PRE-FEASIBILITY REPORT

(Vide MOEFCC Guidelines No. J-11013/41/2006-IA.II(I) Dated 30TH December 2010)

ON

SETTING UP NEW CONCENTRATED NITRIC ACID (CNA) PLANT (100 MTPD) WITHIN EXISTING RCF FACILITY, TROMBAY

FOR

ENVIRONMENTAL CLEARANCE

TROMBAY UNIT

OF

RASHTRIYA CHEMICALS & FERTILIZER LIMITED

Prepared By

PROJECTS & DEVELOPMENT INDIA LIMITED

(A Govt. of India Undertaking)

A-14, Sector-1, Noida, UP

QCI - NABET Accreditation No. NABET/EIA/1821/SA 0124

PDIL Job No.EN-00253 **December, 2021**

EXECUTIVE SUMMARY

1.1 Project Proponent

Rashtriya Chemicals and Fertilizers Ltd (RCF), a leading Public Sector Undertaking in India, is engaged for the past five decades in production and marketing of various Nitrogenous/ Phosphatic Fertilizers and Industrial Chemicals in the plants located at Chembur, Mumbai and Thal, Dist. Raigad, Maharashtra, India.

1.2 Proposed Project

RCF intends to set up a New energy efficient 100 MTPD CNA plant based on Magnesium Nitrate route by replacing the existing CNA plant at Trombay unit. The existing facilities like tanker loading station etc. shall be integrated with the new plant.

1.3 Salient Features

S. No.	Table – 1: Salient Features	
A	**Introduction of Project**	
1	Need of Project	The existing Concentrated Nitric Acid (CNA) plant at RCF Trombay unit, commissioned in 2007 is based on Technology from M/s QVF, UK (now under De-Dietrich, Germany). In this plant, with production of 1 MT of CNA, about 3.5 MT of WSA is formed. The demand of Weak Sulphuric acid is limited and hence the load of the CNA plant is affected adversely. The low load operation / frequent stoppages of CNA plant due to high stock of WSA makes the operation of Conc. Nitric acid plant economically unviable. Considering the good market demand for Conc. Nitric acid, RCF proposes to replace the existing CNA plant with new energy efficient and cost effective plant based on Magnesium Nitrate route. The proposed plant will have the advantages of lower maintenance/ repair cost and will be a major step towards sustainability as it eliminates the hazardous chemicals storage& handling (due to elimination of Weak Sulphuric Acid). The limiting factors like load restriction due to high stock of by-product will be eliminated and hence will

<table>
<tr><td></td><td></td><td>ensure the better capacity utilization and in turn the economic viability of the plant.</td></tr>
<tr><td>2</td><td>Demand Supply Gap</td><td>We are already operating existing Conc. Nitric Acid plant at Trombay unit which is catering to market demand for Conc. Nitric Acid. The proposed plant is replacement of exiting plant in terms energy efficient, cost effective and up to date technology so there shall not be any impact on existing demand supply gap of Concentrated Nitric Acid with this proposed new plant. The product from proposed plant will be sold through existing mechanism.

The proposed plant enables the continuous operation of Conc Nitric Acid plant and thus supply of CNA will ~~be~~ enhance. The availability of domestically produced Conc Nitric Acid will support the Hon'ble Prime Minister "Aatma Nirbhar Bharat Abhiyaan".</td></tr>
<tr><td>3</td><td>Import Vs Indigenous production</td><td>Presently in existing CNA plant, plant load gets restricted on account of high stock of by product weak sulphuric acid. With new proposed plant there shall not be any limitations on plant load. So the plant will run on full load and can cater to the market demand. Thus with this proposed new plant, indigenous production will get increased. With this new proposed plant, equivalent portion of import will be substituted due to increased supply of CNA.</td></tr>
<tr><td>4</td><td>Export Possibility</td><td>CNA produced in the plant shall be consumed indigenously. However, export possibilities will also be explored</td></tr>
<tr><td>5</td><td>Domestic / Export Markets</td><td><table><tr><td></td><td>Export</td><td>Import</td></tr><tr><td>2018 (Million USD)</td><td>4.15</td><td>3.79</td></tr><tr><td>2019 (Million USD)</td><td>4.32</td><td>4.1</td></tr><tr><td>Growth %</td><td>4.09</td><td>8.18</td></tr><tr><td colspan="3">The import and export data for the year 2020 is not available presently.</td></tr></table></td></tr>
<tr><td>6</td><td>Employment Generation (Direct / Indirect)</td><td>• Indirect employment: 200 Nos (during construction and installation).
• Direct :Existing manpower shall be utilized</td></tr>
<tr><td>B</td><td colspan="2">Project Description</td></tr>
<tr><td>1</td><td>Interlinked & Interdependent Project</td><td>• RCF intends to set up a New 100 MTPD CNA plant based on Magnesium Nitrate route at RCF Trombay in place of existing Conc. Nitric Acid Plant. The existing facilities like tanker loading station etc. shall be integrated with the new plant.</td></tr>
</table>

<table>
<tr><td>2</td><td>Location of Project
• Coordinates

• Location

• Environmental Sensitivity</td><td>
• 19° 04’ 19.01”N, 72° 88’ 08.53”E at an Elevation 3 m.
• The proposed site is located within existing RCF Trombay unit in Maharashtra.
• There is no Environment/Ecological sensitive area within study area.

Details of environment sensitivity are mentioned in Table 6.</td></tr>
<tr><td>3</td><td>Details of Alternate Site</td><td>The proposed facilities shall be established within existing plant premises of RCF Trombay, No alternative site was considered for the proposed project.</td></tr>
<tr><td>4</td><td>• Size/Magnitude

• Capacity</td><td>• CNA Plant area: 19 m x 43 m (0.0817 Ha)

• 100 MTPD</td></tr>
<tr><td>5</td><td>Project Details & Process Description</td><td>The proposed CNA plant is based on Magnesium Nitrate route.
The CNA can be obtained from weak Nitric Acid (57-60%) with an extractive distillation column.</td></tr>
<tr><td>6</td><td>Raw material & finished product, quantity, source, mode of transport</td><td>The raw materials are (per ton of product/calc. as 100% HNO3 basis):
<table>
<tr><th>Raw Material</th><th>Quantity</th><th>Source</th><th>Mode of Transport</th></tr>
<tr><td>Weak Nitric Acid:</td><td>1732 kg(58% basis) + 34 kg/h (58% basis) to be recovered from NOx generation</td><td>Produced in house at RCF Trombay unit</td><td>Through existing pipeline network</td></tr>
<tr><td>Magnesium Nitrate:</td><td>1.6 kg</td><td>Procured from outside</td><td></td></tr>
</table>
Finished Product: Concentrated Nitric Acid, HNO_3 (98.5 % w/w). The product is transported through dedicated road tankers.</td></tr>
<tr><td>7</td><td>Resource optimization/Recycling and reuse</td><td>• Part of the salt solution (Magnesium Nitrate) collected in the bottom of the tower is sent to the Salt concentrator heater where a certain amount</td></tr>
</table>

		of water is evaporated. • The concentrated solution is re-circulated to the middle of the tower. • Process Condensate to be recycled to Weak NA plant (at Flow rate – 3108kg/h at Temp. 40°C)
8	Requirement of • Cooling Water • Chilled water • Make-up water • Power • LP Steam • MP Steam	• 175 m^3 • 1.5 m^3 • 0.02 m^3 (for conversion of NOx to NA50 wt %) • 14 kWh • (-)35 kg (recovered) • 1921 kg (above data is per ton of product/calc. as 100% HNO_3 basis)
9	Quantity of Waste (Solid & Liquid)	• All NOx-gases generated in the process are recovered as Nitric Acid of about 50-55 wt% HNO_3. • Site has existing facility to treat the waste water and this existing facility shall be utilized to treat the liquid effluent generated in this plant. • Other Solid waste, if any will be disposed off as per Hazardous and Other Wastes (Management and Trans-boundary Movement) Rules 2016.
C	**Site Analysis**	
1.	Connectivity	Site is well connected to the all local amenities as it is in existing RCF plant at Trombay.
2.	Land Form/Land Use & Land ownership	There would no change in existing land use pattern and land ownership.
3.	Topography	The topography of the area in common with other Deccan Trap regions is undulating with a few small water courses.
4.	Existing land-use pattern	The proposed project site falls within existing industrial premises of RCF, Trombay.
5.	Existing Infrastructure	• Product, Raw Material Storage & Handling Facilities • Raw material Nitric Acid is available in - house •
6.	Soil Classification	The soils of the area are essentially derived from the Deccan trap, which is the predominant rock formation (of the study area) with small outcrops of laterite at few places. The main types of soils found in the area are coastal alluvium and laterite soils.
7.	Climatic Data from secondary sources	Barometric Pressure: 995 - 1007 mbar Temperature: 9 - 38 °C Rainfall: 2500 - 2821 mm Relative humidity: 50 - 100%

		Earthquake Zone: III & IV
8.	Social infrastructure	RCF owns its township adjacent to its factory premises and spread over in an area of about 765 acres at Chembur. The existing infrastructure of RCF Trombay unit with respect to residential colony, green belt, social infrastructure, road facilities, supply of water, sewerage facilities, power requirement etc. are working efficiently and shall be utilized for the proposed project.
D	**PLANNING BRIEF**	
1.	Planning Concept	The proposed project is limited to construction of100 MTPD capacity CNA Plant. All other associated utilities required for smooth operation of the plant shall be extended from the existing facilities available in RCF Trombay unit.
2.	Population Projection	• Temporary requirement of skilled manpower • The permanent manpower requirement shall be fulfilled through existing available manpower of the unit.
3.	Land use Planning	New CNA plant shall be installed within the existing plant premises. Hence, additional land use planning is not envisaged.
4.	Assessment of Infrastructure demand	New CNA plant shall be installed within the existing plant premises. Hence, there shall be no demand of additional infrastructure.
5.	Assessment of amenities/Facilities	RCF Trombay unit is having all the required amenities and facilities to ensure: • Safety of operations, • Health, Environmental, • Social wellbeing, • Cultural wellbeing
6.	Proposed Infrastructure	CNA plant of 100 MTPD is proposed including the following existing amenities: • Cooling tower • Safety & Fire Fighting System including fire water ring with Hydrant System • Power Substation • Auxiliary services, workshop equipment, laboratory equipment, continuous monitoring system, NDT equipment, telephone & telecommunication Public Address System etc.
7.	Rehabilitation & Resettlement Plan	Not Applicable
8.	Project Schedule & Cost Estimation	• 18Months • 49.60 Crores

1.4 Project Consultant:

Projects & Development India Limited (PDIL), a premier engineering and NABET accredited EIA consultant organization (NABET/EIA/1821/SA 0124), have been appointed by RCF for preparation of Pre-Feasibility Report (PFR), online submission of Form-I and related activities as may be required for obtaining Environmental Clearance from MoEF&CC.

2.0 INTRODUCTION OF THE PROJECT

2.1 Identification of project &project proponent

RCF intends to set-up a new energy efficient, cost effective ,up to date technology plant by replacing the existing plant to manufacture Concentrated Nitric Acid (CNA, min Conc.98.5%) from weak nitric acid (WNA,58%), at Trombay in Mumbai, in the existing premises based on the Magnesium Nitrate route.

The proposed project will comprise the following plant and facilities:

- 100 MTPD Concentrated Nitric Acid Production Plant (as 100 %HNO_3 basis).
- Technology: extractive distillation based on Magnesium Nitrate route.

RCF, a Public Sector Undertaking is engaged in the manufacture and marketing of Fertilizers and Industrial Chemicals. The company has presently two manufacturing units, located at Trombay and Thal, both in Maharashtra. The Trombay unit of RCF produces Urea, Complex Fertilizers, Bio-fertilizers, 100% water soluble fertilizer and variety of industrial chemicals such as Ammonia, Methanol, dilute Nitric Acid, Concentrated Nitric Acid, Sodium Nitrite/ Nitrate, Ammonium Bi-carbonate, Sulphuric acid, Ammonium Nitrate, Argon etc.

RCF promotes balanced use of fertilizers for improving the farm productivity and also to help maintaining soil health, RCF has established 8 static and 6 mobile Soil Testing Laboratories (STL) located pan India. This service is rendered free of cost to farmers. RCF's NPK & Micronutrients soil samples analysing capacity is around 61,700 Soil samples per year. As

per assessment of critically polluted industrial areas by CPCB *(26.04.2016)*, RCF Trombay as such does not fall under critically polluted industrial zone.

Real time emission levels are displayed through an illuminated board placed at the entrance of the factory for public viewing. Both the manufacturing units are accredited with ISO 9001 for Quality Management System, ISO 14001for Environment Management System, ISO 50001 for Energy Management System, ISO 45001 for Occupational Health and Safety Management System and ISO 27001 for Information Security Management System.

2.2 Brief description of nature of Project:

RCF Trombay proposes to set up CNA plant of around 100 MTPD capacities, based on Magnesium Nitrate route using latest design/technology with weak Nitric Acid and Magnesium Nitrate as raw materials. The CNA can be obtained from weak Nitric Acid (57-60%) with an extractive distillation column.

RCF proposes to replace the existing Conc. Nitric Acid plant with new energy efficient and cost effective plant based on Magnesium Nitrate route. The proposed plant will have the advantages of lower maintenance/ repair cost, no capacity limiting by products and will be a major step towards sustainability as it eliminate the hazardous chemicals storage& handling (due to elimination of Weak Sulphuric Acid).

The limiting factors like load restriction due to high stock of by product will be eliminated and hence, will ensure the better capacity utilization and in turn the economic viability of the plant.

Proposal for setting up of New CNA plant and subsequent grant of Environmental Clearance falls under 5(a) category of Industrial Projects-3 of MoEFCC.

2.3 Need of Project& its importance to the country/region

- The existing CNA plant capacity utilization is restricted due to generation of weak sulphuric acid as a by-product. Under capacity utilization adversely affects the economic viability of CNA. It also requires frequent maintenance/repair due to handling of highly corrosive sulphuric acid.
- Concentrated Nitric Acid Market size worldwide is growing at a CAGR of 3.8%.and forecast to reach $28.22 billion by 2026.
- In view of these, RCF proposes to replace the existing Conc. Nitric Acid plant with new plant based on Magnesium Nitrate route. The proposed new plant has the advantages of Lower maintenance/ repair cost and a major step towards sustainability as it eliminate the hazardous chemicals storage (due to elimination of Weak Sulphuric Acid).
- Will eliminate the limiting factors like load restriction due to high stock of by-product and hence, ensure better capacity utilization thus, economic viability of the plant.
- Will be an important step towards self-reliance in the market.

Location Advantage

1. The project is located in RCF's industrial premises at Trombay, Maharashtra and is proximate to major markets.
2. RCF is already manufacturing CNA and the requisite supporting infrastructure is in place.
3. Location is well connected with rest of the country for movement of finished product by road, rail as well as sea.
4. Suitability of land from topography & geological aspects, synergy and business point of view.

2.4 Demand Supply Gap

The proposed project is a replacement of existing plant with energy efficient, plant with lower maintenance requirement. Therefore, the market demand is not expected to alter due to the proposed plant. However, with this proposed plant, continuous operation and optimum production of Conc. Nitric Acid will be ensured. Thus it will have a positive impact on domestic

supply of CNA in the country and will support the Hon'ble Prime Minister "Aatma Nirbhar Bharat Abhiyaan".

2.5 Import Vs Indigenous production

Presently in existing CNA plant, plant load gets restricted on account of high stock of by-product weak sulphuric acid. With new proposed plant there shall not be any limitations on plant load. So the plant will run on full load and can cater to the market demand. Thus with this proposed new plant, indigenous production will get increased. With this new proposed plant, equivalent portion of import will be substituted due to increased supply of CNA.

The proposed plant is only a replacement of existing CNA plant with energy efficient cost effective up to date technology configured new CNA plant.

2.6 Export Possibility

CNA produced in the plant shall be consumed indigenously. However, export possibilities will also be explored.

2.7 Domestic / Export Markets:

The import has increased in the year 2019by 8.18% compared to the year 2018.The proposed project is necessary and beneficial in terms of energy & resource conservation as well as an effective management of hazardous chemicals. The handling of hazardous chemicals like Sulphuric Acid is going to be reduced with new CNA plant in comparison to existing one.

CNA produced in the plant shall be consumed indigenously. However, export possibilities will also be explored.

2.8 Employment Generation (Direct / Indirect)

The proposed project is replacement of existing plant with energy efficient cost effective and up to date technology. Hence, there will not be any additional direct employment generation as existing Concentred Nitric acid plant manpower shall be utilized. However, there will be employment

opportunity for nearby skilled/unskilled workers during construction phase of the proposed plant.

Indirect:

The proposed project is expected to generate employment opportunity during construction phase for about 200 nos. of skilled / unskilled workers and will also lead to indirect employment opportunity in the form of suppliers of construction materials, truck drivers, helpers, maintenance labours (unskilled), etc.

Direct:

There will not be any additional direct employment generation as existing Concentred Nitric acid plant manpower shall be utilized:

Table- 04
Existing manpower set-up

Sl. No.	Designation	Nos.
1.0	Dy. Manager / Plant Manager	4
2.0	Shift In-Charge	4
3.0	Asst. Engr./ DCS operators	4
4.0	Field Operators	10
5.0	Plant Maintenance	8
	Total	**30**

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3.0 PROJECT DESCRIPTION

3.1 Type of Project including interlinked & interdependent projects:

RCF intend to set up a New 100 MTPD CNA plant based on Magnesium Nitrate route at RCF Trombay.

The existing facilities like tanker loading station etc. shall be integrated with the new plant. The existing facilities and in house raw material (Nitric acid) will be utilised in the proposed project and thus are interlinked.

3.2 Location of Project

The proposed site is located within existing RCF Trombay unit in Maharashtra.

The geo-coordinates of the proposed project site are as follows:

Table-05
Geo-coordinates

Location	Latitude	Longitude	Elevation (MSL)
General Location	19° 04’	72° 88’	3m
Specific Location	19° 04’ 19.01”N,	72° 88’ 08.53”E	

The plant layout is attached as Annexure-1. Project location on political / Google map is shown in Fig – 1.

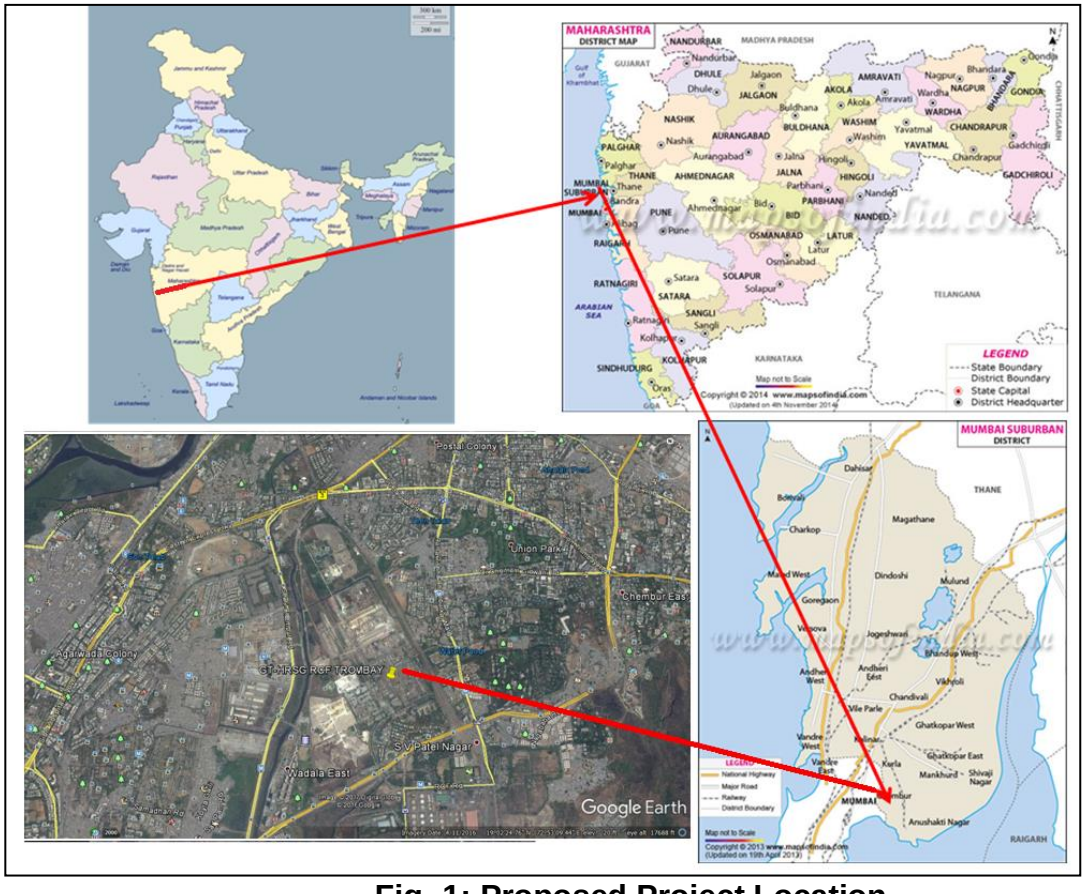

Fig.-1: Proposed Project Location

Table-06
Environmental Setting

Amenities	Name	Distance & Direction
State Boundary	Maharashtra - Gujarat	121 km in North
Nearest City	Mumbai	Project site falls in Chembur, Mumbai
National Highway	NH – 3	1.5 km in NNW
State Highway/Road	Ramakrishna Chemburkar Marg	1 km in East
Railway Station	Sion Railway Station	3 km in West

Airport	Chhatrapati ShivajiMaharaj International Airport	8km in NNW
Hospital	Om sai Baba Hospital	2 km in North
School	St. Sebastian High School	2.5 km in NNE
Nearest Water Body	Arabian Sea	9 km in West
Nearest RF/PF	Chheda Nagar RF	4 km in NE

3.3 Details of Alternate Site

The proposed facilities shall be established within existing plant premises of RCF Trombay and as such do not require acquisition of any additional land. The proposed site is located within RCF premises which meet the layout plan with connectivity to in-house sources of Raw materials and utilities as well as area requirement as per the process licensor.

No alternative site was considered for the proposed project.

3.4 Size / Magnitude of operation

The project is limited to installation within an area of 0.0817 Ha (19 m x 43 m)as earmarked in layout plan for New CNA Plant (Enclosed as Annexure – 1).

Table- 7

Plants & Facilities Considered in the proposed Project

Sl. No.	Plants & Facilities	Capacity
1.	CNA plant	100 MTPD as 100% HNO_3 basis
2.	Product, Raw Material Storage & Handling Facilities:	Existing Facilities to be used

Product	Conc Nitric Acid (100 MTPD)	Existing storage facilities of CNA plant will be used.
Raw Material	Weak Nitric Acid	In house produced at RCF Trombay unit will be used.
	Magnesium	Purchased

Sl. No.	Plants & Facilities	Capacity
		Nitrate from outside and will be stored in dedicated storage area.
3.	Cooling Tower	Considered as per requirement
4.	a) Power supply b) Substation for receiving power	Considered as per requirement
5.	**Steam Generation Facilities**	
	a) MP Steam b) LP Steam	Considered as per requirement
6.	**Water Supply**	
	a) Process Water Supply b) DM Water Supply	Considered as per requirement Considered as per requirement
7.	Yard Piping	Considered as per requirement
8.	Process & utility interconnection	Considered
9.	Instrument Air Facilities	Considered as per requirement
10.	Safety & Fire Fighting System including fire water ring with Hydrant System	Considered as per requirement
11.	Auxiliary services, workshop equipment, laboratory equipment, continuous monitoring system, NDT equipment, Control rooms/DCS, shift office, welfare/rest room telephone & telecommunication, Public Address System, etc.	Existing infrastructure facilities will be used.

3.5 Project Description with process details

Proposed CNA plant of capacity 100 MTPD is based on Magnesium Nitrate ($Mg(NO_3)_2$route.

3.5.1 Technology Options

The prominent technology suppliers contacted for CNA are as mentioned below:

1. ESPINDESA, Spain

2. Pfaudler HoN-MA® Process (Pf Systems), Germany
3. KBR Plinke's Process, Germany

3.5.2 Process Description

Weak Nitric Acid is pumped from the tank farm to the concentration unit.

Before entering the upper part of the column, the flow rate of the cold acid is measured, controlled and after that, the acid is preheated by recovered low pressure steam and mixed with the hot recycled Magnesium Nitrate solution.

Weak Nitric Acid and concentrated magnesium nitrate solution are fed to the upper part of the main column and mixed together with the concentrated Nitric Acid coming from the top of the rectifying column (external reflux).

The column top vapor is condensed and divided into two streams: product and reflux of concentrated acid. The effluent gas is cooled in and sent to NOx Absorption.

The product acid is heated up to its boiling point with low pressure steam before entering the bleaching column, where it is bleached with air to obtain a colorless Nitric Acid with low HNO_2 content. Then, the product stream is further cooled down and led to the tank storage by gravity flow. The reflux is fed back to the column head.

The bottom liquid of the stripping column, which has been denitrated to approx. 0.1 wt% HNO_3, contains about 61 wt% of magnesium nitrate, which is concentrated to about 66 % in the steam heated reboiler, supplying the heat input necessary in the stripping and rectifying column.

The resulting weak magnesium nitrate solution is re-concentrated to 73 wt.%, using a thermo siphon flash-vacuum evaporator. The boiling magnesium nitrate solution, coming from the stripping column, is heated in and fed continuously to the evaporator. The feed capacity is controlled by the level of column sump.

The evaporated water vapor is condensed in a water cooled condenser and the resulting condensate is dipped against vacuum and collected in a

tank, from where it is pumped by to an external storage tank after it is cooled to approx. 35-40°C. Some part is used as feed water in the absorption unit. This condensate may be used as process water in the weak Nitric Acid production plant.

Incondensable inert gases are sucked off from the vacuum pump, which maintains the vacuum of about 180 mbar.

The produced re-concentrated magnesium nitrate solution is continuously recycled to the Nitric Acid concentration column by pump.

The NOx containing effluent gases are sent to treatment within CNA plant Battery Limit.

The NOx containing gas coming from the bleaching unit and the vacuum unit is absorbed under pressure conditions using process condensate and atmospheric air to produce a highly purified gas and a Nitric Acid of about 50 to 55 wt% HNO_3, which is recycled to the Nitric Acid Concentration.

For reducing the chilled water consumption, a second cooler, operated with cooling water, can be installed.

Preparation and Filtering of Magnesium nitrate unit

Inorganic salts coming into the system by feeding WNA will be dissolved in Magnesium- nitrate solution. The content will increase and precipitate, when no more is dissolvable.

To remove the incoming salts, some part of the salt solution is neutralized in a stirred tank using Magnesium Hydroxide and the precipitations are removed by filtration. For this procedure, the used solution has to be diluted down to approx. 35 wt% and neutralized with Magnesium Oxide (MgO) as filter aid, added to improve filtration efficiency.

For first filling and for make-up of losses of magnesium nitrate, which are very low, the same installation is applied to produce a solution of solid magnesium nitrate hexa-hydrate by dissolution in water. Alternatively, the magnesium nitrate can be delivered as approx. 35 wt% solution and pumped to the intermediate storage tank. From there, it is supplied to the plant and re-concentrated to the operation concentration approx. 73 wt%.

The frequency of filtering depends on amount of incoming salts with the feed weak nitric acid.

The process flow diagram are presented in the Clause 3.10 of the report.

3.6 Raw material& finished product quantity, source, mode of transport& storage

Raw Material and utilities consumption figures (per ton of product /calc. as 100% HNO_3) is summarized in the below Table:

Table- 8
Daily Raw Material/Finished product& Utility Requirement

S. No.	Description	Quantity
Raw Material		
1.	Weak Nitric Acid	1732 kg(58% basis)+ 34 kg/h (re-circulation of weak nitric acid, 58% basis)
2.	Magnesium Nitrate	1.6kg/MT of CNA
Product		
1.	Conc. Nitric Acid	1 MT

3.7 Resource optimization/Recycling and reuse

All NOx-gases generated in the CNA plant are recovered as Nitric Acid of about 50-55 wt% HNO_3 in absorption tower. The recovered Nitric Acid from the absorption tower is sent to Concentration unit and is concentrated.

3.8 Availability of water, steam&power

The total requirement of water, steam & power are as follows:

Table- 9: Utility Requirement

S. No.	Description	Quantity per ton of 100% HNO_3 basis
Utilities		
1.	MP Steam (19barg)	1921 kg
2.	LP Steam(3barg)	-35 kg (recovered)
3.	Cooling Water(35°C-40°C)	175 m^3
4.	Chilled Water(11°C-16°C)	1.5 m^3
5.	Power	14 kWh
6.	Make Up Water for recovery of NO_x to Nitric Acid 50 wt% (external unit)	0.02 m^3

3.9 Quantity of Waste (Emissions, Effluent &Solid)

- Gaseous emissions from Concentrated Nitric Acid Plant will be treated in Absorption unit of the plant.
- Site has existing facility to treat the waste water.
- No Solid waste is envisaged to be generated in the proposed CNA plant except residual non-hazardous salt left after filtration of Magnesium Nitrate.
- Hazardous Solid waste, if any will be disposed off as per Hazardous and Other Wastes (Management and Transboundary Movement) Rules 2016.

3.10 Schematic presentation of feasibility drawing (Process flow chart)

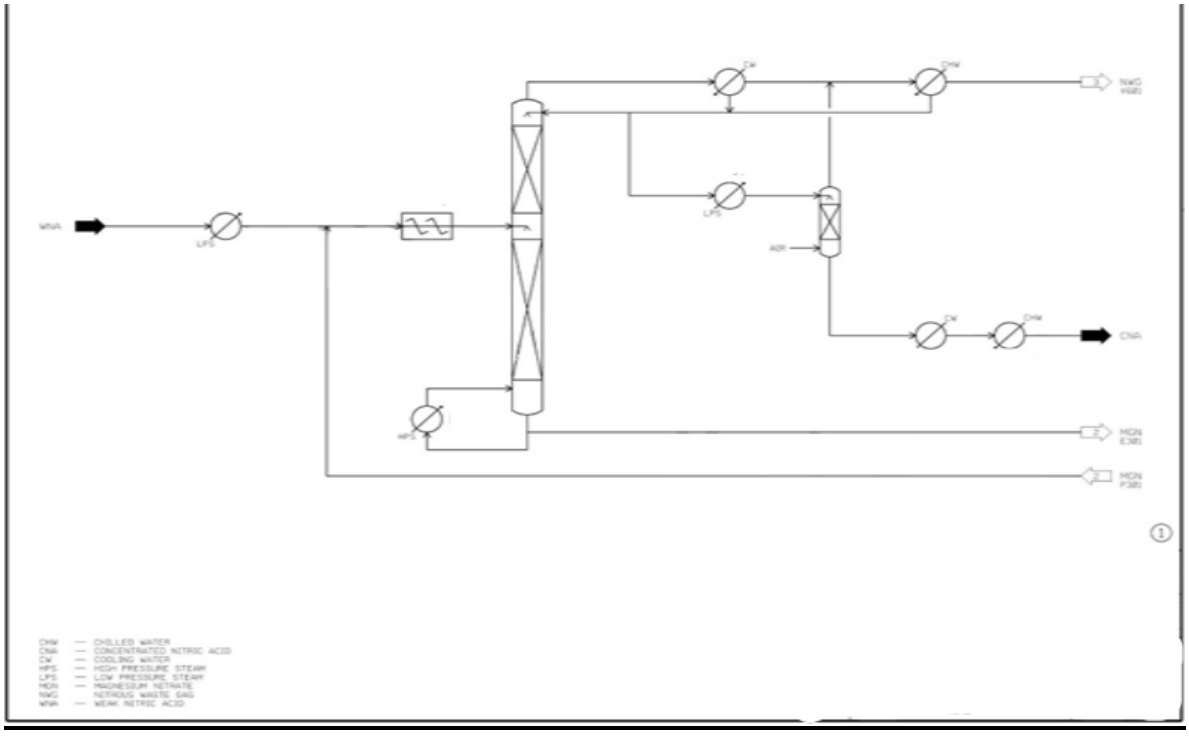

Fig 2a: Process Flow Diagram Nitric Acid Concentration unit

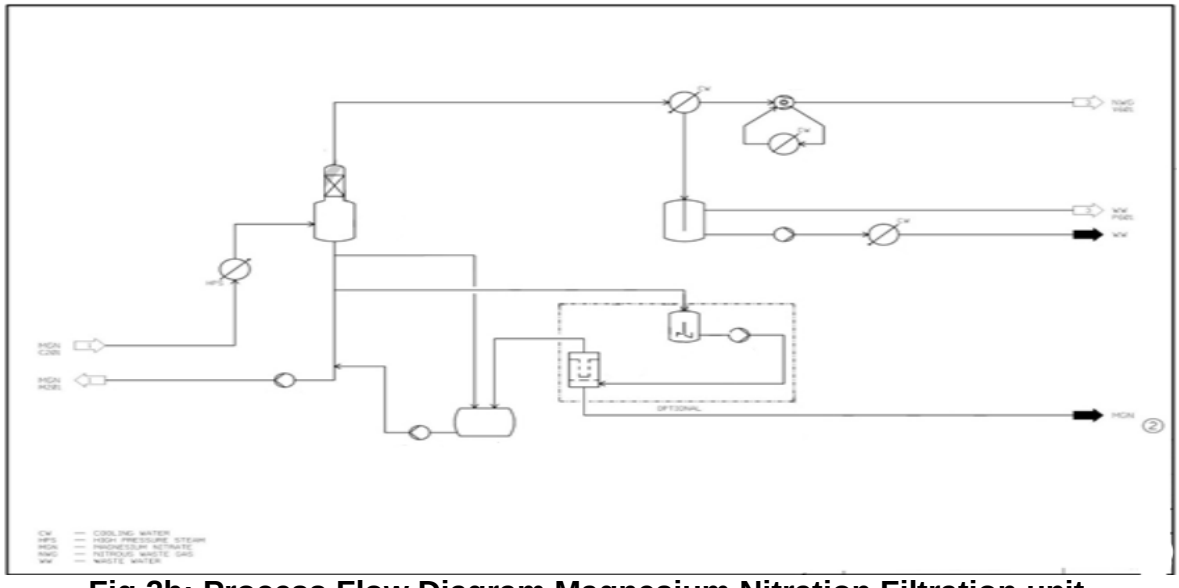

Fig 2b: Process Flow Diagram Magnesium Nitration Filtration unit

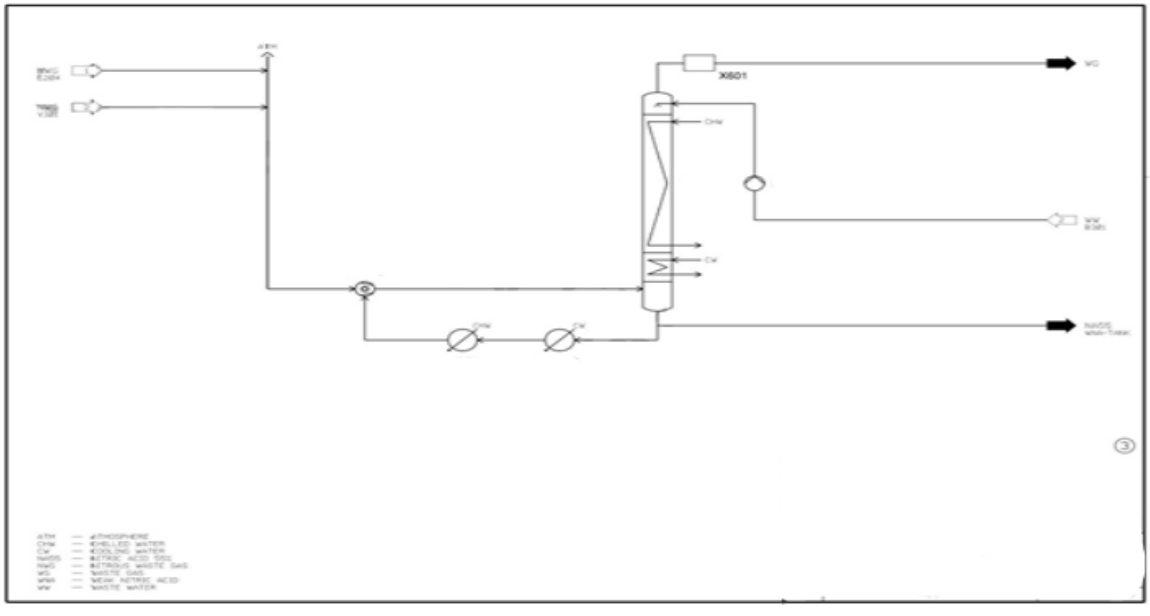

Fig 2c: Process Flow Diagram Absorption unit

4.0 SITE ANALYSIS

4.1 Connectivity

The coordinates for the area which is earmarked tentatively for the plant are 19°04'19.01"N, 72°88'08.53"E at an altitude of about 6m from MSL. Project site is well approachable and connected to all basic amenities as mentioned below:

Table- 10

Local Connectivity

Amenities	Name	Distance & Direction
Nearest City	Mumbai	Falls in Mumbai
National Highway	NH - 3	1.5 km in NNW
State Highway/Road	Ramakrishna - Chemburka Marg	1 km in East
Railway Station	Sion Railway Station	3 km in West
Airport	Chhatrapati ShivajiMaharaj International Arport	8 km in NNW
Hospital	Om sai Baba Hospital	2 km in North
School	St. Sebastian High School	2.5 km in NNE

4.2 Land Form/Land Use & Land ownership

The proposed project for installation of CNA plant of 100 MTPD capacities shall be set up within the existing fertilizer complex of RCF at Trombay, there would no change in existing land use pattern and land ownership.

4.3 Topography

The proposed project site is at about 9km away from eastern shore of Arabian Sea. The Eastern Expressway passes at a distance of 1 km. The topography of the area in common with other Deccan Trap regions is undulating with a few small water courses. The Chembur village is located on the north-western extremity of the Bombay Island, lying to the north-east or east of the main Bombay Island.

4.4 Existing land-use pattern

The proposed project site falls within existing industrial premises of RCF, Trombay.

Table- 11

Land-use / Land-cover Statistics within 10 km radius of RCF Trombay

Classification	Area in Ha	%
Built-up Land	12482.42	39.73
Industrial Land	1264.92	4.03
Barren/Unculturable/Wastelands, Scrub Land	2901.21	9.23
Airport	542.45	1.73

Mangroves	2644.06	8.42
Water Body	11580.53	36.86

4.5 Existing Infrastructure

In view of the size and magnitude of proposed project, no additional infrastructure is envisaged. Following existing facilities shall be extended for operation of proposed CNA plant:

Table- 12

Existing Infrastructure

Sl. No.	Plant & Facilities	Provisions
1.	Product, Raw Material Storage & Handling Facilities a) Nitric Acid b) Magnesium Nitrate	Existing facility for storage and transportation of finished product and raw material will be utilised. For magnesium nitrate, a dedicated storage area shall be utilised.
2.	Power supply	Considered as per requirement
3.	Steam Generation Facilities	
	a) MP Steam b) LP Steam	Considered as per requirement
4.	Water Supply	
	a) Process Water Supply b) DM Water Supply	Considered as per requirement
5.	Instrument Air Facilities	Considered as per requirement
6.	Safety & Fire Fighting System including fire water ring with Hydrant System	Considered as per requirement
7.	Auxiliary services, workshop equipment, laboratory equipment, continuous monitoring system, NDT equipment, telephone & telecommunication Public Address System etc.	Existing infrastructure facilities will be used

4.6 Soil Classification

The soils of the area are essentially derived from the Deccan trap, which is the predominant rock formation of the study area with small outcrops of laterite at few places. The main types of soils found in the area are coastal

alluvium and laterite soils. Detailed soil characterisation shall be done during baseline environmental data generation.

4.7 Climatic Data from secondary sources

Table- 13

Climatic details of the site

Climate	Value	Unit	Frequency
Barometric Pressure	995 1006 1007	mbar mbar mbar	Minimum Mean Maximum
Temperature	38 40 9	^{o}C ^{o}C ^{o}C	Design Maximum Minimum
Rain Fall	2500 2821	mm mm	Mean Annual Heaviest in Year
Relative Humidity	85 100 50	% % %	Design Maximum Minimum
Seismic Zone	III & IV	---	---

4.8 Social infrastructure

RCF owns its township adjacent to its factory premises and spread over in an area of about 765 Acres at Chembur. The existing infrastructure of RCF Trombay unit with respect to residential colony, green belt, social infrastructure, road facilities, supply of water, sewerage facilities, power requirement etc. are working efficiently and will be utilised for the proposed project.

5.0 PLANNING BRIEF

5.1 Planning Concept

The proposed project is limited to setting-up of 100MTPDof CNA plant. All other associated utilities required for smooth operation of the plant shall be extended from the existing facilities available in RCF, Trombay unit to the extent possible. Keeping in view the significant advantages of negligible risks due to time and cost overruns and preference for a much leaner project implementation group in the Owner's Organization, even though this implies

a slightly higher cost to the Owner, the implementation mode envisaged for the proposed project is cost-plus to save on the project implementation time for the new CNA plant thereafter for its smooth operation.

5.2 Population Projection

The manpower requirement for the operation of CNA plant shall be met from the existing staff however; the expenditure towards this manpower shall be dedicated towards this proposed project and has been considered accordingly in the project financials. All the related training activities would be taken care of by the present operation expertise of Trombay plants and related OSBL operations team. The manpower will be adequately trained before the start of operation for the New CNA plant. RCF already has experience of running existing CNA plant.

There will be a temporary requirement of skilled& unskilled manpower during construction phase only. The visit of super specialists during development period can't be ruled out. They will be accommodated in RCF Guest House.

5.3 Land Use Planning

As the project proposal is limited to installation of new CNA plant within the existing factory premises. Hence, additional land use planning is not envisaged.

5.4 Assessment of Infrastructure Demand

The existing infrastructural facilities available at RCF Trombay are able to meet all the basic requirements and are updated from time to time. Hence, there shall be no demand of additional infrastructure during establishment of proposed project.

5.5 Assessment of Amenities/ Facilities

RCF Trombay is having all the required amenities and facilities. Safety, health, environmental, social, cultural requirements are periodically assessed and updated as per requirements.

6.0 PROPOSED INFRASTRUCTURE

The infrastructure already exists within RCF premises to meet the proposed project requirement. Therefore, existing facilities like raw material, Offsite & utility section, weighbridge, green belt, social infrastructure, road facilities, supply of water, sewerage facilities, power requirement etc. are working efficiently. In view of the size and magnitude of proposed project, no additional infrastructure is envisaged.

Table-14

Proposed Infrastructure

Sl. No.	Plant & Facilities	Provisions
1.	CNA Plant	100 MTPD as 100% HNO_3
2.	Cooling Tower	Considered as per requirement
2.	Yard Piping	Considered as per requirement
3.	Safety & Fire Fighting System including fire water ring with Hydrant System	Considered as per requirement
4.	Power	Considered as per requirement
5.	Process & Utility interconnection	Considered

Main Plant

The proposed project shall consist of a 100MTPD, which would use existing off-sites & utility facilities. The Plant is expected to be on stream for 330 days per year.

Cooling water & DM Water supply and distribution

It is considered as per requirement...

Steam & Power supply and distribution

It is considered as per requirement....

Steam System

Steam is used mainly for the following purposes:

- Process use (Chemical reaction, stripping steam etc.)
- As heating medium for steam heated exchangers
- Steam tracing of lines

Power System

- Power is used in the complex for following main purposes:
- For driving motors to run various rotating machinery (pumps, compressors, blowers, etc.)
- For meeting the power demand of instruments
- For operating electric heaters (like instrument air dryer heater, electric tracing of lines if specified, etc.)
- For plant lighting and other miscellaneous purposes, etc.

Instrument Air Facilities

It is considered as per requirement...

Fire Fighting System

Firewater storage, pumps etc. shall be provided to meet the requirement of proposed plant. Provision has been made for fire fighting system, firewater ring and other fire & safety equipments.

The fire pump automatically starts when continuous drop of pressure is detected in the fire water network.

Additional Facilities:

The following facilities have been considered under this head.

- Safety
- Plant Buildings
- Furniture & Fittings (Plant)
- Public address system
- Computers & Software

7.0 REHABILITATION & RESETTLEMENT PLAN

The proposed project shall be established within plant premises of RCF Trombay. Hence, any planning with regard to rehabilitation & resettlement is not applicable.

8.0 PROJECT SCHEDULE & COST ESTIMATES

8.1 Project Schedule

The proposed project for construction (Mechanical Completion) of CNA plant of 100 MTPD capacity is expected to be completed within18 months based on cost plus mode of execution from zero date.

8.2 Project Cost

Capital Cost of the proposed project is estimated at *Rs. 49.60 Crore*. Summary of the estimated capital requirement are given in Table below:

Table – 15

Summary of Cost estimates

Sl. No.	Particulars	Total (Lakhs)
A	**Engineering Fee**	
1.0	License Fee	201
2.0	Basic Engineering	344
3.0	Detailed engineering	430
B	**Plant& Machinery incl. Electrical, Instrumentation & Civil works**	
5.0	Mechanical Equipment Proprietary	621
6.0	Balance Equipment & Material	585
7.0	Electrical & Instrumentation	319
8.0	Power Distribution	126
9.0	Insulation & Painting	36
10.0	Spares	69
C	**Others**	
11.0	Miscellaneous	100
12.0	Plant Building Civil work/ Erection/ Temporary Facilities	710
13.0	Auxiliary Services	23
14.0	Insurance	21
15.0	PM & Pre-operating Charges	694
16.0	Land Development	21
17.0	Commissioning Expenses	61
18.0	Working capital	80
19.0	Contingency	222
20.0	Financial Cost (IDC)	294
D	**Total Project Cost**	**4960**

8.3 Analysis on the basis of economical viability

8.3.1 Project IRR

The normal life of a new CNA plant is around 20-25 years. It is assumed that the plant will be operated at 90% capacity in 1st year and 100% from 2nd year onwards. At the end of the project life, 5% of the project cost is kept as salvage value which is also accounted in IRR calculations along

with working capital. On the above basis, *IRR of the proposed project has been worked out at 15.84%*.

8.3.2 Pay Back Period

The capital investment will be paid back in about 5.85 years by annual cash accruals including depreciation at nominal rated capacity of operation.

9.0 CONCLUSION & RECOMMENDATION

9.1 Conclusion

RCF has always striven for upkeep of the plants through modernizing and upgrading technology which facilitated plants to sustain operations and meet technological challenges of improved efficiency, lower energy consumption and maintain environmental norms.

RCF proposes to set up a New, energy efficient, cost effective CNA plant based on up to date Magnesium Nitrate route in place of existing Conc. Nitric acid plant at its Trombay Unit. it will also have less repair and maintenance cost and will ensure better capacity utilization.

It is possible to produce product of min Conc. 98.5% wt Nitric acid solution based on Magnesium Nitrate route which is highly economical having flexibility of operation to save energy and resources.

As the project will be located in existing industrial premises of RCF at Trombay, Maharashtra will have the advantage of proximity to major markets.

New CNA project will also support the government initiatives such as Make in India and “Aatma Nirbhar Bharat” ensuring sustained supply of CNA for domestic market.

9.2 Recommendation

There is a substantial demand for Conc. Nitric acid. The replacement of existing plant with new Conc Nitric acid plant based on Magnesium Nitrate route shall be a sustainable step of RCF to ensure the better capacity

utilization and reduction in handling of hazardous chemicals like Sulphuric acid.

The proposed project will replace highly corrosive chemicals like sulphuric acid with Magnesium Nitrate which is non-corrosive chemicals and hence, the equipment breakdown and maintenance cost will be significantly less. The continuous operation of the plant (due to less break down of equipment),will in turn ensure the better capacity utilization and hence economic viability of the plant.

Therefore, it is recommended that the proposal for production of CNA at RCF Trombay and grant of Environment Clearance may be generously considered for an early approval.