmosphere to support and sustain combustion.
4. A source of ignition must be present.
5. The dust must be fine enough to support an explosion.

Mitigation Measures

Explosion Prevention: Dust explosions can be prevented by ensuring that the following conditions are met:

a. Formation and Suspensions of Sulphur dust in air will be avoided through closed shed
b. To prevent dust formation during the storage and handling of sulphur, necessary actions will be taken to avoid spillage and crushing of granular sulphur during bulk loading and unloading in the storage area. For Avoidation of direct contact of sulphur with skin personal protective equipments will be provide to the worker while handling
c. Storage shed will be constructed with number will be minimized of horizontal surfaces to avoid dust accumulation.
d. All sources of ignition will be excluded.
e. Presence of moisture helps in preventing dust explosion, for which day to day housekeeping will be kept to avoid risk.

2. Fire in Sulphur storage

There is a risk of fire in sulphur storage as ignition temperature is low 190 deg C. Solid and liquid sulphur will burn to produce sulphur dioxide gas, which is extremely irritating and toxic the effects of the fire hazard itself are slight.

Mitigation Measures

a. Smoking and the use of matches shall be prohibited in all areas where sulphur dust is likely to be present. Prominent NO SMOKING signs shall be placed around such areas.
b. Naked flames or lights and the use of gas cutting or welding equipment will be prohibited during the normal operation of the plant. Repairs involving the use of flames, heat, or hand or power tools in areas where sulphur may be present shall be made only after getting hot work permit from the authorities.
c. Where this is not possible the sulphur shall be wetted down.
d. For prevention of fire extinguishers will be placed on site.
e. Sulphur dioxide gas is heavier than air and will accumulate. Sulphur fires produce hazardous sulphur dioxide gas in the vapour spaces of the rail car. Use of Self Contained Breathing Apparatus (SCBA) will be used.
f. Small sulphur fires are easily extinguished by adding more sulphur on top of the burning sulphur. This depletes the oxygen and smothers the fire. For larger sulphur fires use a light water fog or CO\textsubscript{2} to extinguish. No use of heavy water streams as this may create sulphur dust which could potentially explode.

7.3.3. Sulphur Dioxide Production

TLV value – TWA 2 ppm, STEL-5 ppm

Sulphur dioxide is produced by oxidation of molten sulphur in situ in a standard readymade unit and is used in Sulphitation of Sugar cane juice. There is in storage of Sulphur dioxide, as it is produced at the consumption rate and when required. However, general mitigation measures are suggested as below-

**Mitigation Measures**

I. Before the plant start up and every six months, pressure test and thickness test of all the equipments and piping carrying Sulphur dioxide shall be carried out to avoid leakage.

II. Alarm system, in case, SO\textsubscript{2} leakage, to warn all workers of the leakage has already been installed in existing plant the same will be followed for expansion.

III. SO\textsubscript{2} leak detector have been installed.

IV. Emergency Shutdown procedure and action already been installed in existing plant the same will be followed for expansion.

V. Emergency Shutdown procedure and action has been displayed in the SO\textsubscript{2} production area in the local language.

VI. It mock drills will be carried out as per on-site emergency plan.

VII. In case of leakage is noticed from a flange joint, emergency shutdown plant will be ordered Only trained persons will deal with the situations using safety appliances and breathing apparatus, and area around SO\textsubscript{2} production unit and part of the main plant shall be vacated immediately.

VIII. In case of major leakage, onsite emergency plan for the entire plant will be put in action and if necessary Govt. authorities will be alerted and off site emergency plan shall be activated and if necessary population around 1 to 1.5 km will have to be warned.

IX. LED paneled temperature sensors have been installed in the SO\textsubscript{2} production unit

7.4 POTENTIAL AND MAJOR HAZARDS IN CO-GENERATION PLANT

The existing co generation is 32 MW and this plant shall be fully automated with interlocks, alarms and shall have following standard safety features.

1. Turbine shall be interlocked with high and low steam inlet pressure
2. Turbine shall be interlocked with high and low steam inlet high and low pressure
3. Turbine shall be interlocked with high vibration of any bearing of turbine, gear box, and alternator.
4. Turbine shall be interlocked with any bearing high temperature.
5. High axial displacement of the rotor will be installed
6. Turbine shall be interlocked with high lube oil temperature
7. Separate Turbine over speed protection and interlock shall be provided for turbine to trip on high speed.
8. For reducing noise, all stem out lets shall be provided with silencers.
9. Pressure safety reliefs valves shall be provided on stem drum and stem lines.
10. In addition to mechanical SRVs electrometric safety relief valve is provided.
11. Smoke leak detector alarm shall be provided with alarm.
12. Jockey pump with auto start shall be for fire fighting with low pressure interlock to automatically start main pump on low pressure.

**For boiler following safety and interlocks shall be built**

- Low drum level interlock,
- Furnace high pressure interlock
- Boiler feed pump interlock
- De aerator level interlock

### 7.5 POTENTIAL AND MAJOR HAZARDS IN DISTILLERY UNIT

Normally alcohol plants sections are fully automated with PC control for maintaining recommended operating conditions for ensuring the product specifications, plant safety and achieving the plant capacity. Sufficient instrumentation, alarms and interlocks would be provided to minimize any risk of accident.

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Area of operation</th>
<th>Hazard</th>
<th>TLV Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Molasses Storage</td>
<td>Leakage</td>
<td>---</td>
</tr>
<tr>
<td>2</td>
<td>Alcohol Manufacturing</td>
<td>Leakage and fire</td>
<td>TWA-1000 ppm</td>
</tr>
<tr>
<td>3</td>
<td>Alcohol storage</td>
<td>Leakage and Fire</td>
<td></td>
</tr>
</tbody>
</table>

#### 7.5.1. Storage of molasses

1. Molasses shall be stored in good quality and leak proof steel tanks. Bund walls shall be constructed around the tank.
2. The capacity of storage of molasses will be 800 MT/Month.
3. Continuous mixing of molasses will be done.
4. If there is increase in temperature beyond 30°C external cooling of tanks shall be provided.
5. A temperature recorder shall be provided to the tanks.

If there is leakage following measures shall be followed –

a. Leakage should be washed out and diluted and should be recycled as far as possible or must be properly treated in Effluent treatment plant.
b. Replacing of leaky gaskets, joints, should be done strictly by following work permit system.
c. Leakage of pipelines, welding repairs should be attended / carried out outside the plant. The necessary hot work permit would be issued after taking necessary precautions and fire fighting measures for onsite hot work, by the concerned authority before any hot work in undertaken
d. Leakage through pump gland shall be reduced to the minimum by installing mechanical seals.
e. To attend all major leakage in tanks the following procedure should be followed
f. Transfer the material to other tank.
g. Prepare the tank for welding repairs by making sure that it is positively isolated with blinds from other vessels and ensuring that it is free of the chemicals and gases by air analysis before any hot work is undertaken and this should be done by skilled workers. For this purpose safety permit should be given.
h. A small representation of Molasses tanks is as follows

**Table 7.1 Details of Molasses storage**

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Tank Details</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Molasses Storage Tanks</td>
<td>Quantity: 2</td>
<td>Existing Tanks</td>
</tr>
<tr>
<td></td>
<td>(In Sugar Factory)</td>
<td>Capacity: 7,000 MT each</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Molasses Storage Tanks</td>
<td>Quantity: 1</td>
<td>Existing Tanks</td>
</tr>
<tr>
<td></td>
<td>(In Sugar Factory)</td>
<td>Capacity: 8,000 M</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Molasses Storage Tanks</td>
<td>Quantity: 1</td>
<td>Existing Tanks</td>
</tr>
<tr>
<td></td>
<td>(In Sugar Factory)</td>
<td>Capacity: 10,000 MT</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Molasses Storage Tanks</td>
<td>Quantity: 2</td>
<td>1 Existing Tank;</td>
</tr>
<tr>
<td></td>
<td>(In Distillery)</td>
<td>Capacity: 150 MT each</td>
<td>1 To be taken under Expansion.</td>
</tr>
</tbody>
</table>

The representation of Storage tanks of Molasses with dyke wall is given as follows.

**Figure 7.1 Front view of Molasses storage tanks**

![Image of Molasses storage tanks with dyke wall](image)

**7.5.2. Alcohol manufacturing unit**

The main hazard is the alcohol storage tanks where the hazard is Leakage and fire so to prevent the risk considerable mitigations will be followed

For improvisation of safety near storage tanks, the storage tanks will be separated with the distance half of the diameter of the nearby tanks. The generalized representation of same is provided as follows in Figure 7.2

**Table 7.2 Details of Alcohol storage tanks**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Description</th>
<th>Technical data</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Rectified Spirit Receiver</td>
<td>Quantity: 3 No.</td>
<td>Site Fabricated</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Capacity: 130 M³</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Material: M.S.</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Extra Neutral Alcohol Receiver</td>
<td>Quantity: 2 No.</td>
<td>Site Fabricated</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Capacity: 130 M³</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Material: M.S.</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Ethanol/Absolute Alcohol Receiver</td>
<td>Quantity: 3 No.</td>
<td>Site Fabricated</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Capacity: 130 M³</td>
<td></td>
</tr>
<tr>
<td>Sr. No.</td>
<td>Description</td>
<td>Technical data</td>
<td>Remark</td>
</tr>
<tr>
<td>---------</td>
<td>------------------------------------------</td>
<td>----------------------------------------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>4.</td>
<td>Impure Spirit Receiver</td>
<td>Quantity: 2 No. Capacity: 10 M³, Material: M.S.</td>
<td>Site Fabricated</td>
</tr>
<tr>
<td>5.</td>
<td>Denatured Spirit Storage Tank</td>
<td>Quantity: 2 No. Capacity: 30 M³, Material: M.S.</td>
<td>Site Fabricated</td>
</tr>
<tr>
<td>6.</td>
<td>Rectified Spirit Bulk Storage Tank</td>
<td>Quantity: 3 No. Capacity: 750 M³, Material: M.S.</td>
<td>Site Fabricated</td>
</tr>
<tr>
<td>7.</td>
<td>Extra Neutral Alcohol Bulk Storage Tank</td>
<td>Quantity: 1 No. Capacity: 750M³/Hr, Material: M.S.</td>
<td>Site Fabricated</td>
</tr>
<tr>
<td>8.</td>
<td>Ethanol/Absolute Alcohol Bulk Storage Tank</td>
<td>Quantity: 2 No. Capacity: 750 M³, Material: M.S.</td>
<td>Site Fabricated</td>
</tr>
<tr>
<td>9.</td>
<td>Ethanol/Absolute Alcohol Bulk Storage Tank</td>
<td>Quantity: 2 No. Capacity: 1000 M³, Material: M.S.</td>
<td>Site Fabricated</td>
</tr>
<tr>
<td>10.</td>
<td>S.D.S. Bulk Storage Tank</td>
<td>Quantity: 2 No. Capacity: 1000 M³, Material: M.S.</td>
<td>Site Fabricated</td>
</tr>
<tr>
<td>11.</td>
<td>Impure Spirit Bulk Storage Tank</td>
<td>Quantity: 2 No. Capacity: 100 M³, Material: M.S.</td>
<td>Site Fabricated</td>
</tr>
<tr>
<td>12.</td>
<td>Day Tank For Ethanol Feed</td>
<td>Quantity: 1 Capacity: 60 MT, Material: M.S.</td>
<td>Site Fabricated</td>
</tr>
</tbody>
</table>

Figure 7.2 Top view of Alcohol storage tank
Qualitative Risk analysis: HAZOP studies would be carried out for this unit and all the recommendations particularly related to safety, like instrumentation modifications, installation of alarms, interlocks, to eliminate possible hazards due to process upsets, shall be in place before plant commissioning.

### Table 7.5 Alcohol Storage Details

<table>
<thead>
<tr>
<th>Tank No.</th>
<th>Dimensions (M)</th>
<th>Volume (M³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>10X13</td>
<td>1000</td>
</tr>
</tbody>
</table>

Recommendations based on QRA:
1. Will be sprinkler system will be installed on the tanks to cool the tanks in case of fire in any other tank.
2. Results of QRA would be taken into account while finalizing factory layout.
3. Fire hydrant lines would laid minimum 15 - 20 meters away from the dyke wall for fighting persons to stay at a safe distance way from heat radiations
4. For different tank capacities and design QRA has to be done again and results should be interpreted and action taken for layout.
5. Based on the table given above, it is recommended to follow the interspacing distances as given in the Petroleum rules 2002 (Extract of Table -3 from petroleum rule 2002 is given in Annexure–B)
6. Fire fighting would be designed as per the best practices, IS codes but preferably as per OS 117 code

### Risk Assessment

The risk assessment determines whether the risks are tolerable or if risk mitigation measures are required to reduce the risk to a level which can be considered to be as low as reasonably practicable (ALARP). UK standards are generally followed here. Risk assessment depends on failure frequency of the system and probability of ignition and explosion. These are assessed below.

#### Ignition Probability

Ignition probability data is important in quantification of risks. Historical data on ignition of flammable releases are used as a basis for determining suitable ignition probabilities. As probability of ignition depends upon availability of source of ignition, it also depends on the maintenance of safety level. **Table** shows the ignition probability for flammable liquids.

### Table 7.9 Ignition Probability for Flammable Liquids

<table>
<thead>
<tr>
<th>Type of Ignition</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Immediate</td>
<td>0.065</td>
</tr>
<tr>
<td>Delayed</td>
<td>0.065</td>
</tr>
<tr>
<td>No Ignition</td>
<td>0.87</td>
</tr>
</tbody>
</table>

#### 7.6 FIRE TRIANGLE

The triangle illustrates the three elements a fire needs to ignite: Fuel, Heat , and an oxidizing agent (usually oxygen) A fire naturally occurs when the elements are present and combined in the right mixture, Meaning that fire is actually an event rather than a thing.
A fire can be prevented or extinguished by removing any one of the elements in the fire triangle. For example, covering a fire with fire blanket removes the oxygen part of the triangle and can extinguish a fire. This type of representation will be Exposed in the fire prone Areas.

7.6.1. Colour coding for safety during in-house material transfer and PPE

Following color coding shall be implemented on site for pipes carrying materials in Industrial premises.

<table>
<thead>
<tr>
<th>Substance</th>
<th>Colour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>G</td>
</tr>
<tr>
<td>steam</td>
<td>G</td>
</tr>
<tr>
<td>Acid &amp; alkali</td>
<td>G</td>
</tr>
<tr>
<td>Air</td>
<td>G</td>
</tr>
<tr>
<td>Other liquid</td>
<td>G</td>
</tr>
<tr>
<td>Gaseous</td>
<td>G</td>
</tr>
</tbody>
</table>

Mitigation Measures for Leakages and Fire:

I. Approval from Chief Controller of Explosives CCOE’ shall be procured in addition to regular factory inspector’s approval and other statutory approvals.

II. With respect to the Petroleum Act, Petroleum rules, 2002 following important measures with respect to tank layout and factory layout shall be followed though these are recommended for storage above 5000 M3

III. Minimum Clear distance between two tanks shall be 0.5 D or d or 15 meters D= tank diameter in meters, d= diameter of small tank in meters. Or (D+d)/4

IV. Tanker vehicle loading/unloading center of the bay area shall be minimum 15 meters away from the tanks storage periphery.

V. Boundary fencing shall be minimum 20 meters away from periphery

VI. All the tanks shall be placed within the area surrounded by dyke wall, constructed as per standard design and construction norms.

VII. Volume of the within the dyke wall shall be more than the largest storage tank inside the dyke wall.

VIII. Provision shall be made for spare tank of for pumping large alcohol spillage or leakage by proving sump and pump connection.

IX. In case, spare tank is not provided pump piping shall be provided such that large leakage can be pumped to a suitable process tank.

X. All pump motors and other electrical fittings shall be flame proof of suitable class.

XI. Chilled water condenser shall be provided over the tanks to avoid alcohol loss.

XII. Suitable and proper safety measures shall be installed on the tanks.

XIII. Tanks shall be provided with level indicating instruments with high and low alarms.
A) Details On Fire Fighting System to be Provided Around The Alcohol Storage Area

- Guidelines in OISD 117 shall be followed, while designing firefighting system around the alcohol storage area.
- The main components of the fire system are Fire Water Storage, Fire Water Pumps and Distribution Piping Network.
- The fire water system installation shall be designed to meet the fire water flow requirement to fight single largest risk at a time.
- Fire water flow rate for a tank farm shall be aggregate as following:
  - Water flow calculated for cooling a tank on fire at a rate of 3 lpm/m² of tank shell area.
  - Water flow calculated for exposure protection for all other tanks falling within a radius of (R +30) meters from centre of the tank on fire (R-Radius of tank on fire) and situated in the same dyke at a rate of 3 lpm/m² of tank shell area.
  - Water flow calculated for exposure protection for all other tanks falling outside a radius of (R+30) m from centre of the tank on fire and situated in the same dyke at a rate of 1 lpm/m² of tank shell area.
- Foam water requirement required shall be calculated based on 5lpm/m2 of tank area
- For water flow calculations, all tanks farms having class A or B petroleum storage shall be considered irrespective of diameter of tanks and whether fixed water spray system is provided or not.
- Water flow required for applying foam on a single largest tank by way of fixed foam system, where provided, or by use of water/foam monitors.
- Various combinations shall be considered in the tank farm for arriving at different fire water flow rate and the largest rate to be considered for design.
- Fire water flow rate for supplementary streams shall be based on using 4 single hydrant outlets and 1 monitor simultaneously.
- Capacity of each hydrant outlet as 36 m³/hr and each monitor as 144 m³/hr minimum may be considered at a pressure of 7 kg/cm².

B) Header Pressure

Fire water system shall be designed for a minimum residual pressure of 7 kg/cm²(g) at hydraulically remotest point in the installation considering single largest risk scenario.

C) Storage

a. Water for the fire fighting shall be stored in easily accessible surface or underground or above ground tanks of steel, concrete or masonry.

b. The effective capacity of the reservoir/tank above the level of suction point shall be minimum 4 hours aggregate rated capacity of pumps. However, where reliable make up water supply is 50% or more of design flow rate, the storage capacity may be reduced to 3 hours aggregate rated capacity of pumps.

D) Other mitigation measures to avoid leakage and fire:

(i) Regular mock drills and trainings for success of emergency plan during actual emergency shall be carried out. Emergency procedures shall be laid down clearly and convincingly to everyone on site, particularly the key personnel & essential workers. Record will be maintained for same.

(ii) Safety policy, Environment, Health and Safety policy will be formulated and will be displayed at all prominent places in the plant and offices. (please confirm whether the company already has EHS policy or not)

(iii) There will be properly equipped Occupational Health Care in the factory premise.
(iv) Regular medical check-up of workers will be carried out and proper records must be maintained.
(v) Frequent checking of pipe lines and storage units shall be done.
(vi) Welding would not be done near combustible material storage.
(vii) Disaster/ emergency Prepared Plan will be prepared as per the guidelines and rules laid down in Factory’s act.

- Mechanical operations and unit processes in sugar production
  a. During handling of the equipment such as - electrical motor-pumps, mechanical mixers, automatic weighing arrangement, automatic dosing arrangement, pressure release and safety accessories on steam generating, handling as well as conveyance systems, heat exchangers, condensers and cooling as well as chilling machinery, temperature and pressure gauges are used.
  b. The concerned workers are provided with adequate operation and safety tools / equipment.
  c. Sufficiently trained and qualified workers are employed in all sections of the industry.

7.7 TRAFFIC STUDY

7.7.1. Traffic Load Due To Proposed Integrated Project

Following table shows the transportation details of product and raw material required for proposed integrated project.

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Type of Vehicle</th>
<th>Avg. wt (MT)</th>
<th>Daily No. of Vehicles</th>
<th>Quantity (MT/Day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Bullock Carts - Sugar Cane</td>
<td>2.25</td>
<td>1,200</td>
<td>2,700</td>
</tr>
<tr>
<td>2.</td>
<td>Tractor Trolleys- Sugar Cane</td>
<td>9.14</td>
<td>175</td>
<td>1,600</td>
</tr>
<tr>
<td>3.</td>
<td>Trucks- Sugar Cane</td>
<td>16.00</td>
<td>75</td>
<td>1,200</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td>1,455</td>
</tr>
<tr>
<td>4.</td>
<td>Trucks - Molasses</td>
<td>15</td>
<td>5</td>
<td>75</td>
</tr>
</tbody>
</table>

Table 7.12 Details of Product Transportation

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Type of Vehicle</th>
<th>Avg. wt</th>
<th>No. of Bags or KL of alcohol / Season</th>
<th>Capacity of vehicles</th>
<th>Total no. of Vehicles throughout season</th>
<th>Average no. of daily Vehicles</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Trucks - Sugar</td>
<td>50Kg / Bag</td>
<td>21,78,000</td>
<td>200 Bags</td>
<td>10,890</td>
<td>52</td>
</tr>
<tr>
<td>2.</td>
<td>Tanker - Alcohol</td>
<td>--</td>
<td>16,200 KL</td>
<td>20 KL</td>
<td>810</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>55</td>
</tr>
</tbody>
</table>