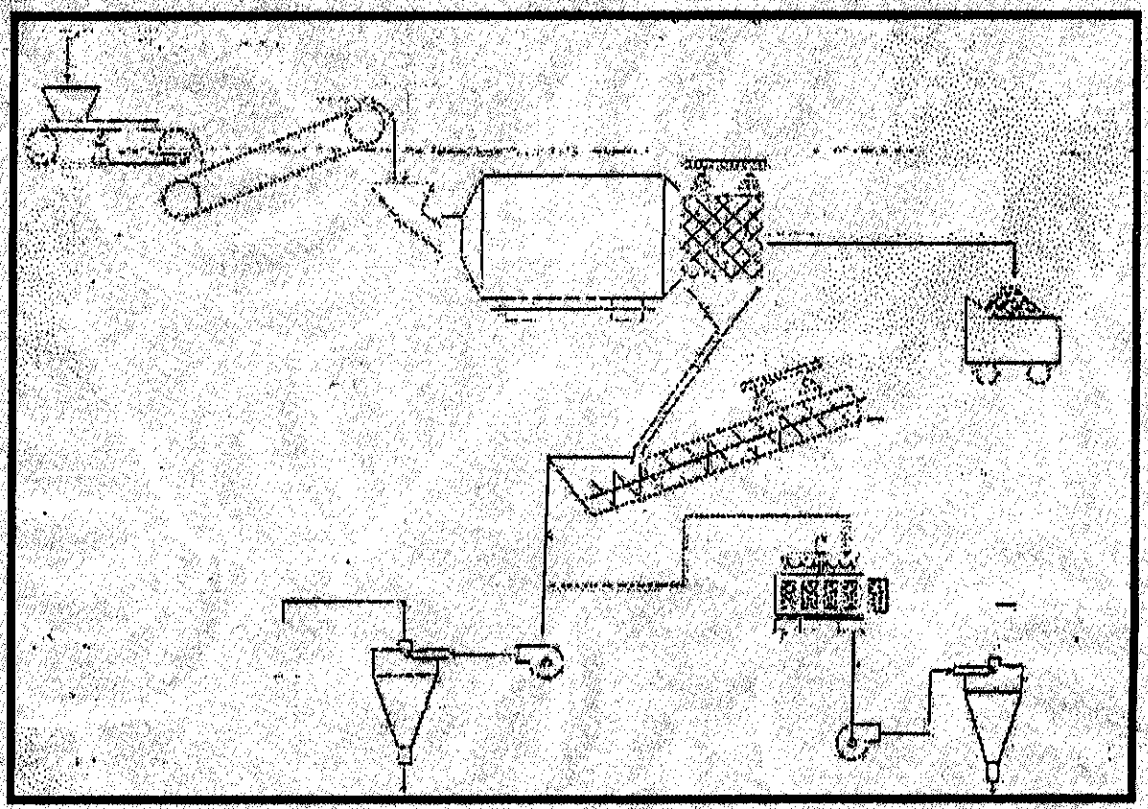
Beneficiation of China Clay

- an investment opportunity in Gujarat

***Project Cost*: Rs 200 Lakhs**
***Capacity:* 100 Tonnes per day**



Project and Technology Division

iNDEXTb

INDUSTRIAL EXTENSION BUREAU

Bolck 18, 2nd Floor, Udyog Bhavan, Sector – 11,

Gandhinagar 382 011, Gujarat

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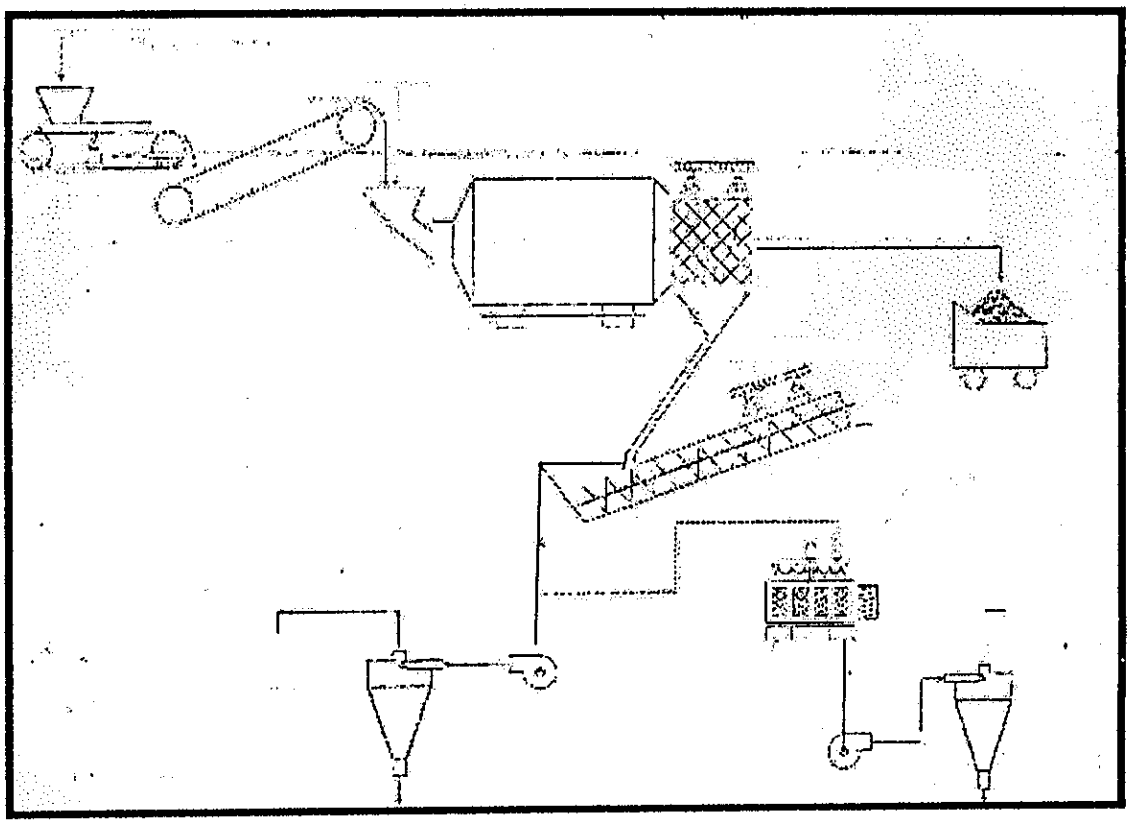

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INDEX

China Clay Beneficiation

-an investment opportunity in Gujarat

INTRODUCTION

Gujarat is endowed with abundant supply of natural resources and is reported to have huge reserves of key minerals like, China Clay, Dolomite, Limestone, Lignite and others. Gujarat accounts for about 7 % of the total value of the mineral production and has maintained its 3rd position in value in the country and more prominently China Clay is one of them.

China clay originated from granite. sandstone and pyroclasts has different impurities like TiO_2. SiO_2. CaO. and FeO3. Particle size and whiteness also differs. China clay used for textile, rubber, paper, pharmaceuticals and cables have different specifications. To meet these requirements. impurities have to be removed by adopting process know-how evolved by different R&D organizations and laboratories. I.B.M.-Nagpur, R.R.L.-Bhubaneshwar, R.R.L.-Trivandrum have done extensive laboratory Experiment. On the basis of these laboratory results and flow chart, china clay lease-holders or entrepreneurs may go for china clay beneficiation projects adopting suggested flow sheet with indicated equipment. Present report describe technology. developed by I B M. Nagpur for iNDEXTb, based on two specified available China Clay in the State.

In Gujarat. 72 China Clay leaseholders covering 1,01,930 hectares area exploits 19,000 tonnes china clay per annum. However. conventional plant has very poor recovery and therefore to adopt modern beneficiation techniques by Air cyclone or by Hydro cyclone, beneficiation results have shown that bleaching and flocculation can enhance whiteness as per the need.

China Clay/Kaolin have many industrial applications mainly because of its quality like chemical inertness, quietness, low conductivity of heat and electricity, reinforcing characteristics etc. Some of the user industries with their specific use are:

1. Ceramic →for manufacturing structural clay products like tiles, potteries, bricks, pipes, etc.
2. Rubber→ in both natural and synthetic rubber this is used mainly as a filler
3. Paper→ is used both as filler and for coating.
4. Plastics→ it is used as a filler and reinforcing agents.
5. Paint→ it is used to get its whiteness and opacifing effect at a relatively low cost. As filler it also cuts down the expensive pigment required to formulate paint.
6. Textile → To provide filling effect on fabric
7. Other Uses:
    a. Insecticides→ china clay is used to manufacture of disinfectant like DDT.
    b. Cosmetics & Pharmaceuticals→ Superfine china clay is utilized in making powder, surgical plaster lotion, and ointment for external use.

Specific characteristics and end uses, therefore, need to be kept in mind while deciding Process Technology and sequence in beneficiation.

MARKET POTENTIAL

All India recoverable reserves of kaolin as on 1-4-1995 are estimated at 1,042 million tones; of which Gujarat's recoverable reserves are estimated at 31 million tones. During 1998-99, production of kaolin was estimated at 0.7 million tones in the state. Kerala is the leading producer of kaolin contributing to approximately 27 % of the total production; while Gujarat's share was 13 % of the total production. In case of processed kaolin, 95 % of the production was by Kerala, West Bengal, Bihar and Gujarat.

The Sector-wise consumption of kaolin is estimated at 256.600 tonnes. The major end user industries were cement (47%), ceramics (21 %), insecticides (10 %), paper (6.3%), refractories (8 %), paints (3 %), cosmetics (1 %), rubber (0.8 %) and other industries like abrasives, asbestos products, dry battery cells, chemicals, electrodes, glass and textiles (1.8 %).

Major importers of kaolin are Bangladesh, Iran, UAE, Sri Lanka and Philippines. The potential exists for exports of good quality kaolin. Besides its regular application in various growing end user industries as under :

The growth of conventional **Ceramic Products** export has been impressive in the last decade. Export of ceramics and refractories rose to Rs 552 crore in 2000-01 as against Rs 64 crore in 1991-92. However, the global market share of the total Indian exports of these products is around 0.5 per cent, compared to China's 2.6 per cent. So there is a room to grow. In India there are 14 units in organized sectors with an installed capacity of 12 lakh MT that constitutes 2.5% of world ceramic tile production. The **Ceramic tile** industry in the country has grown by about 11% per annum during the last three years. Similarly Sanitaryware also is manufactured both in large and small sectors with a growth rate of 5% per annum during last two years. The sector is exporting about Rs. 850 million during 2001 – 2002 .

Indian industry's contribution to the global **Paper** Production is presently just two percent. This offers a good potential for the paper makers in India. The signs are already visible as the industry is growing at a faster rate in India (around 5 percent per year) than in the rest of the world (around 3 percent). There are around 515 units engaged in the manufacture of paper, paper boards and news print in India producing 24.52 lakhs during 2002 – 2003 (upto Dec 2002).

Future development of both natural **Rubber** (NR) and synthetic rubber (SR) industries is particularly due to the ever-growing tyre industry. World total rubber consumption has increased at an average of 5.9 per cent per year since 1900 to reach 17.41 million tonnes in 2001 from just half a million tones in 1900, and the two major factors for this increased off take are a steady rise in world population and the ever-increasing world output, particularly in vehicles, footwear and industrial goods sectors.

Petrochemicals and Plastic sector has been a high growth sector with production outpacing the general industrial production in India. Production of major petrochemicals (excluding fibre intermediates) registered a growth rate of 16% in 1999-2000. The demand for petrochemicals in India is expected to grow at an annual rate of 10-12% beyond the year 2000.

All these major consumer industries are showing a constant growth potential and which, in turn, is expected to boost the requirement of the Clay in near future.

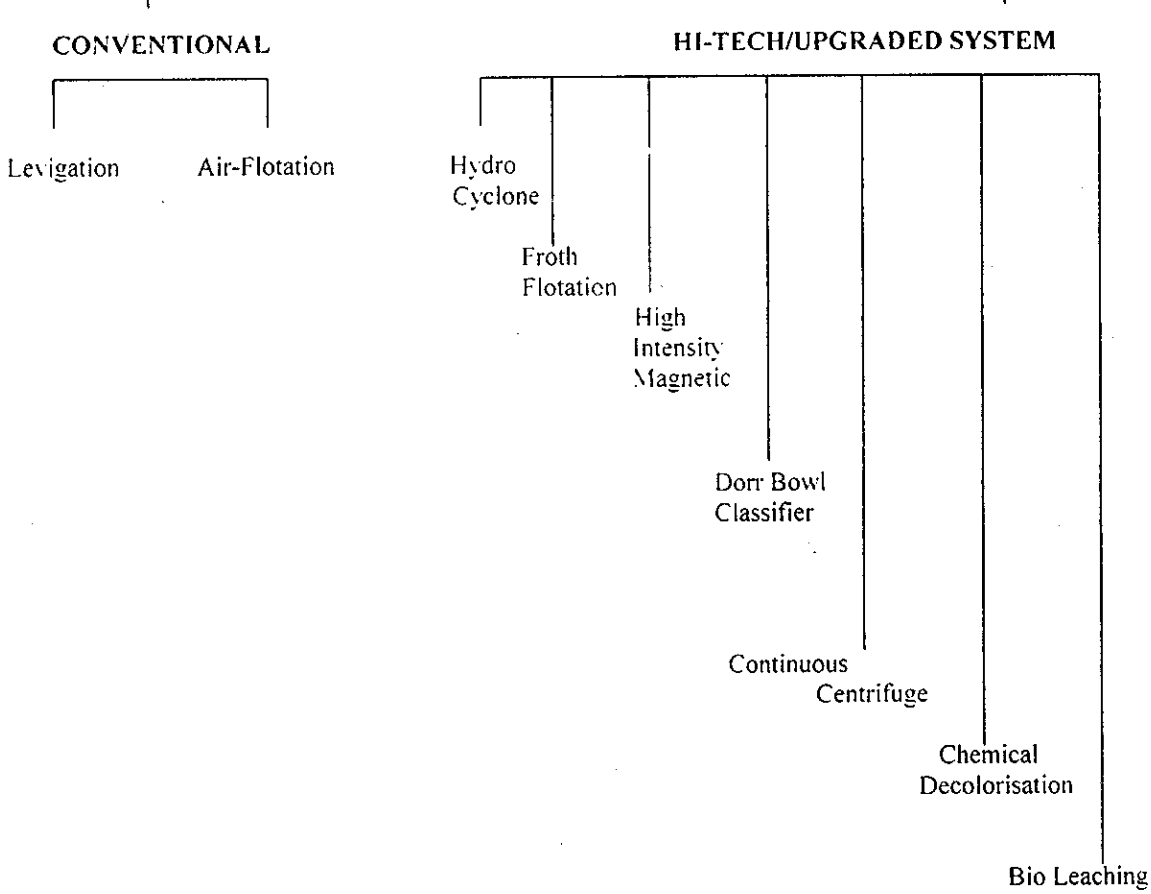
PROCESS TECHNOLOGY

The primary step in processing kaolin is to separate the abrasive minerals like quartz and undesirable minerals such as mica.

There are two basic methods of processing kaolin, a dry method or a wet process (Guillet and Kriens, 1984). The dry method is called Air flotation, which separates the clay from contaminants. The wet method produces water washed clay where the clays are fractionated, beneficiated or otherwise modified from their original state. When used in the paper industry, air floated clays are used exclusively as filler pigments while water washed clays are used as both fillers and as coating pigments.

The dry processing of kaolin is relatively simple, has lower costs, lower yields and lower quality products than the wet process. The essential feature of the dry process is to dry the crude clay so that it can be pulverized. The wet processing of kaolin is more complex than the dry technique. The first step is simply to make the crude clay into slurry.

LINE DIAGRAM FOR BENEFICATIONS OF CHINA CLAY



Benefications Studies Based On Clay Sample Received from

Arsodia Mines, Sabarkantha dist.. Gujarat and Mamuara Mines, Bhuj dist., Gujarat have been carried out by Indian Bureau of Mines for iNDEXTb. Same has been described as follows:

TECHNO-ECONOMIC PRE-FEASIBILITY
For Benificiation of China Clay

Based on Technology developed by Indian Bureau of Mines

Detail of chemical analysis of sample as carried out in the laboratory:

Constituents	ASSAY %	
	For Arsodia Mine	For Mamuara Mine
Al_2O_3	18.3	32.19
SiO_2	67.29	49.26
Fe_2O_3	0.87	1.66
TiO_2	0.82	2.81
CaO	2.63	0.25
MgO	0.48	0.55
K_2O	0.14	0.18
Na_20	0.07	0.30
LOI	9.27	12.30

Quantitative distribution of minerals as determined by Microscopic studies is as follows:

Name of Minerals	Approx. distribution % of Minerals	
	Sample of Arsodin Mine	Sample of Mamuara Mine
Kaolinite	50-55	80
Quartz	30-35	7-10
Mica	2-3	2-3
Feldspar	3-4	--
Iron Oxide	2-3	2-3
Calcite	5-7	1
Others (tourmalillc, rutile/auatarse, zircon, disposed and garnet/ chlorite etc.	3-5	3-4

Final process Flow sheet recommended for both the samples is as follows:

1. Scrubbing (in Indigenous attrition scrubber)
2. Classification (Spiral classifier)
3. Hydro cyclones (Mosley)
4. WHIMS followed by Hydrocyclone
5. Bleaching
6. Thickening
7. Drying

By adopting tile above-mentioned process route the details of the results obtained on both the samples are as follows:

PRODUCTS	ARSODIA MINES				MAMUARA MINES			
	Overall Wt%	PSA -24 microns	Brightness ISO		Overall Wt%	PSA -24 microns	Brightness ISO	
			B.B	A.B			B.B	A.B
CL. O/F	49.7	45.1	74.42	79.51	53.0	68.6	68.88	71.53
Non-Mag of CL OF	45.1	47.1	76.58	81.00	49.9	70.6	70.19	75.61
Cy O/F of CL OF	11.7	62.8	76.81	80.82	12.8	72.7	70.22	72.87
Cy O/F of Non-mag	10.3	63.4	78.60	81.46	12.2	74.2	71.89	74.66
Decant of CL O/F	21.7	77.4	76.92	81.06	19.9	82.5	70.71	72.89
Decant of non-mag	21.9	78.9	78.77	82.11	20.9	84.1	71.07	76.11

Note:

O/F	:	Over Flow	CL	:	Classifier
Cy	:	Cyclone	PSA	:	Particle Size Analysis
BB	:	Before bleaching	AB	:	After bleaching

It can be assessed from the above table that there is no significant improvement in brightness either before bleaching or after bleaching, by adopting Wet High Intensity Magnetic Separation (WHIMS). Hence while preparing the techno-economical feasibility report WHIMS is not considered. Moreover, since the process flow sheet is common, the feasibility report is prepared on one of the samples

01. The process flow sheet, process line diagram. Showing material balance and material balance calculation sheet are given as ANNEXURES.

02. Plant Design Criteria:

(a) Plant Capacity	: 100 Tonnes per day (TPD)	
(b) Working Shift	: 2	
(c) Working hours in each shift	: 8	
(d) Plant Availability	: 75%	
(e) The Actual No. of working hours	: 2 x 8 x 0.75 = 12	
(f) Design –TPH	: 100/12	= 8.33 say 9.0

Process: No combination is involved.

UNIT OPERATION AND CALCULATIONS:

1. Fine Ore Bin : For storing 2 days stock

   Bulk density : $2T/M^3$

   Volume required = $\frac{100}{2}$ TPD

   $\pi r^2 h$ = $50\ M^3$

   Size = 2.8 Dia x 4.2 ht.

2. **Scrubber** : Locally made, fitted with trommel 1550 ϕ x 3000 Length mm for retention time of 5'.

   Trommel : 900 ϕ x 1200 mm circular punched holes.

3. **Weigh Feeder** With conveyor belt for feeding the Scrubber suitable flow raters for water addition.

4. **Spiral Classifier**

   PD - 20% solids

   Mesh of separation - 325 mesh

Slope	-	3"		
Feed TPD	-	100		
Total area required	-	100/1.57	=	64 sq.ft.

Size selected: 60" Simplex Classifier with 3" slope sand racking capacity 140 tonnes

= 140 tonnes

Hydro cyclone – KREB

Feed	-	4.77 (dry wt)
Water	-	27.1 M^3/hr
Pulp	-	31.87 MT pH
% Solids	-	15.0

Pulp volume to be handled	=	27.1 +4.77/2.67 = 28.8 M^3/hr
Sp. Gr. Of pulp	=	**Wt/V = 31.87/28.8 = 1.1**
% Solids by Wt.	=	$\frac{\%\text{ Solids x Sp. Gr. Of pulp}}{\text{Sr. Gr. Of Solids}}$
	=	$\frac{15 \times 1.1}{2.67}$
	=	6.18
Cyclone overflow required	=	80% minus 2 microns
Cyclone selection	=	4 Nos. of U4B Kreb make or 60 Nos. of 10 mm Mozley

BLEACHING

Dry wt = 1.15 TPrl (cyclone overflow)

Pulp Vol = 1.15/2.67 + 19.17

= 19.6 M2/hr or 19600 litres

= 19600/60

= 330 litres/mt

Lab Bleaching Time:

1st Conditioner	2nd Conditioner
20 minutes	20 minutes

Therefore, Volume required = 25 x 330

= 8,250

or = 8.5 M^3

$\pi r^2 h$ = 8.5

πr^2 x 1.5 r = 8.5

8.5

= 3.14 x 1.4

r^3 = 1.8

r = 1.2

h = 1.88

Bleaching Conditioner(s): 2ϕ x 3 ht = 2 Nos.

Thickner

Unit area = 0.188 m2/T/24 hrs (Lab data)

Dry solids/24hrs to be handled = 12.8 say 13.1

Therefore, area required = 13 x 0,188 = 2.44, M2

Thickner area = πr^2

3.14 x r^2 = 2.44M^2

Therefore, r = 0.9 M

D = 1.8M

Height = 2.7 M

Therefore, Thickner suggested : 1.8 Mϕ x 2.7 M

Thickner underflow : 40% solids.

LIST OF EQUIPMENT

Sr.No.	Equipment	Qty	Make	Size	HP	Approx. Price (Rs. In lakhs)
I.	Ore Bin	I	Local	50 M^3	--	2.0
2.	Conveyor Belt	I	Local	--	5	6.0
3.	Weigh Feeder	1	Local	--	2	1.0
4.	Scrubber	1	Local	1500x3000 mm	5	12.0
5.	Classifier	1	Local	60" Simplex	5	10.0
6.	Hydrocyclone	3	Mozley C1030C/Kreb	10 mm dia	15	15.0
7.	Slurry pumps	5	Local	50,40&25 mm	25	5.0
8.	Bleaching conditioners	2	Local	2øx 2.4 M ht	10	4.0
9.	Thicker	1	Local	1.8ø x 2.4 M	15	4.0
10.	Filters	-	Local	-	15	15.0
11.	Dryer	-	Local	-	5	20.0
12.	Misc.	-	Local	-	-	10.0
					-----	--------
			TOTAl.		102	104.00

ESTIMATION OF CAPITAL GOODS

			Rs. In Lakhs.
1.	Plant building cost (0.2 x 100)	..	20.0
2.	Total cost of major equipment	..	100.0
3.	Installation cost including electrical piping, engg. Etc. (0.5 x 100)	..	50.0
4.	Tailing Ponds (0.1 x 100)	..	10.0
5.	Other contingencies (0.1 x 100)	..	10.0
	TOTAL	..	**190.00**

CAPITAL INVESTMENTS:

I. Capital Cost		..	190.0
2. Working capital:			
a)	Stores and Spares (3 months stock)	..	5.0
b)	Cash in hand	.	5.0
	Total capital investment	..	**200.0**

MANPOWER REQUIREMENT

Sr. No.	Designation	No. of Posts	Salary per Month	Annual Salary
1.	Plant Manager	I	12.000	1,44,000
2.	Shift Incharge	3	24,000	2,88,000
3.	Mechanics	3	15,000.	1,80,000
4.	Electricians	3	15,000	1,80,000
5.	PA to Manager	1	7,000	84,000
6.	Helpers, peons etc.	8	32,000	3,84,000
7.	Clerks	2	10,000	1,20,000
	TOTAL	**21**		**13,80,000**

Labour Cost per tonne of ROM = 13,80,000

---

100 x 300

= Rs. 46/-

Criteria for Calculation of Operating Cost:

I. Direct Operating Cost : Water and electric power cost have been assumed to be Rs. 5.0 and Rs. 3.0 respectively.

8. Electric Power requirement (Clay circuit):

= 29.0 x 0.746

0.85 x 9

= 21.63

7.65

= 2.82 kwh/t ROM

Where 0.85 is efficiency factor

9 is tph capacity.

b) Water requirements : 4.0 M3/tonne of ore

OPERATING COST ESTIMATION:

(A) Direct Operating cost:

Sl. No	Head	Unit	Rate (Rs/unit)	Qty.	Rs/Metric tonne of RCM
1.	Water	LM3	5.00	4.00	20.00
2.	Power	Kwh	3.00	2.82	8.46
3.	Concentrate handling charges		5.00	1.00	5.00
4.	Royalty				1.00
5.	Reagent	Kg.	60	1.3	78.00
			TOTAL		**112.46**

(B) Fixed Operating Cost:

			Rs.per tonne of ROM
I.	Total labour cost	..	46.00
2.	Maintenance and spares (5% of equipment cost)	..	16.66
3.	Depreciation (5% of tolal investment	..	33.33
4.	Insurance (1 % of total investment)	..	6.66
	TOTAL	...	102.65

Processing Cost (per tonne of ROM = (A) ÷ (B)

= 112.46 + 102.65

= Rs. 215.11

Cost per tonne of finished product = $\frac{\text{Rs. 215.11 or say Rs. 215/-}}{0.5}$

= Rs. 430/-

(0.13 tonnes 80% -2 microns + 0.37 tonnes –325 mesh)

MATERIAL BALANCE .

Sl. No.	Products	Dry Wt. TPH	Water M3/hr	Pulp	P.D.	Wt %
I.	Feed to scrubber	9.0	-	-	-	100.0
2.	Water to scrubber + trommel	9.0	16.5	25.5	35.3	100.0
3.	Trammel over size	0.29	0.19	0.48	60.4	3.2
4.	Trammel under size	8.71	16.31	25.02	34.8	96.8
5.	Feed to classifier	8.71	16.31	25.02	34.8	96.8
6.	Water to classifier	8.71	18.53	43.55	20.0	96.8
7.	Classifier underflow	3.94	7.74	11.68	33.7	43.8I
8.	Classifier overflow	4.77	27.1	31.87	15.0	53.0

HYDROCYCLONING

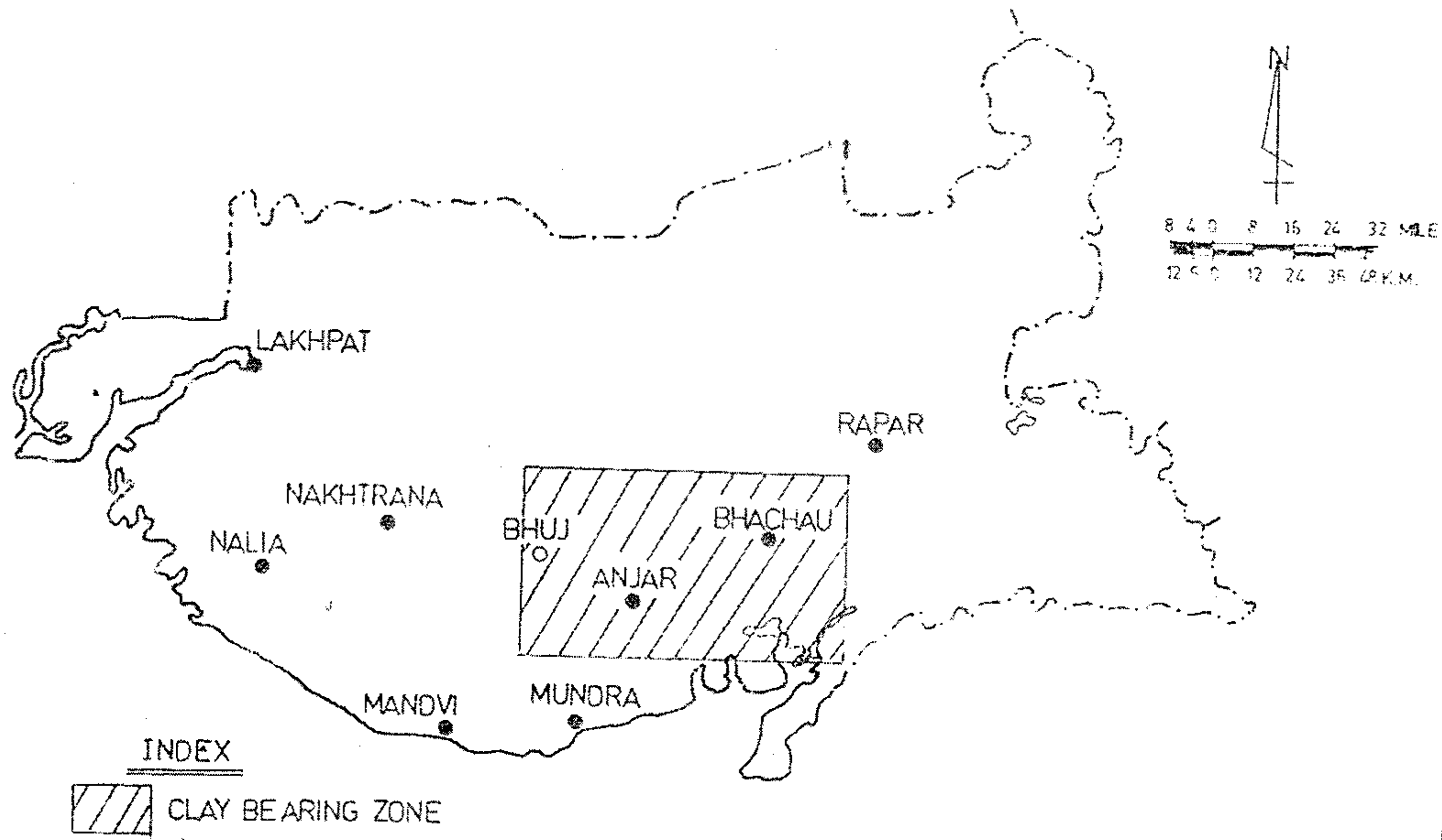
Feed to Cyclone	4.77	27.1	31.87	15.0	53.0
Cyclone overflow	1.15	19.17	20.32	6.0	12.8
Cyclone underflow	3.62	7.93	11.55	31.3	40.2
Magnetic Separation					
Feed to WHIMS	4.77	27.1	31.87	15.0	53.0
Mag	0.28	0.84	1.12	25.0	3.1
Non-mag	4.49	26.26	30.75	14.6	49.9
Hydro Cycloning					
Feed to cyclone (Non-mag)	4.49	26.26	30.75	14.6	49.9
Cyclone underflow	3.39	9.03	12.42	27.3	37.7
Cyclone overflow	1.10	17.23	18.33	6.0	12.2

AVAILABILITY OF CHINA CLAY IN GUJARAT

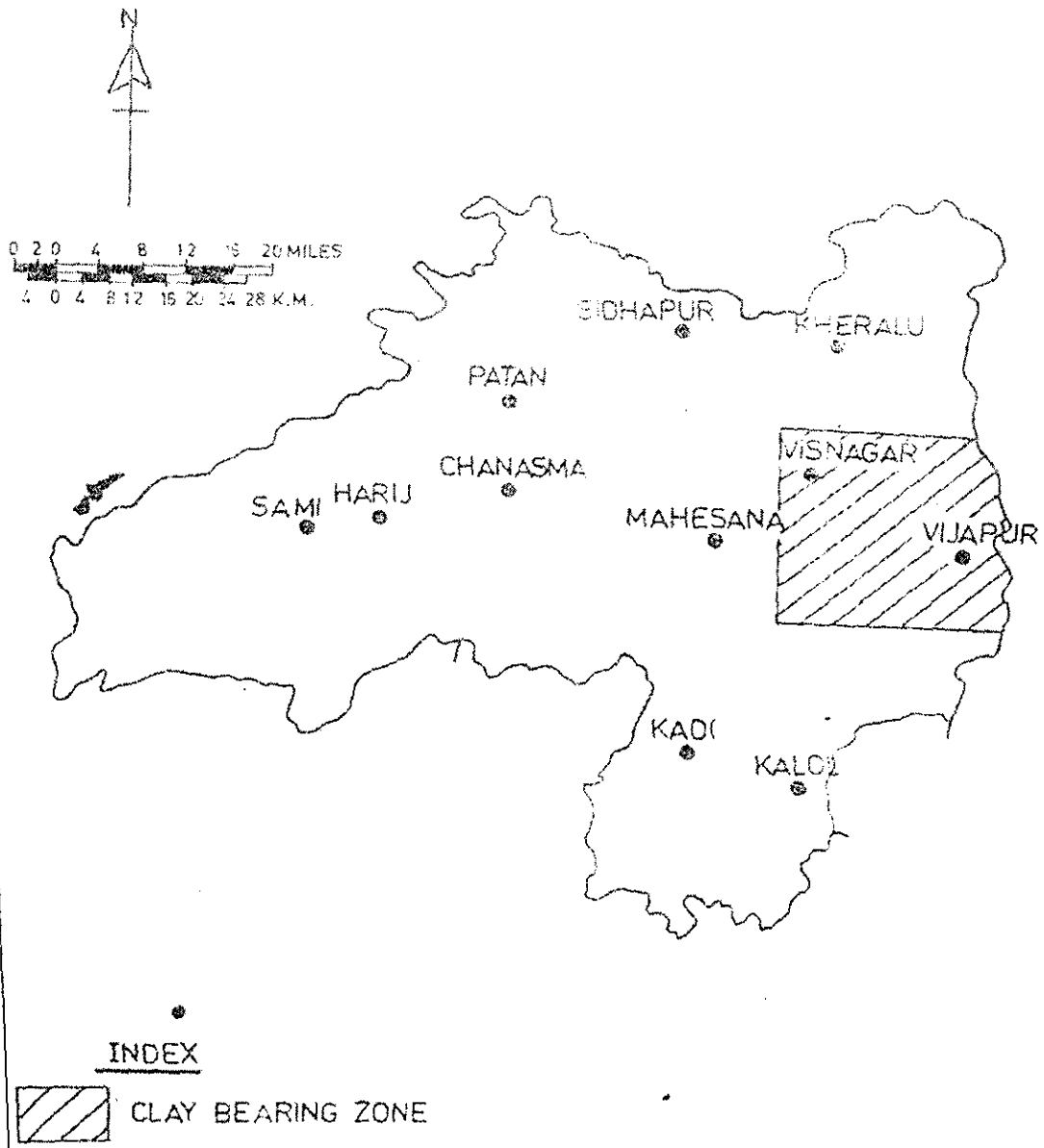
The sedimentary kaolin deposits are encountered in the following regions of Gujarat:

1. Wankaner and Morvi in Rajkot and Surendranagar Districts
2. Wandh in Kachchh Districts
3. Rajpardi in Narmada District
4. Jhagadia, Valia in Bharuch District
5. Bardoli in Surat District
6. Aluvas and Dhokawada in Banaskantha District
7. Visnagar and Vijapur in Mehsana District and
8. Himatnagar and Idar in Sabarkantha District

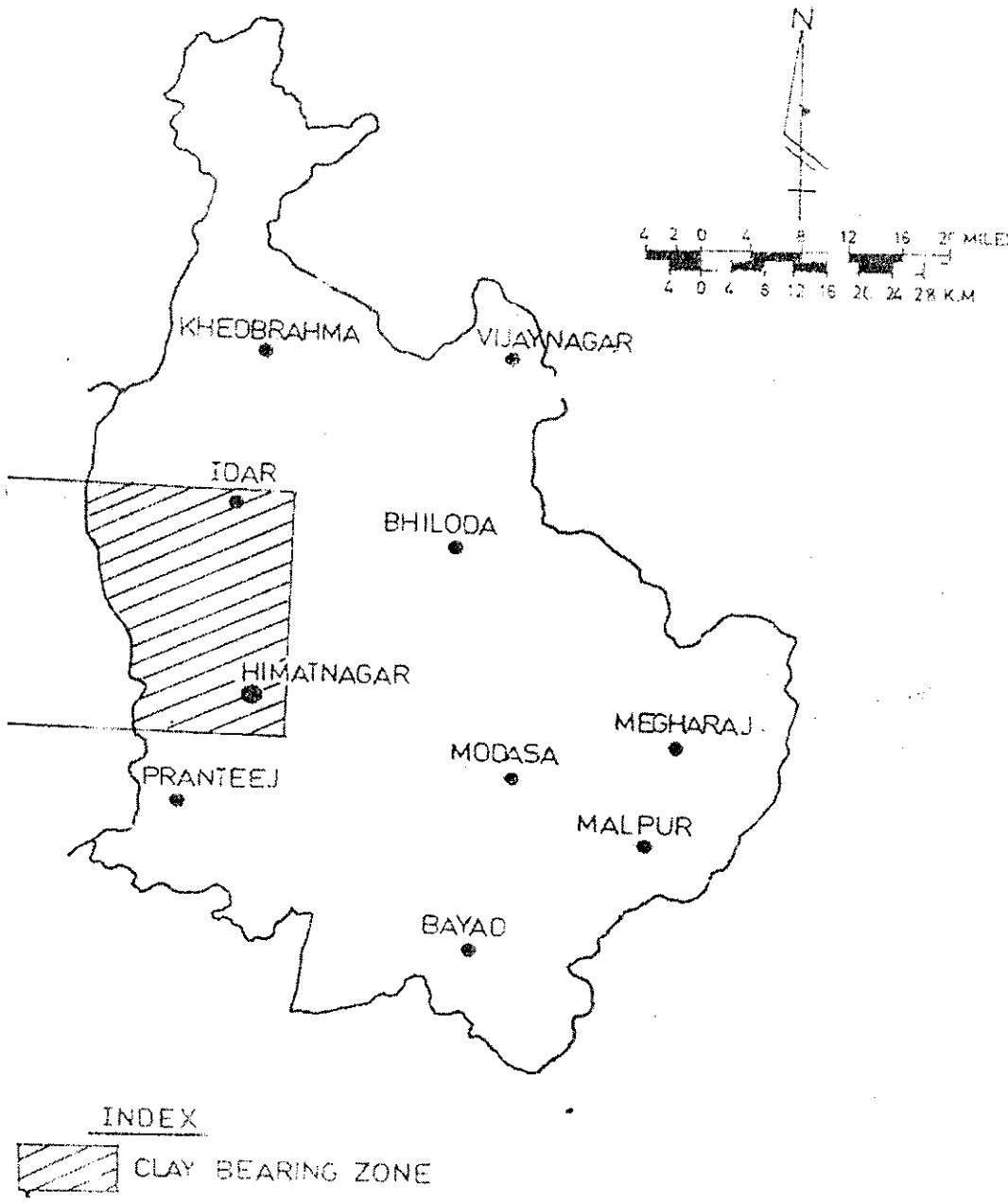
CHINA CLAY OCCURRENCES IN KACHCHH DISTRICT.



CHINA CLAY OCCURRENCES IN MAHESANA DISTRICT.



CHINA CLAY OCCURRENCES IN SABARKANTHA DISTRICT



China Clay and other Mineral Reserves

Sr. No	Name of the Mineral	Reserves in M.Tonnes	Important Mining Centers
1.	Basemetal	7.00	Ambaji (Banaskantha Dist.)
2.	Bauxite	105.00	Bhatia Mewasa Bhopalka Ran,(Jamnagar Dist.), Naredi, Wandh, Nagrecha (Kutch)
3.	Bentonite	105.00	Hamla, Ratadia, (Kachchh Dist.) Padva, Morchand (Bhavnagar Dist.)
4.	Chalk	57.90	Aditayana, Kajavadan (Junagadh Dist.)
5.	**China Clay**	**163.00**	**Arasodia, Eklara (Sabarkantha)**
6.	Coal bed methane	316 billion Cu. Mt.	Kheda, Ahmedabad, Mehsana, Patan, Banaskantha Dist.
7.	Dolomite	720.00	Chhotaudepur (Baroda Dist.)
8.	Flourspar	11.60	Kadipani (Baroda Dist.)
9.	Fire Clay	155.23	Muli, Makansar(Surendarnagar Dist.)
10.	Granite	2005	Banaskantha,Sabarkantha,Vadodara,Panchmahals Dists.
11.	Gypsum	23.57	Kutchh & Jamnagar Dist.
12.	Lignite	1687	Panandhro, (Kutchh Dist) Bhuri (Bharuch Dist), Vastan (Surat dist.)
13.	Limestone	11860.00	Amreli,Kutchh,Jamnagar,Junagadh,Panchmahals, Banaskantha,Bhavnagar,Sabarkantha Dists.
14.	Manganese	2.50	Shivrajpur, Pani, Bapotia, (PMS Dist.)
15.	Marble	259	Ambaji, Zanivav,(Banaskantha Dist.).
16.	Oil	418.00	Kalol, Mehsana Oilfields. (Mehsana Dist.)
17.	Quartz	4.00	Natapur, Ratanpur,(Panchmahals Dist.)
18.	Wollastonite	3.00	Banaskantha Dist

Source: Commissioner of Geology & Mining, Gandhinagar

LEASE HOLDERS OF CHINA CLAY IN GUJARAT

Sr No	Name of Lease Holders	Address	Location of Mines
1	Shri Vasantrai Manilal Doshi	Vavera, Via Rajula, Amreli	Devaka
2	Shri Pradeep Rasiklal Shukla	Ahmedabad, Ahmedabad	Rajula
3	Shri Khodiyar Pottery Works	Sihor, Bhavnagar	Rajula
4	Shri Vinod Purushottamdas Solanki	Madhapar, Kutch	Nadapa
5	M/s Ghanshyam Minerals	Makehl, Kutch	Ratnal
6	Shri Rasik Bhimjibhai Doshi	Mandvi, Kutch	Bela
7	Shri Bharatkumar Manilal Patel	Bhuj, Kutch	Manafara
8	Shri Vasantkumar Rambhai Patel	Ladol, Mehsana	Mamuara
9	M/s Ashish Mines & Minerals	Mandvi, Kutch	Lodai
10	Shri Raichand Korshi Nishar	Mumbai,	Kakrava
11	Shri Ramesh N Shukla	Hadvad, Surendranagar	Mauara
12	Shri Valji Jivandas Suraiya	Mandvi, Kutch	Kakrava
13	Shri Gangaram Valjibhai Thakkar	Santalpur, Banaskantha	Aluvas
14	M/s Ambey India Pvt Ltd	Ahmedabad, Ahmedabad	Ransipur, Rampur
15	M/s Eklara Chinaclay Works	Ahmedabad, Ahmedabad	Eklera
16	Eklera trading Co.	Ahmedabad, Ahmedabad	Eklera
17	Shri Amidhar Chunilal Joshi	Himatnagar	Darad
18	Shri Mahendrakumar Shantilal Kadiya	Ahmedaba	Eklera
19	Amrapali & Co.	Ahmedabad	Eklera
20	Ishwarlal Ambalal aptel	Idar	Eklera
21	Westcoast Minerals & Chemicals	Ahmedabad	Dolathar, Bhammson, Kammat
22	Shri Harji Ramji Pandharia	Mirsapm, Kutch	Mamuara
23	Shri Gopal Rupa gangal	Jowaharnagar, Kutch	Modsar
24	Smt. Kamshriban Shivraj Madhuda	Bhuj, Kutch	Padthar

Leading Exporters/Manufacturers of China Clay in Gujarat

MANEK GROUP, Estd. 1980, (Girish Bhemat)
2/1, Near Bhujodi Village, Gujarat
+91-2832-240699 Fax : +91-2832-241944
Exporter of Bentonite , Bauxite, China clay, Attapulgite, Lignite, Mica, Talc

20 MICRONS LTD, Estd. 1988, (DIPESHGOYAL)
307/308 Arundeep Complex,Race Courcr(South),, vadodara, Gujurat
+91-265-351540 Fax : +91-265-333755
Micronised minerals such chinaclay,calcium carbonate,talc,dolomite,silica etc.

SHREE PRAJAPATI ROOFING TILES CO, Estd. 1989, (Umesh Prajapati)
national highway 8-a, so-ordi, Morbi, Gujurat
+91-2822-40633/40256 Fax : +91-2822-41269
MANUFACTURER OF CLAY ROOFING TILES & DECORATIVE TILES. SINCE 1950. STRICT QUALITY CONTROL

MANEK MINERALS, Estd. 1980, (Girish Bhemat)
2/1, Near Bhujodi Village, Gujarat
+91-2832-240699 Fax : +91-2832-241944
Bentonite, Bauxite, Attapulgite, China Clay

20 MICRONS LIMITED, (Rajesh Parikh)
307/308,Arundeep Complex, Race course,, Baroda, Gujurat
Phone +91-265-322956 Fax : +91-265-333755
Description: Calcined Clay, Pigments,Calcium carbonate,China clay,Talc,Barytes

HD ENTERPRISES PVT. LTD., Estd. 1994, (Mr. Hansraj Patel)
107, Silver Point , New Station Road,, Bhuj-Kutch, Gujarat
Phone+91-02832-251135 Fax : +91-02832-250937
Description Mines Owner & Mineral Processer China Clay

MICROFINE INDUSTRIES, Estd. 1990, (Ashit Shah)
Plot No.316/1, G.ID.C. Ranoli, Road No.4, Baroda 391 350, India, Gujurat
Phone +91-265-2323182 Fax : +91-265-2300530
Description: Manufacturers & Exporters of Industrial Minerals like talc(soap-stone), calcite, □arites, dolomite, mica powder for the use as filler in plastic(compounding), paints, pvc, paper, ceramic, cosmetic in

MANAN MICRON(Mr. Mukesh M. Patel)
367 GIDC – Phase II
Mehsana
Tel : 02762 – 43522,59021
Tel : 02767 – 82242
Description: Mines owners & Suppliers of China Clay, Bauxite and Minerals

MICRON MINERAL INDUSTRIES(Mr. Mahesh Patel)
603 to 605 G.I.D.C
Deham – 382305
Dist : Gandhi Nagar
Gujarat
Tel 079-3632084,3633255,3633256(F)
Tel : 079-5633216 I
Mob: 98250-74260
Description: Rubber, Ceramic, Paint detergents , Refractory and paper mill Industries, We also Manf,. And suppliers of Plaster of Paris and Pyropholite powder 200 to 500.

SHREEJI MINERALS
Mr. Mahendra bhai Patel
(Mobile – 98253 –29222)
Plot No. 83 to 86, G.I.D.C Estate
P.Box No. 29
Anjar – 370 110
Kutch, Gujarat
India
Web address : shreejimine
Tel : 91-2836-242910 (O/F)
Tel : 91-2836-242310 I
Description: Mines Owner, Manufacturer & Suppliers Best Quality of Lavigated China Clay Lumps, Powder For Rubber ,Paint, Ceramic, Soap, Detergent, Plastic and Paper Mills.

SUMUSU Geopro Services(Minerals & Chemicals)
Mr. M.U.Savla
(Minerals Consultant)
2nd Floor, Plot No. 236
Sector – I-A,
Gandhinagar – 370 201
Kuchchh, Gujarat,
India
Tel : 91-2836- 225581,225424,261293
Description: Mines Owner, Manufacturer & Suppliers of Lavigated China Clay Lumps, Powder For Rubber,Paint, Ceramic, Plastic, Soap, Detergent and Paper Mills.

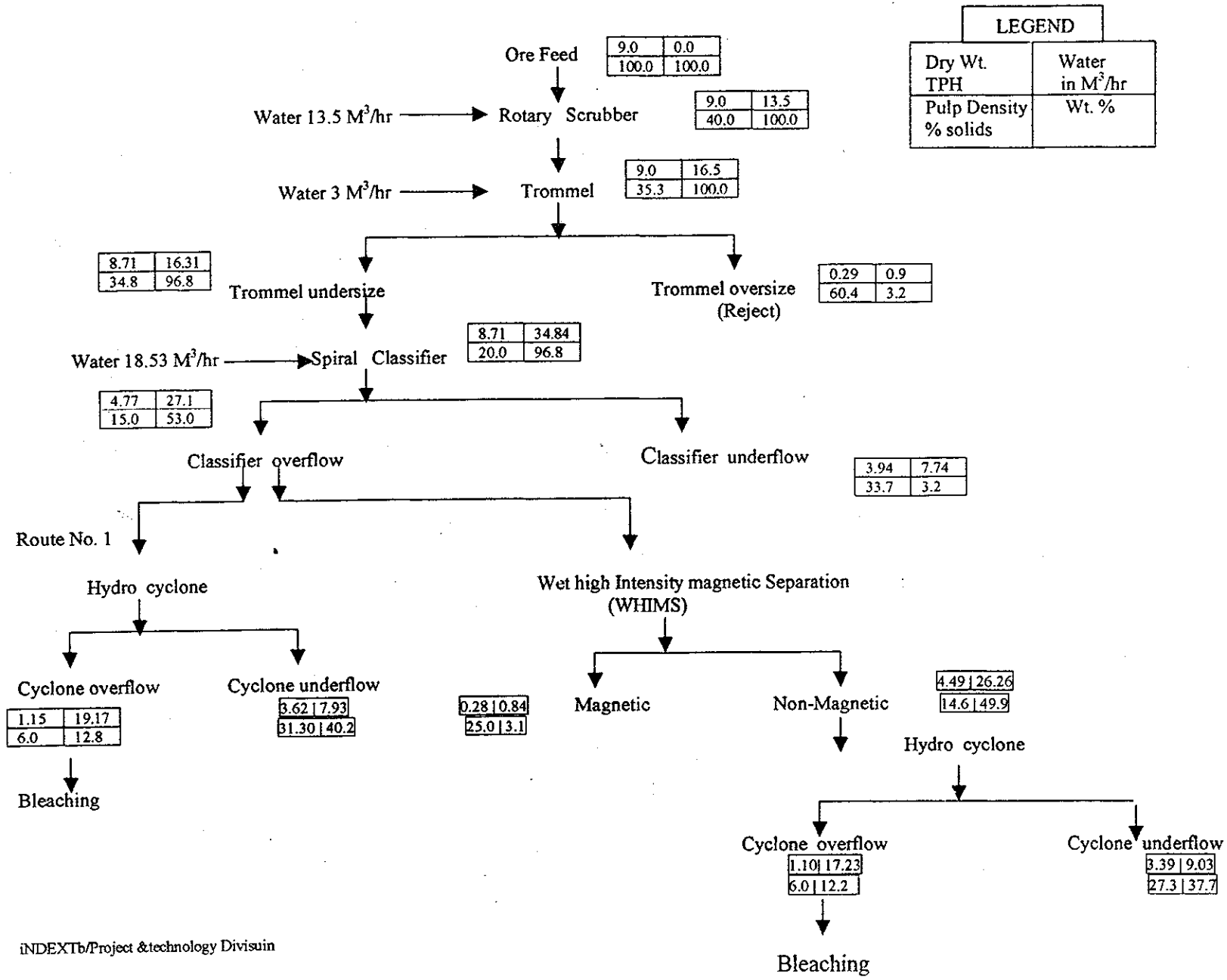
AHIR MINERALS
Mr. Narayan R. Ahir
Opp. Ratnal Railway Station
Ratnal (P.O)
Anjar,
Bhuch, Kutch – 370 110
India17
Tel : 91-2836-276365,276312 (O/F)
Tel : 91-2832-273314
(Mobile : 98252-97416)
Description: Mines Owner, Manufacturer & Suppliers Levigated Snow White China Clay Lumps, Powder (250 –500 Mesh) For
Rubber ,Paint, Ceramic, Soap,Detergent, Paper Mills and other Industries

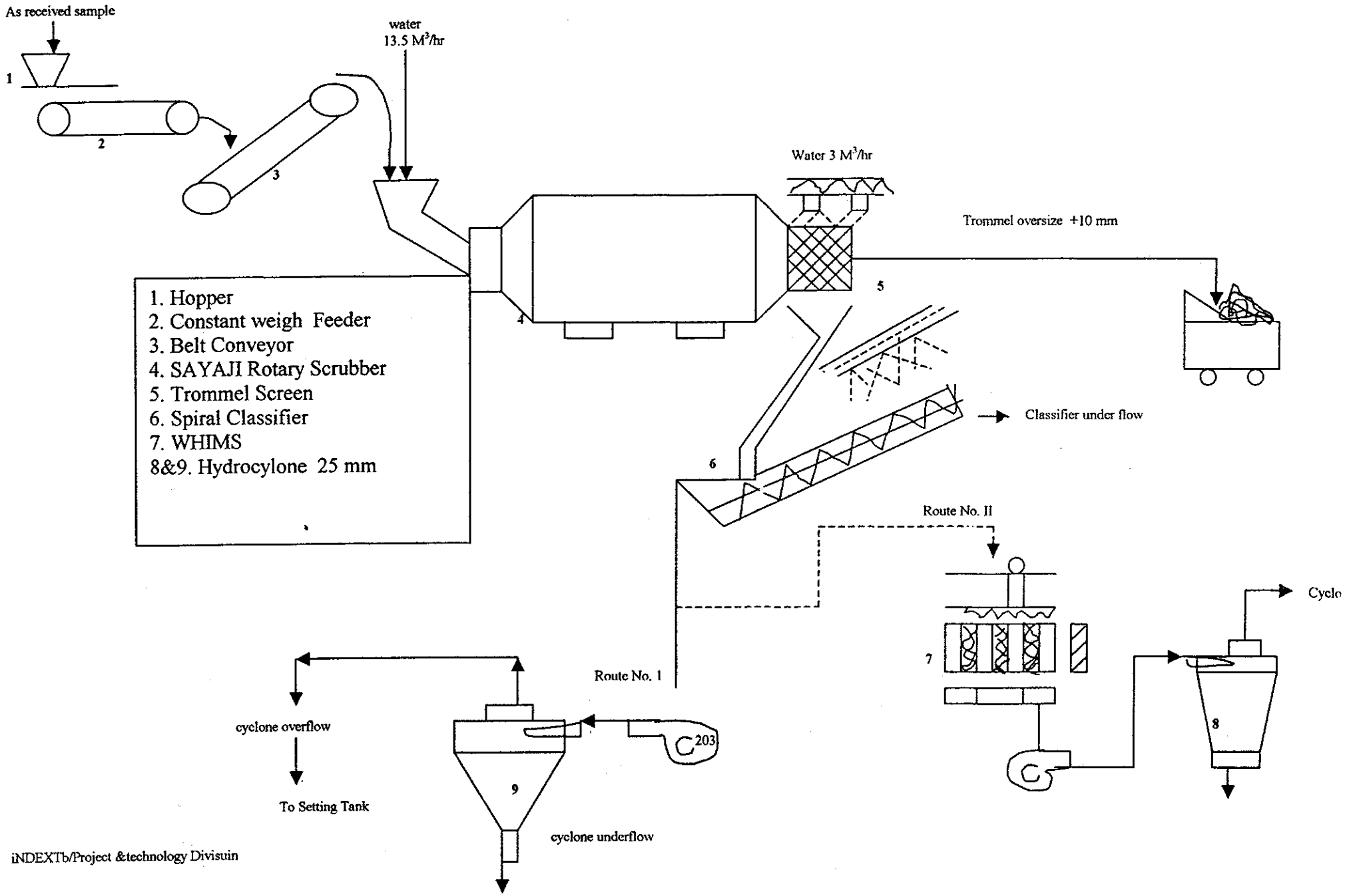
Suggested Location for Benefication Plant:

In the process of beneficiation many units in the State carry out conventional levigation by sedimentation. In Gujarat, plant operators in Kutch, Mehsana & Sabarkantha districts have capacity to process 1000 tonnes refined clay for ceramic applications, fillers and manufacturing rubber. Further potential area for development of this kind of Project are as below :

- Himatnagar,
- Mehsana,
- Bhuj,
- Bhachau

PROPOSED FLOWSHEET & MATERIAL BALANCE FOR PREPARATION OF FEASIBILITY REPORT OF 100 TPD CLAY PROCESSING PLANT IN GUJARAT (FOR iNDEXTb)





iNDEXTb/Project &technology Divisuin