# Executive Summary

*For*

## Proposed Manufacturing of Manganese oxide, Manganese Dioxide, Manganese Sulphate, Zinc Sulphate & Ferro Alloys (By Thermite Process)

*At*

**Plot no. B – 16/9, B - 16/10, MIDC Butibori, District: Nagpur (Maharashtra)**

## Project Proponent
## M/s. Raghav Minerals

# *EXECUTIVE SUMMARY*

## PREAMBLE

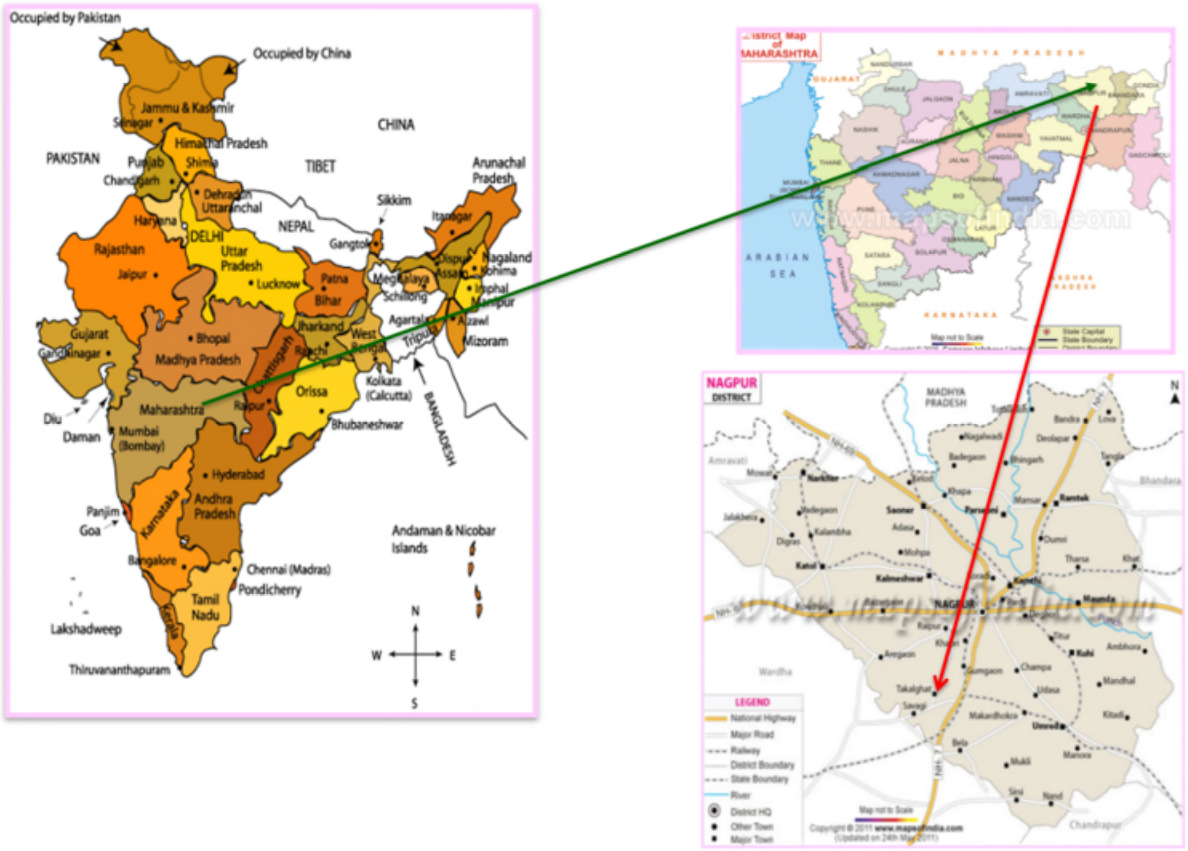
Ferroalloy refers to various alloy of iron with a high proportion of one or more other elements such as manganese, aluminum, or silicon. They are used in the production of steels and alloys. The alloy impart distinctive qualities to steel and cast iron or serve important functions during production and are, therefore, closely associated with the iron and steel industry, the leading consumer of ferroalloys. The leading ferroalloy-producing countries in 2008 were China, South Africa, Russia, Kazakistan and Ukraine, which accounted for 77% of the world production. World production of bulk chromium, manganese and silicon ferroalloys was estimated as 29.1 million tonnes (MT) in 2008, a 3% decrease compared with 2007.

Ferro-alloys are among the essential inputs required for steelmaking. It improves the quality of steel, by controlling the harmful impurities and at the same time improves the mechanical properties of steel through alloying. Growth in Global as well as domestic steel industry directly drives the demand of Ferro-alloys. Since Indian steel industry is under massive expansion, there is a tremendous potential for investment in Ferro-alloy production.

The increasing demand of Ferro Alloys, which is used as raw material in steel and stainless steel industries, prompted M/s. Raghav Minerals to Manufacture Manganese Oxide & Manganese Dioxide, Manganese Sulphate, Zinc Sulphate and Ferro Alloys (By Thermite Process).

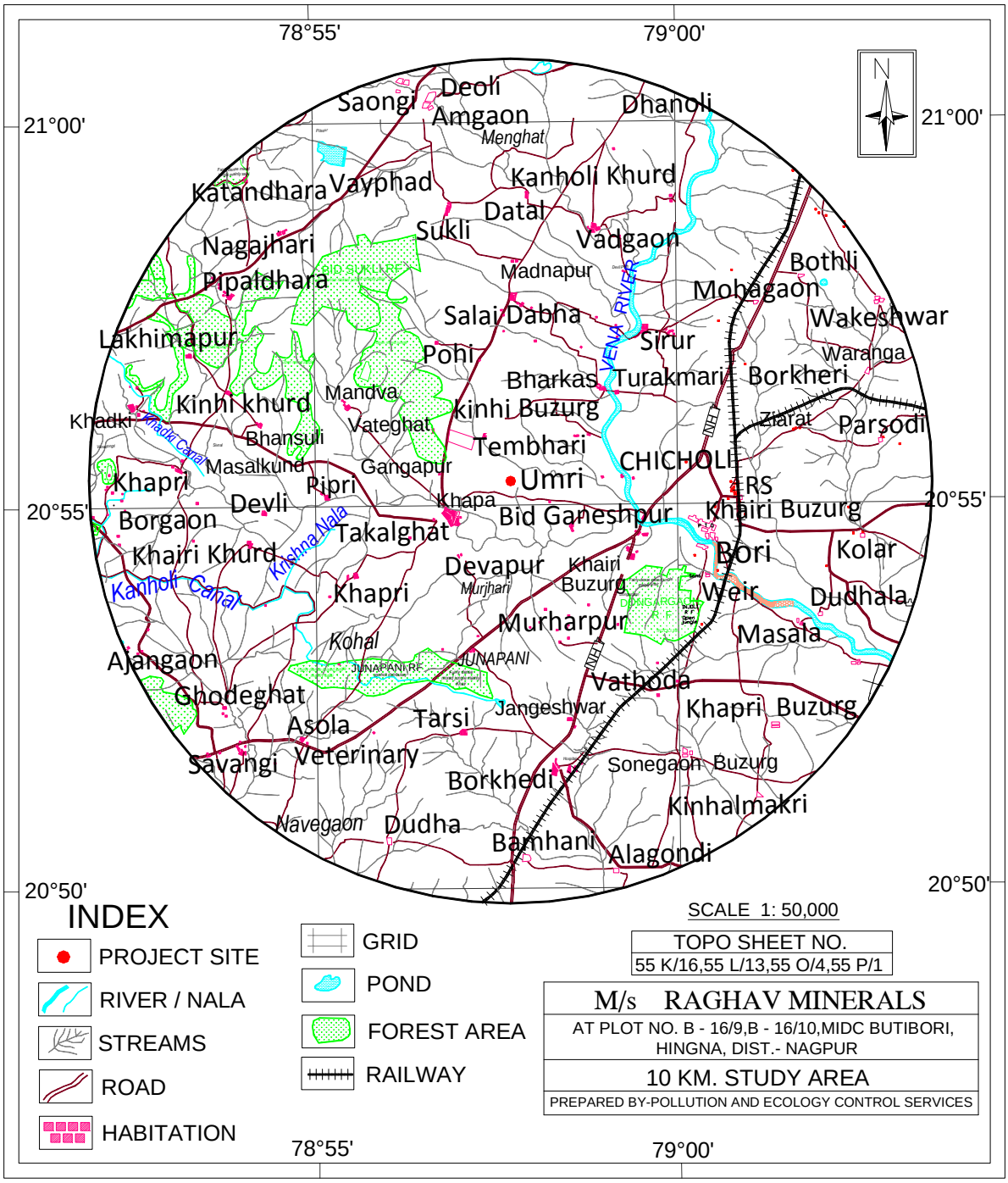
The plant of M\s. Raghav Minerals is established to manufacture and process Manganese Ore and Manganese Oxide. The project site is located 28 kms away from Nagpur city, at Plot no. B – 16/9, B - 16/10, MIDC Butibori, District: Nagpur (Maharashtra)

The location, topographical map and details of the proposed project are given below




**Source:mapsofindia.com**

**Location of the Project Site**




**Source: SOI Toposheet**

**Topographical Map (10 km radius)**

## DETAILS OF THE PROJECT

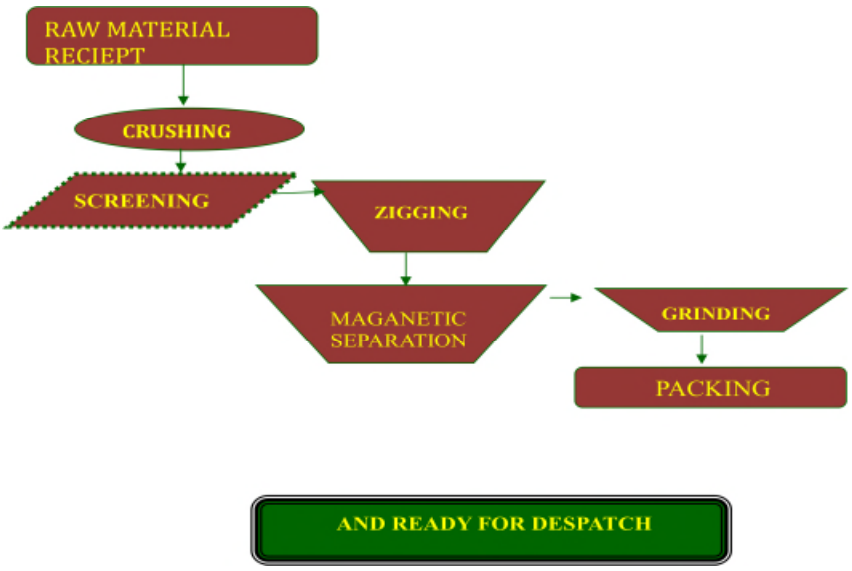
| Sr. No. | Particulars | Details |
|---|---|---|
| 1. | Project Site | MIDC - Butibori<br>Dist. - Nagpur<br>State - Maharashtra. |
| 2. | Nearest major road | NH – 7 : 4 Km (E) |
| 3. | Coordinates | Latitude - 20°55'29.89"N<br>Longitude - 78°57'34.36"E |
| 4. | Nearest railway station | Butibori railway station : 5.5 kms (E) |
| 5. | Elevation above MSL | 923 mt |
| 6. | Toposheet | 55 L/13,55K/16, 55 P/1 and 55 O/4 |
| 7. | Climatic conditions<br>(Based on IMD) | Maximum Average: 28 $^0$C<br>Minimum Average : 13 $^0$C<br>Humidity Average : 20 to 80%<br>Rainfall Average : 1000mm |
| 8. | Nearest village | Tembhari :1 km (N)<br>Umari : 1.5 km (W) |
| 9. | Nearest major city | Nagpur - 28Kms (NE) |
| 10. | Nearest water body | Vena river : 2.5km(E)<br>Krishna nala : 3km (SE)<br>Kanholi Canal : 6.0 km (SW)<br>Vadgaon lake : 9.6km (S) |
| 11. | Defense Installation | Nil |
| 12. | Sensitive locations | Archaeological structures, Historical places, Sanctuaries and Biosphere None within 10 km |
| 13. | Nearest forest | Reserve forest :<br>Bid Sukli – 1.5Kms (NW)<br>Dongargaon R.F. : 5 km (SE)<br>Junapani R.F. : 7 km (S) |
| 14. | Project Cost | Rs. 157 Lacs |
| 15. | EMP Cost | Rs 50 Lacs |

## DESCRIPTION OF PROCESS

### Manufacturing Process of Manganese Dioxide

After receipt of material it is tested for its quality. After getting full information's about its impurities following processes are followed to remove impurities and improve the purity of Manganese Ore.

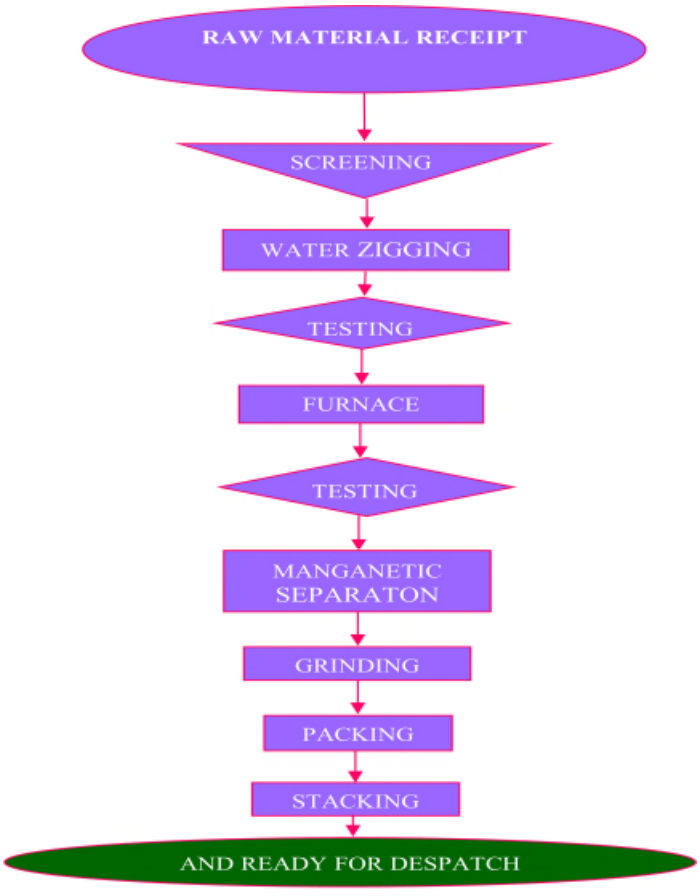
- **Screening**: The material is screened so that uniform sizes are obtained for further process.
- **Zigging**: Water zigging is done to separate and wash impurities.
- **Magnetization**: Different sizes of $MnO_2$ ore are feed to magnet where unwanted impurities get removed.




**Process Flow Chart of $MnO_2$**

**Manufacturing Process of Manganese Oxide**

- After Raw Material receipt at the site it is tested for the contents of various elements and then the material is screened. After screening you get different sizes, which are zigged in automatic water zigging.
- The material is then heated in coal fired furnace. From where it is transferred for drying and magnetic separation.
- Then the material is dried and after Magnetic Separation it is feed to grinding Machine, where it is powdered in the required mesh size.
- After grinding it is semi automatically packed in 25 kg/50 kg/ or 1000 kg HDPE Bags and kept ready for dispatch.



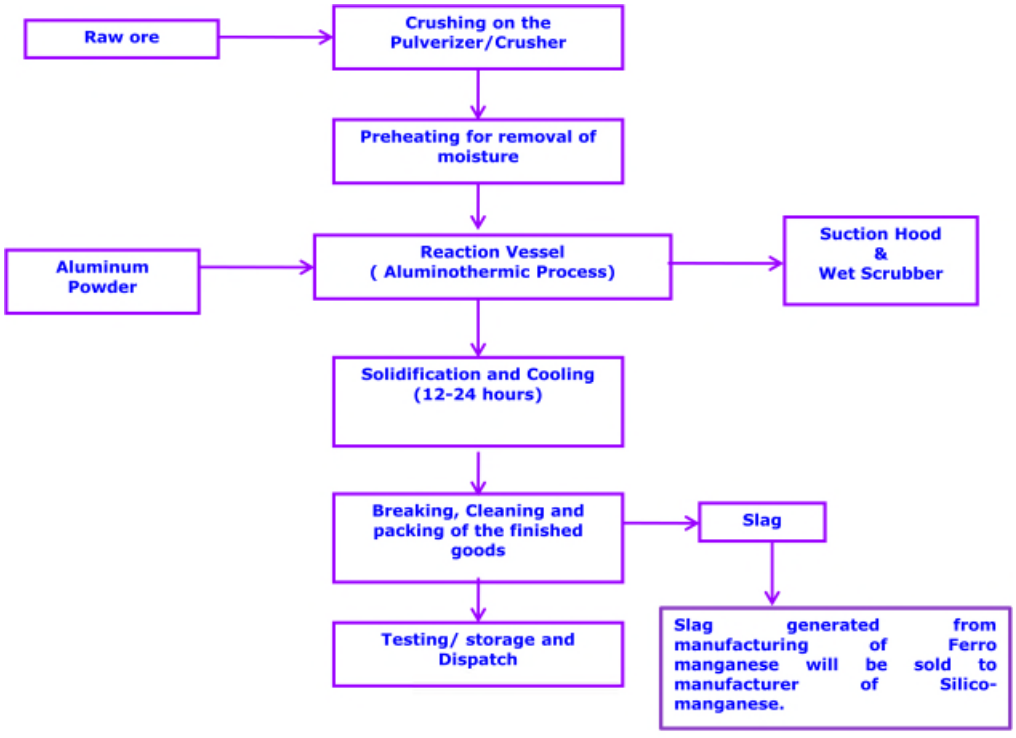

**Process Flow Chart of MnO Production**

**Ferro Alloys / and Other Noble Ferro Alloys Thermite Process**

Manufacturing of Ferro Alloys through Termite Process is very easy and simple.

Following activities are carried on:

- ✓ Powdering of different Alloys / Minerals.
- ✓ Mixing in blender in the required proposition
- ✓ Then a small fire is created (By aluminum powder) in the reaction vessel, where this blended material is added slowly. The powder starts melting inside the vessel and the Metallic contents are automatically separated which settles down and the sludge floats.
- ✓ Metal and Sludge are separated by manual processes.
- ✓ Metal is crushed and for some customer it is powdered in Pulveriser.
- ✓ The Metal is crushed and packed in bags and kept ready for dispatches.



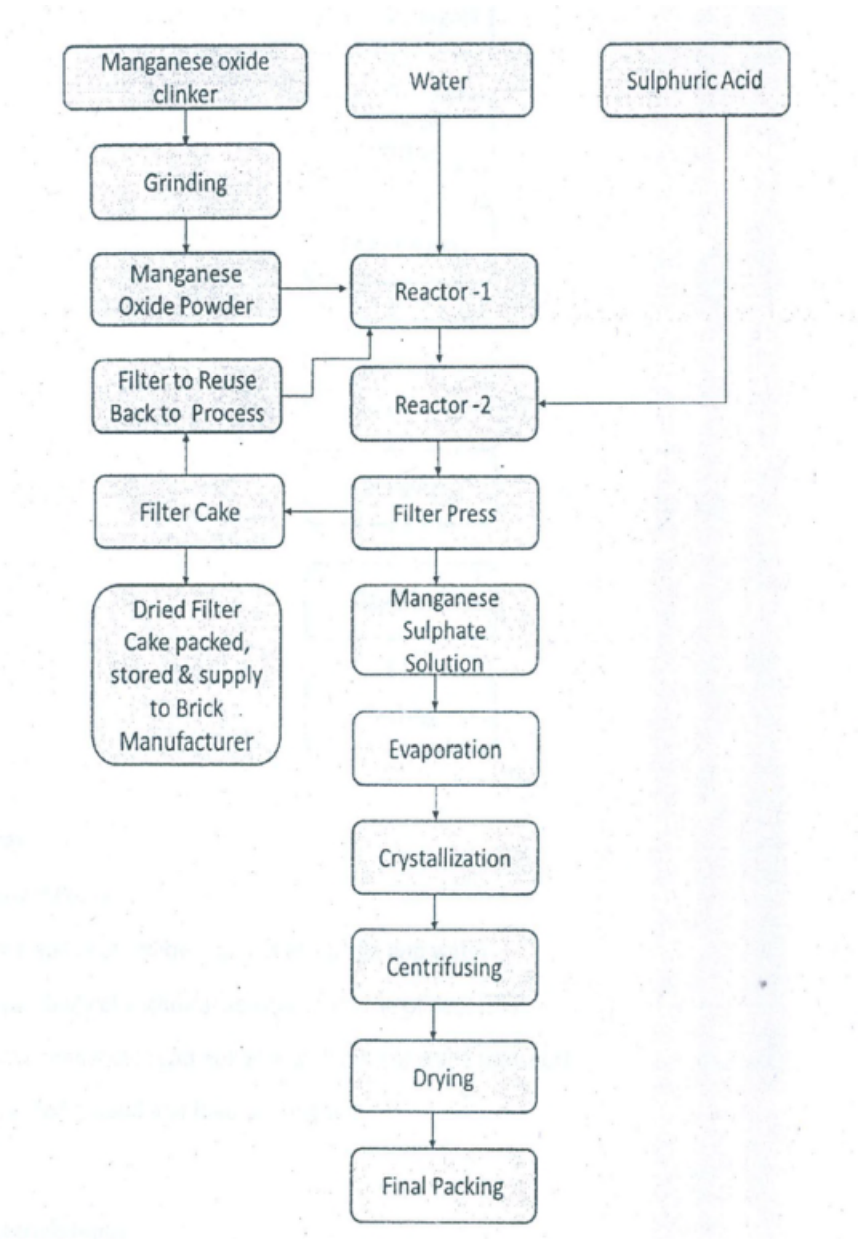

**Thermite Process**

**Manufacturing Process for Manganese Sulphate**

- Manganese Oxide Clinker and Sulphuric Acid will be procured from its suppliers and water is available through the MIDC water supply.
- The Manganese Oxide Clinkers are first ground into fine powder by grinding machine where efficient cyclone separator followed by bag filter system will be installed to control the particulate emission as well as to reduce the product losses.
- This fine Manganese oxide powder is mixed with water in a reactor using a mechanical stirrer.
- Once the slurry is ready, it is pumped into another reactor where it is mixed with Sulphuric Acid till neutral pH value so that the Manganese Oxide is converted into Manganese Sulphate which is water soluble.
- The whole mass is filtered so that the impurities and un-dissolved solid are removed, clear solution of Manganese Sulphate is prepared which is stored in a storage tank from where it is packed and dispatched.
- The removed impurities and un-dissolved solids are washed with water and again filtered filtrate is reused back to process and the filter cake is transferred into the drying area

Chemical Reaction:

$$2MnO + 8H_2O + 2H_2SO_4 \longrightarrow 2MnSO_4 5H_2O$$



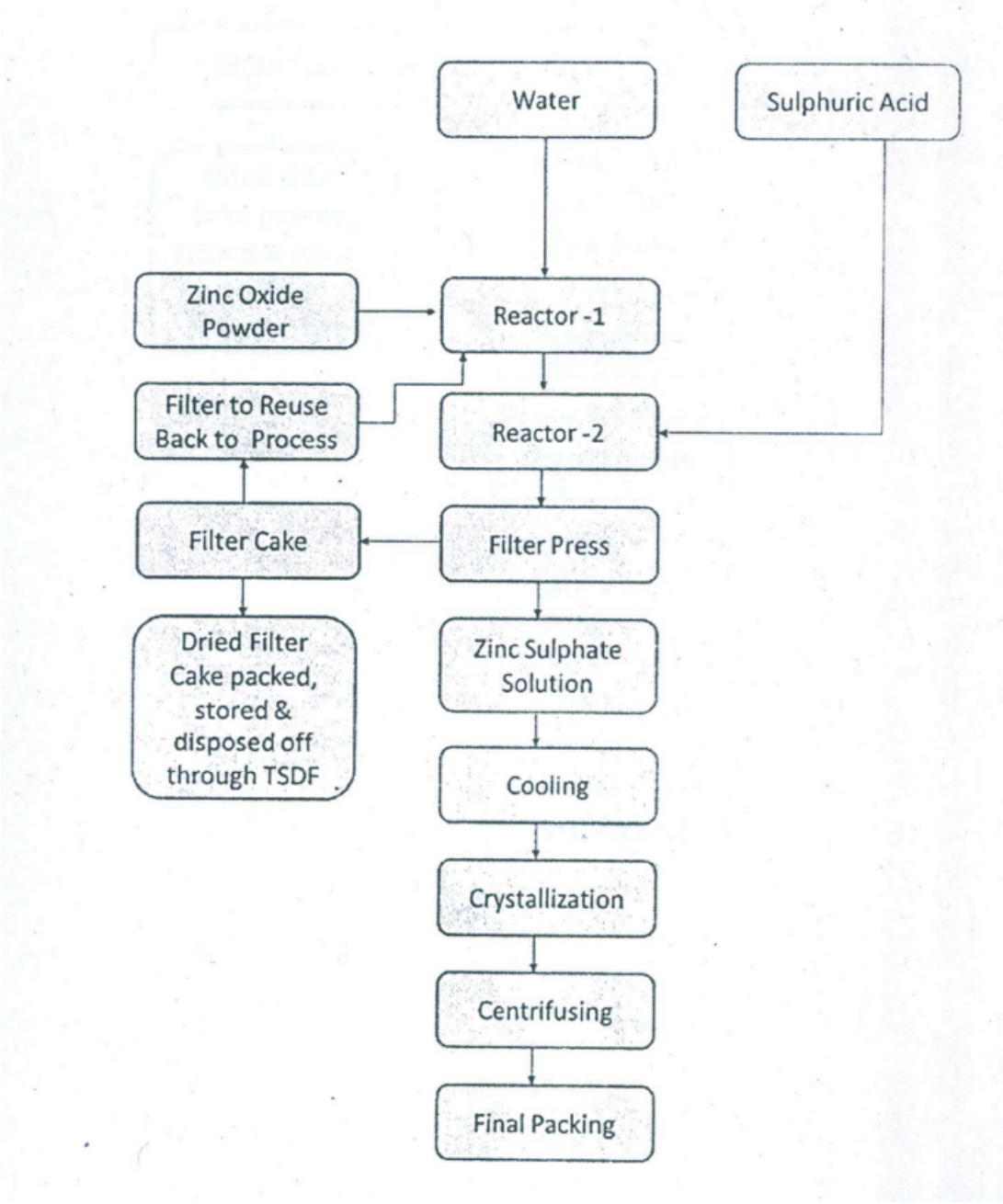

**Manufacturing Process for Manganese Sulphate**

**Manufacturing Process for Zinc Sulphate**

- Zinc Oxide Clinker and Sulphuric Acid will be procured from its suppliers and water is available through the MIDC water supply.
- The Zinc Oxide Clinkers are first ground into fine powder by grinding machine where efficient cyclone separator followed by bag filter system will be installed to control the particulate emission as well as to reduce the product losses.
- This fine Zinc oxide powder is mixed with water in a reactor using a mechanical stirrer.
- Once the slurry is ready, it is pumped into another reactor where it is mixed with Sulphuric Acid till neutral pH value so that the Zinc Oxide is converted into Zinc Sulphate which is water soluble.
- The whole mass is filtered so that the impurities and un-dissolved solid are removed, clear solution of Zinc Sulphate is prepared which is stored in a storage tank from where it is packed and dispatched.
- The removed impurities and un-dissolved solids are washed with water and again filtered filtrate is reused back to process and the filter cake is transferred into the drying area.

Chemical Reaction:

$$2ZnO + 8H_2O + 2H_2SO_4 \longrightarrow 2ZnSO_4 5H_2O$$




**Flow Chart of Manufacturing Process for Zinc Sulphate**

## 10.3 DESCRIPTION OF ENVIRONMENT

The baseline environmental quality for the period of October, November & December 2016 was assessed in an area of 10 km radius around the proposed project site**.**

**Air Environment**

It has observed that about 46.36 % of total time, the wind was calm i.e. the speed was less than 1 km/hr. The predominant wind directions were from NE (35%), Average wind speed was 5.9 km/hr during monitoring period and most of the time wind speed was between 1 to 5 km/hr.

The ambient air quality monitored at 8 locations selected based on predominant wind direction, indicated the following ranges;

$PM_{10}$ : 31.5 to 58.5 µg/$m^3$.

$PM_{2.5}$ : 15.4 to 32.1 µg/$m^3$

$SO_2$ : 7.6 to 25.0 µg/$m^3$

$NO_x$ : 9.9 to 28.2 µg/$m^3$

| Industrial Area<br>Residential, Rural Area (CPCB Norms) | $PM_{10}$ | $PM_{2.5}$ | $SO_2$ | NOx |
|---|---|---|---|---|
| | 100 µg/$m^3$ | 60 µg/$m^3$ | 80 µg/$m^3$ | 80 µg/$m^3$ |

The concentrations of $PM_{10}$, $PM_{2.5}$, $SO_2$ and $NO_x$ were found within the National Ambient Air Quality Standards (NAAQ).

**Water Environment**

A total 10 samples including two surface & eight ground water samples were collected and analyzed. The water samples were analyzed as per Standard Methods for Analysis of Water and Wastewater, American Public Health Association (APHA) Publication.

The data indicates that the ground water as well as the surface water quality are below the stipulated standard for drinking water (BIS 10500 – 2012) except high concentration of total coli form in surface water, which may be due to the human activities.

**Noise Environment**

Noise levels measured at eight stations are within limit of 55.0 dB (A) for Residential Area or 75.0 dB (A) for Industrial Area as given in MoEF Gazette notification for National Ambient Noise Level Standard.

| Area Code | Category of Area | Limits in dB(A) Leq | |
|---|---|---|---|
| | | Day time | Night time |
| A | Industrial Area | 75 | 70 |
| B | Commercial Area | 65 | 55 |
| C | Residential Area | 55 | 45 |
| D | Silence Zone** | 50 | 40 |

** Silence zone is defined as area up to 100 meters around premises of hospitals, educational institutions and courts. Use of vehicle horns, loud speakers and bursting of crackers are banned in these zones

**Land Environment**

Three Soil samples were collected analyzed for physico-chemical characteristics at selected locations in the study area to assess the existing soil conditions around the proposed project site. The relevant parameters show the following characteristics.

a. Texture of soil samples from agriculture land and waste land are silty loam and sample from Forest land are clay-loam in Texture Classification.

b. Colour of soil samples from agriculture and Barren lands are gray and sample from waste land are dark grey in colour.

c. The bulk density of soil samples from Forest land are in the range of 1.64 to 1.93 g/cc and sample from agriculture land are in the range of 1.85 to 1.88 g/cc and sample from waste land are in the range of 1.68 to 1.75 g/cc.

d. Soil samples from Forest land have pH values between 8.1 to 8.5 and sample from agriculture land have 8.15 to 8.20 and sample from waste land have 7.83 to 7.90 ranges of pH values. The pH values are indicating nature of soil samples is neutral to alkaline.

e. Soil samples from Forest land have conductivities between 0.137 to 0.192 mmhos/cm and conductivities of soil sample from agriculture land ranges between 0.260 to 0.292 mmhos/cm and conductivities of soil sample from waste land ranges between 0.125 to 0.162 mmhos/cm.

f. Soil samples from Forest land have Organic Matter between 8.6 to 15.6 % and sample from agriculture land have between 1.97 to 2.16 % Organic Matter and sample from waste land have between 1.13 to 1.65. These values represent good fertility of soils.

g. Soil samples from Forest land have concentration of Available Nitrogen values ranged between 98 to 150 kg/ha and samples from agriculture land range between 801.1 to 878.2 kg/ha and samples from waste land range between 458.2 to 668.2 kg/ha Available Nitrogen value.

h. Soil sample from Forest land have concentration of Available Phosphorous values ranged between 3.6 to 4.9 kg/ha and soil samples from agriculture land have concentration values ranges from 34.5 to 45.1 kg/ha and samples from waste land have concentration values ranges from 7.4 to 10.7 kg/ha.

i. Soil sample from Forest land have concentration of Available Potassium values range between 137 to 194 kg/ha and sample from agriculture land concentration of Available Potassium as its values range between 989.7 to 1482.4 kg/ha and sample from waste land have values range between 245.4 to 286.0 kg/ha.

j. Characteristic of Fores and Waste land soil is a little deficient in nutrients concentration. Whereas, agricultural land soils are moderately suitable for cultivation of climatic crops and have good fertility.

## 10.4 ANTICIPATED ENVIRONMENTAL IMPACTS & MITIGATION MEASURES

### Impact on Air Quality

The impacts on air quality due to source of the air pollution in the proposed facilities have been identified.

### Sources of Emissions

Emissions released from the stack during operation phase will get dispersed in the atmosphere and finally reach the ground at a specified distance from the sources. From the proposed activities the possible environmental impact on air quality has been envisaged due to the following sources.

In this case the source emission is envisaged from furnace during roasting of manganese ore with coal and grinding of Manganese Ore.

### Mitigation Measures

- M/s. Raghav Minerals shall provide dust suction system which will control fugitive emission due to material and raw material handling.
- Dust suppression system will be provided in the form of water sprinklers.
- All vibrating screens and weigh feeders below the hopper; day bins etc are totally covered to prevent leakages of dust.
- All bins are packed and covered so that there is no chance of dust leakage.
- Regular monitoring of air polluting concentrations, etc.
- Stack of 30 mt ht is proposed with bag filters to minimize the concentration of pollutants which is mainly $PM_{10}$, $PM_{2.5}$
- Predictions have been carried out using GPM-MODEL for study period. The predicted ground level concentrations obtained when superimposed on the baseline concentrations are within the prescribed NAAQ Standards for residential areas. $PM_{10}$, $PM_{2.5}$ & $SO_2$ will increase by 0.28 $\mu g/m^3$, 0.1 $\mu g/m^3$ and 2.9 $\mu g/m^3$ respectively.

**Impacts Due to the Transportation of Raw Material**

The major impact due to transportation of the raw material is the emissions due to transportation of vehicles in the study area. Loading and transportation of raw materials are the significant sources of emissions.

Major raw material is being transported through self-discharging trucks upto the site. Other Raw Material is also transported by covered truck. Existing road network is adequate and is being used for the transportation. There is no major fugitive dust generation during transportation of raw materials & products. Pucca Tar Road exist upto the site. The existing road network is capable of absorbing this truck movement. There is no adverse impact on vehicular traffic due to the project.

The majority of trucks (95%) plying in the study area are manufactured in India as per the standard norms hence it is assumed that emission from these trucks will be similar and is mandatory for the vehicle manufactures to follow emission norms under the Motor Vehicle Act. The emissions through transportation are assessed based on Emission factors for on-road vehicles (CPCB Publication 1998).

**Mitigation Measures**

- The vehicles transporting raw materials will be covered by tarpaulin in order to prevent dust emission during the transport.
- The vehicles used in transportation will comply norms as per the motor vehicle act.
- The repair and maintainance of vehicle will be taken care by transporter
- Vehicles with PUC will be only allowed to operate
- The finished product will be transported by the same trucks carrying raw material.

**Impact on Water Environment**

The water requirement for MnO and $MnO_2$ , Manganese Sulphate and miscellaneous activities is 11 KLD. During plant operation 4 $m^3$/ day of waste water will be generated. The Waste Water from Floor & Equipment washing which will be treated in the settling / neutralization tank within the premises and the treated water will be recycled back to the

process. The wastewater from the zigging process will also be reused in the process. The sewage generated from the toilets and bathroom will be 1.5 $m^3$/day in the proposed facilities which will be treated in packaged type STP of 5 $m^3$/day. No major river within 1 km of the study area.

**Impact on Noise Environment**

During operation, the major noise generating sources are grinding mill, auto loading sections, blenders etc. These sources will be located far off from each other. Under any circumstances the noise level from each of these sources will not exceed 85 dB (A). Noise levels generated in the project site will be confined within the Proposed plant the impact of noise levels on surrounding will be insignificant.

**Mitigation Measures**

The noise levels stipulated by Central Pollution Control Board at any point of time will not exceed the standards.

- By providing padding at various locations to avoid sharp noise due to vibration.
- Other than the regular maintenance of the various equipment, ear plugs/muffs are recommended for the personnel working close to the noise generating units;
- All the openings like covers, partitions will be designed properly
- Inlet and outlet mufflers will be provided which are easy to design and construct.
- All rotating items will be well lubricated and provided with enclosures as far as possible to reduce noise transmission.

The insulation provided for prevention of loss of heat and personnel safety will also act as noise reducers.

**Solid Waste**

**Solid Waste generation @ 9 to 10% of $MnSO_4$ production and its Management**

- The major solid waste generated will be the discarded cake from the filter press.
- The solid waste generated will be used for brick manufacturing.

**Solid Waste generation and its Management During Manufacturing of MnO**

- The Fly ash generated will be 480 TPA.
- Solid waste is non hazardous and non-toxic in nature.
- Fly ash generated will be sold to brick manufacturers.

**SOCIO-ECONOMIC ENVIRONMENT**

The impacts of the proposed project, during its operation, on demography and socio-economic condition can be identified as follows.

- Increase in employment opportunities and Reduction in migrants to outside for employment.
- The plant will give direct employment and indirect employment to 30 people of local area.
- Increase in consumer prices of indigenous produce and services, land prices, house rent rates and Labour prices.
- Improvement in socio-economic environment of the study area.
- Improvement in transport, communication, health and educational services.
- Increase in employment due to increased business, trade commerce and service sector.
- The overall impact on the socio economic environment will be beneficial.
- The management of M/s. Raghav Minerals has proposed to give preference to local people for recruitment in skilled and semi skilled category.

**ENVIRONMENT MONITORING PROGRAMME**

The environmental monitoring is important to assess performance of pollution control equipment installed in the proposed project of M/s. Raghav Minerals. The proposed project is for Manufacturing of Manganese Oxide & Manganese Dioxide, Manganese Sulphate, Zinc Sulphate and Ferro Alloys (By Thermite Process). The sampling and analysis of environmental attributes including monitoring locations will be as per the guidelines of the Central Pollution Control Board.

Environmental monitoring will be conducted on regular basis by M/s. Raghav Minerals to assess the pollution level in the proposed plant. Therefore, regular monitoring program of the environmental parameters is essential to take into account the environmental pollutant of the study area.

The objective of monitoring is:

- To verify the result of the impact assessment study in particular with regards to new developments;
- To follow the trend of parameters which have been identified as pollutants;
- To check or assess the efficiency of the controlling measures;
- To ensure that new parameters, other than those identified in the impact assessment study, do not become critical due to the commissioning of proposed facilities;
- To check assumptions made with regard to the development and to detect deviations in order to initiate necessary measures;

The attributes, which needs regular monitoring, are specified below:

- Air quality
- Water and wastewater quality;
- Noise levels;
- Soil quality;

**ENVIRONMENT MANAGEMENT PLAN**

**Air Environment**

The sources of air pollution are raw material handling system, materials transportation, raw materials feeding to the operating equipments. The automatic process equipments will be employed for the raw material feeding system. Stacks of adequate height of 30 m

is proposed for proper dispersion of flue gases. The following Environmental Management Plan will be implemented to control air emissions.

**Action Plan to Control of fumes**

- Bag Filters followed by a 30 mt height stack will be installed.
- Fugitive emission from material unloading operations, material transfer points will be controlled fully with total enclosure.
- Fugitive as well ambient air quality monitoring shall be carried out on regular basis to ensure the compliance with National Ambient Air Quality Standards (NAAQS). The ambient air quality within the factory premises shall not exceed the standards ($PM_{10}$ 100μg/$m^3$, $PM_{2.5}$ 60μg/$m^3$ $SO_2$ 80μg/$m^3$, $NO_x$ 80μg/$m^3$ and CO 04μg/$m^3$) prescribed by CPCB.
- The monitoring frequency of air quality shall be as per the consent issued by State Pollution Control Board and reports shall be submitted as part of compliance. The records will be maintained.
- Regular Stack Monitoring will be done. All the emissions from the plant will be controlled to meet the relevant standard set by CPCB/State Pollution Control Board
- Fumes will be evacuated directly from furnaces through hoods with swirling mechanism and ducting.
- Plantation will be done to control fugitive emissions & gaseous pollutants to keep clean and healthy environment.

**Water Environment**

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**Management Plan of Solid waste**

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**Socio Economic Environment**

M/s. Raghav Minerals would aid in the overall social and economic development of the region. The plant will give employment to about direct employment to 30 people of local area. In order to mitigate the adverse impacts likely to arise in the proposed project activities and also to minimize the apprehensions to the local people, it is necessary to

formulate an affective EMP for smooth initiation and functioning of the project. The suggestions are given below:

- Communication with the local people will be established regular basis by project authority to provide an opportunity for local youth.
- Project authorities will undertake regular environmental awareness program on environmental management.
- Job opportunities are the most demanding factor, the local people as per their education will be employed.

  For social welfare activities to be undertaken by the project authorities, collaboration should be sought with the local administration, gram panchayat, block development office etc for better coordination.

**Occupational Safety & Health Management**

M/s. Raghav Minerals will provide all necessary provisions under Factory Act. In addition a Safety committee will be formed and manned by equal participants from Management and Workers. All personal protect equipments like Safety shoes, helmet & uniform will be issued to each employee based on the nature of job involved. In case a person inhales fumes, he should be removed to fresh air and given oxygen through a mask for 30 minutes and if required cardiopulmonary resuscitation should be performed.