Market Survey cum Detailed Techno Economic Feasibility Report

On

Penicillin G

Prepared By

R. Senthil Kumar
Director GxP Operations
Isha's GMP Consultancy
New No.11/3 Old No.6/3, IInd Floor(Mezzanie)
4th Street,Bharathi Nagar, T.Nagar, Chennai,
Land Mark : Opposite to CROMA Show room,
India, Mobile :+91 8667589984,+91 8939666562
e-mail: info@ishasgmp.com, qaqcra@gmail.com
Website:www.ishasgmp.com

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1. EXECUTIVE SUMMARY....5

2. PENICILLIN G....10

2.1 INTRODUCTION....10
2.2 MARKET SURVEY....12
2.3 COMPETITIVE LANDSCAPE....14
2.4 PROCESS FLOW CHART....15
2.4.1 FERMENTATION PENICILLIN G....16
2.4.2 6 APA....17
2.4.3 MICROFILTRATION SYSTEM SECTION:....18
2.4.4 EXTRACTION....19
2.4.5 DEWATERERS....20
2.4.6 BACK EXTRACTION:....21
2.4.7 VACUUM STRIPPING....22
2.4.8 ENZYMATION:....23
2.4.9 PA REMOVAL....24
2.4.10 CRYSTALLIZATION:....25
2.4.11 ISOLATION:....26
2.4.12 DRYING:....27
2.4.13 MILLING & KEGGING:....28
2.5 ALTERNATIVE TECHNOLOGIES AND COMPARATIVE ANALYSIS....30
2.6 PROCESS YIELDS AND KEY CHALLENGES....31
2.7 MAJOR PROCESS EQUIPMENT LIST....35
2.8 LIST OF MAJOR RAW MATERIALS....38
2.9 BASIS OF FACILITY DESIGN....39
2.10 PLANT ECONOMICS....44
2.10.1 Total Project Cost....44
2.10.2 Civil Cost....45
2.10.3 Utility Equipment Cost....45
2.10.4 Effluent Treatment Equipment Cost....46
2.10.5 Land Cost....46
2.10.6 Assumption made for establishing the projected Balance Sheet....46
2.10.7 Land & Building Cost....47
2.10.8 Working Capital required per Month....48
2.10.9 Salary & Wages....49
2.10.10 Means of Finance....50
2.10.11 Projected Cash Flow....51
2.10.12 Project Balance Sheet....52
2.10.13 Projects Pay-back period....53
2.10.14 Project At a glance....54

4. SUPPLIERS OF PLANT & MACHINERY....91

5. SUPPLIERS OF RAW MATERIAL....115

1. EXECUTIVE SUMMARY

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To overcome this scenario, has taken an immediate initiative to analyses the market study

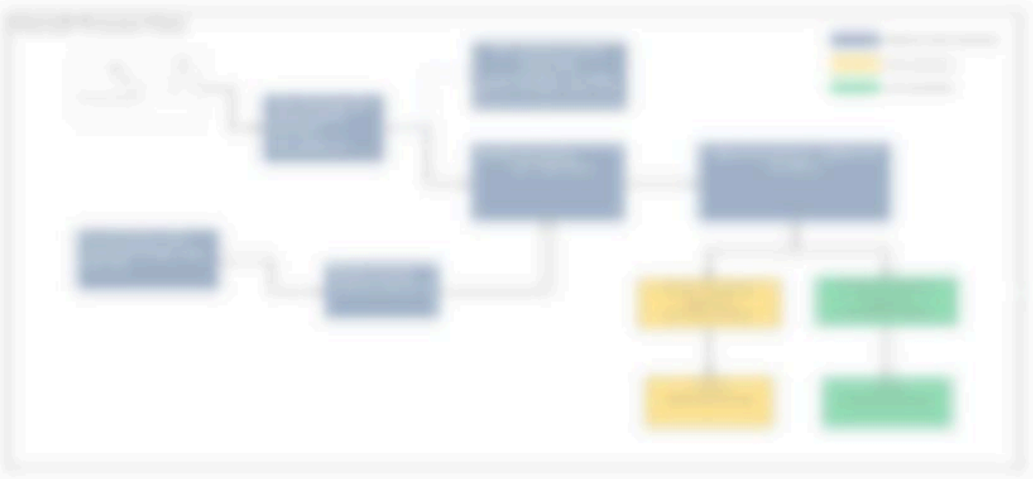


Table 1 : Building wise Area

S.No.	Building	Area (SqM)
1	A-WHS Manufacturing Building	7,108
2	T-WHS Manufacturing Building	4,120
3	Utility Building	1,620
4	Solvent Recovery plant	1,620
5	Workshop	1,300
6	Effluent Treatment plant	11,100
7	Fuel Oil storage tank	600
8	Electrical sub station	60
9	Sprinkler pump house	200
10	Water Storage tank	600
11	Final and emergency Treatment tank	900
12	Admin	700
13	Car Park	5600
14	Stores and Lab	2500
15	Future Expansion	10,300
16	Gate House - 1	60
17	Gate House 2	60
	Total Build up Area	49,188



Table 2 : *Total Project cost for various option*

S.No.	Product	Area (SQM)	Total Cost (INR Cr.)	Return on Investment (ROI)
1.	[illegible]	[illegible]	[illegible]	[illegible]
2.	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]

[illegible]

PwC report on Indian API Industry

Our analysis based on critical APIs shows that: - 50% of the critical APIs are being imported and almost all the imports are from China. - Domestically produced APIs cover approximately 50% of the total quantity. However, key starting materials (KSMs) for most APIs are still sourced from China.

The Chinese API industry has an inherent advantage because of economies of scale and support from the Chinese government in the form of financial incentives, infrastructure and regulatory policies: - lower capex requirements due to large Special Economic Zones (10–15 times the size of Indian SEZs)

- *lower borrowing costs: 5–7% vs 11–14% in India*
- *lower logistics costs: 1% of total costs in China vs 3% for India*
- *Lower conversion costs as labor and electricity costs in China are relatively cheaper (an average of 11 US cents/kwh vs 19 US cents/kWh in India)*

Indian API manufacturers lost their competitive edge in the manufacture of APIs at the lower end of the spectrum and ***fermentation technologies*** *to countries like China, largely on account of factors like: - stricter implementation of pollution control norms, leading to higher costs of manufacturing APIs in India*

No financial incentives like lower tax, cheaper utilities and land subsidy to lower capex requirement - lack of large-scale mega parks to manufacture bulk drugs

Immediate Action:

Provide faster environment clearance: The approval process could be bought down to 2 months from the current timeline of 4–6 months. Give total category capacity where additional clearance is not required as long as the pollution load is not exceeded. Deep sea discharge norms to be in line with global best practices.

- *Encourage manufacturing by providing a fiscal stimulus:*

API/intermediates

Provide a 12% subsidy on the overall production value of these APIs/intermediates with the following criteria: minimum threshold on investment value (~INR 100 crore) in any greenfield or brownfield project and a minimum threshold on production value (~INR 250 crore) by the third year of operation.

Fermentation products

Provide a 30% subsidy on overall production value with minimum threshold on both investment and production value. Additional subsidies can also be considered in line with fiscal incentives provided under electronics policy, such as wage reimbursement, capital subsidy and electricity at INR 2/kWh

Financial incentives: Cost of electricity and water to be cut by 50% for 5 years, land to be provided at concessional rate, and infrastructure status to be provided to the industry.

2. PENICILLIN G

2.1 Introduction.

Impact of COVID19

India has now outlined the details of a large-scale incentive scheme for manufacturers of certain critical active pharmaceutical ingredients (APIs) and drug intermediates in the country as it seeks to galvanize the domestic industry and shrink dependence on China.

The ministry of chemicals and fertilizers has provided the specifics of a production-linked incentive scheme to bolster domestic manufacturing of critical APIs, key starting materials (KSMs) and drug intermediates. The scheme, with a total outlay of INR69.40bn ($918m), provides incentives for six years for fermentation-based products and five years for chemically synthesized drugs; it encompasses 41 products and covers the 53 critical APIs which had earlier been identified as crucial to India's national medicines security.

Details of the new program, which is applicable only to greenfield products, stipulate that for certain eligible fermentation-based products, an incentive of 20% on incremental sales of KSMs, drug intermediates and APIs will be provided for the first four years (2022-23 to 2025-26), reducing to 15% in 2026-27 and then 5% in 2027-28.

For certain chemically synthesized products, the new scheme sets an incentive of 10% for a five-year period running from 2021-22 to 2025-26.

The plan as a whole comes against the backdrop of massive dependence on China for antibiotic APIs manufactured via the fermentation route such as penicillin, cephalosporins and macrolides, which has come into sharp relief during the coronavirus crisis.

The ministry notification makes no direct reference to imports from China but underscores that continuous supply of medicines is necessary to ensure delivery of affordable healthcare to India's citizens and that any disruption in supplies can have a significant adverse impact on drugs security, which is also "linked to the overall economy of the country." It also specified that India imports APIs largely for "economic considerations."

The new scheme envisages the distribution of approximately INR7.20bn per annum for certain key fermentation products, essentially penicillin G/6APA, 7-ACA, erythromycin thiocynate/TIOC and clavulanic acid; another set of 10 niche fermentation-based products are expected to see disbursements of INR2bn per annum, industry experts indicated to the Pink Sheet, referring to details in certain guidelines on the proposed scheme. Similarly, distribution of INR2.30 bn annually is envisaged for 23 chemical synthesis-based products under the program.

One industry veteran noted that the difference in cost of production in India versus China is about 25% and with the incentives envisaged, the program could make Indian manufacturers competitive. "And then you can become an alternative source of supply over a period of time. The advantage with Indian firms is that we have the technology but lacked the financial advantage," the executive told the Pink Sheet.

The department of pharmaceuticals (DoP) will enter into memoranda of understanding with concerned state governments for the development of parks and 70% of the project cost - or INR10bn, whichever is lower - is expected to be borne by the DoP.

Meanwhile, the Indian government also appears to be putting in a place a tight vetting process for firms to qualify for the incentives under the new production-linked incentive scheme.

The government is also considering clearing of bottlenecks for getting quicker environmental clearances. If the government is able to announce a package quickly for the existing as well as the new API industries, in the form of soft loans, capital subsidy, power subsidy, interest subsidy and other support, besides speedy environmental clearance, we have a chance to improve the Indian API sector in the coming years, although it may not meet the immediate requirement due to paucity of time. To meet the immediate requirements, we need to consider imports of raw materials from non-affected areas of China as well as doing any short term measures to increase the production of APIs in India. A short term measure for API production can be in the form of lifting environmental restrictions and allowing Indian manufacturers to produce any raw material if they are within the approved pollution load.

2.2 Market Survey

Global Amino Acids Industry; Global Amino Acids Market to Reach $27. 5 Billion by 2027. Amid the COVID-19 crisis, the global market for Amino Acids estimated at US$20. 9 Billion in the year 2020, is projected to reach a revised size of US$27.

Billion by 2027, growing at a CAGR of 4% over the analysis period 2020-2027. The Amino Acids market in the U.S. is estimated at US$5.6 Billion in the year

2020. China, the world`s second largest economy, is forecast to reach a projected market size of US$5.8 Billion by the year 2027 trailing a CAGR of 7.1% over the analysis period 2020 to 2027. Among the other noteworthy geographic markets are Japan and Canada, each forecast to grow at 1.2% and 3% respectively over the 2020-2027 period. Within Europe, Germany is forecast to grow at approximately 2.1% CAGR.

Indian pharmaceutical companies supply almost all the country's demand for API and nearly 70 per cent of demand for bulk drugs. The imports of pharmaceuticals are estimated at 10 to 12 percent of the total market. The major suppliers are Switzerland, China, USA, Germany, Italy, Denmark, France, and UK. Imports include raw materials and finished products. Some major pharmaceuticals which are imported include Provitamins and Vitamins, Cortisones, Hydrocortisone, Insulin, Penicillin, Osetrogen, Progesterone and other hormones, Erythromycin and other ANTIBIOTICS, Antisera & other blood fraction, and Glycosides.

The size of the domestic pharmaceutical market is larger than export market. However, owing to the growth of global generics market, stringent price controls in the domestic market, and better margins, the export market is growing much faster than the domestic market.

India exports pharmaceuticals to numerous countries around the world, including to the U.S., Germany, France, Russia and UK. The Indian pharmaceutical industry ranks 17th with respect to exports value of bulk actives and dosage. Exports constitute nearly 40 per cent of the production, with bulk drugs 45 per cent.

According to the Pharmaceutical Export Promotion Council (Pharmexcil), the pharmaceutical exports in 2007-08 stood at US $6.68 billion against US $5.73 billion in 2006-07, recording a growth rate of 16 per cent. The industry has been clocking export growth rate, recording 18 per cent, 23 per cent and 17 per cent

growth rates during 2006-07, 2005-06, and 2004-05, respectively. The overall pharmaceutical exports are estimated to increase at a CAGR of 30-32 percent and reach US $ 18.3 billion in 2010 - 11.

1.1.

2.3 Competitive Landscape

List of top key players In Penicillin Active Pharmaceutical Ingredients Market Report are –

1. Centrient Pharmaceuticals
2. Harbin Pharmaceutical Group
3. Jiangxi Huabang
4. North China Pharmaceutical
5. Novartis (Sandoz Anti-Infectives)
6. CSPC Zhongrun

Penicillin active pharmaceutical ingredients is widely for oral and injection. The proportion of oral in 2019 is about 62.70%.

About Centrient Pharmaceuticals Centrient Pharmaceuticals is the leading manufacturer of beta-lactam antibiotics, and a provider of next generation statins and anti-fungals. As a business-to-business partner produce and sell intermediates, active pharmaceutical ingredients and finished dosage forms. They stand proudly at the centre of modern healthcare, as a maker of essential and life-saving medicines. With their commitment to Quality, Reliability and Sustainability at the heart of everything they do, our 2700 employees work continuously to meet our customers' needs. They work towards a sustainable future by actively participating in the fight against antimicrobial resistance. Founded 150 years ago as the 'Nederlandsche Gist- en Spiritusfabriek', company was known as Gist Brocades and more recently DSM Sinochem Pharmaceuticals. Headquartered in Rotterdam (the Netherlands), we have production facilities and sales offices in China, India, the Netherlands, Spain, Egypt, the United States and Mexico. Centrient Pharmaceuticals is wholly owned by Bain Capital Private Equity, a leading global private investment firm.

One of the first to scale up industrial production of penicillin.

Under the code name "Bacinol", they successfully developed an industrial fermentative process for making penicillin in large quantities. They benefited

from the expertise that had been built up since the company's founding in the nineteenth century, as well as from the data in the Netherlands' extensive national collection of fungi.

Harbin Pharmaceutical Group

Harbin Pharmaceutical is engaged in the research, development, manufacture and sale of pharmaceutical products. The Company primarily offers antibiotics, Chinese patent medicines, over-the-counter (OTC) medicines, healthcare products and synthesized preparations, among others.
During the year ended December 31, 2007, the Company obtained approximately 73% and 14% of its total revenue from the sale of western medicines and traditional Chinese medicines, respectively. As of December 31, 2007, the company had two subsidiaries/associates: one specializes in manufacturing oral solutions, while the other is engaged in the retail and wholesale of pharmaceuticals.

Harbin Pharmaceutical Group Co., Ltd., a State-Controlled Sino-Foreign Equity Joint Venture.

Harbin Pharmaceutical Group Co., Ltd. (HPGC) is a state-controlled Sino-foreign equity joint venture. It is composed of domestically famous pharmaceutical companies like HPGC General Factory, HPGC Sanjing, HPGC Sixth Factory, HPGC Chinese Medicine, HPGC Bioengineering and HPGC Vaccine, and commercial circulation companies like HPGC Medicine, HPGC Sales and HPGC Marketing. HPGC has two listed companies, HPGC Holding and HPGC Sanjing. HPGC owns 45.06% equity stake in HPGC Holding, and HPGC Holding owns 74.82% equity stake in HPGC Sanjing. HPGC has more than 20,000 employees, and total assets of 18.5 billion RMB.

HPGC is integrated with pharmaceutical manufacture, trade and R&D. They have seven main business segments, which are antibiotics, small-molecular drug preparations, OTC and healthcare products, modern Chinese medicines, biopharmaceuticals, animal vaccines and medicine circulations. HPGC produce more than 20 dosage forms and over 1000 drugs. The annual production capacity is 15 thousand tons of API and intermediates, 2 billion vials of small-molecule drug for injection, 100 million vials of Chinese medicine for injection, 180

million vials of solution injections, 11 billion tablets, 14 billion capsules, 2.2 billion vials of oral solutions and 30 billion doses of animal vaccines.

HPGC products are sold throughout China and more than fifty other countries. The market shares of cephalosporin APIs and preparations, healthcare product series of calcium supplements, and Chinese medicines for injection consistently rank first in the country. Part of our products has reached European, Asian, African, and Middle and North American markets. The annual foreign exchange earning is more than 100 million dollars. More than 100 products exceed revenue of 10 million RMB, over 30 of which exceed 100 million RMB.

HPGC has 5 Chinese Famous Trademarks, which are Hayao, Sanjing, Gaizhonggai, Hutong and Shiyitang. Hayao is one of the most valuable pharmaceutical brands in China and its brand value is evaluated to be worth 18.4 billion RMB. The operating profit and the main business revenue of HPGC have been in the front seats among Chinese Top 100 Pharmaceutical Companies for seven consecutive years since 2005.

In addition to establishing the strong brands, HPGC has put the rich resources accumulated by the aid of the famous brands into technology innovation. HPGC has been setting up the new R&D location – HPGC Pharmaceutical Academy since 2011. The R&D institute has full range of collaborations with domestic and international experts from prestigious universities and research institutes. Six research centers are established, which are research centers of small-molecule drugs, bioengineering drugs, drug preparations, modern Chinese medicines, OTC and healthcare products and animal vaccines. We have several innovative R&D platforms in the institute, such as technology platform of extended, controlled and immediate release, technology platform of fat emulsions, liposomes and lipid microspheres, and technology platform of biopharmaceutical PEGylation. With those platforms, we focus to develop our strength core technologies and products. We currently have over 140 new products. The penicillin and cephalosporin C fermentation technologies are in the world-advanced level. The constantly improved independent R&D system and the growing research team, along with the strong brands constitute the company’s pair of wings.HPGC has received honors and awards including “Winner of Chinese Top 100 Pharmaceutical Companies”,“China’s Most Respected Enterprise”, “Champion of the Global Top 100 Chinese Companies”, “China’s Innovative Company with the Most Growth

Potential", "Harbin Top 50 Taxpayers of Industry Companies", "the Top 10 Most Influential Pharmaceutical Enterprise Award", and "Key High-Tech Enterprise of National Torch Plan". They have brought wide attention and praise of the society to HPGC.

For year 2012, the gross industrial output of HPGC is 10.2 billion RMB, with revenue of 18 .0 billion RMB and profit of 885 million RMB.

Standing on the new start point that bears hope and vitality, HPGC will take practical actions to achieve leapfrog development under the new strategy of "Take a second pioneering journey through transformation and upgrade". HPGC endeavor to join the Global 500 and become a world-class company with international competitiveness.

Jiangxi Huabang Pharmaceuticals Co., Ltd. is located in Zibu Fine Chemical Industrial Park of Wannian County in Jiangxi Province with the register capital of RMB 30.70 million Yuan and the total asset of RMB 100 million Yuan. The designed plant area is 300 mu. The first stage construction will cover an area of 120 mu and 20,000 square meters have been completed. The total fixed asset investment is about RMB 100 million Yuan

Jiangxi Huabang is professional in the scientific research, production and sale of antibiotic materials and pharmaceutical intermediates. Currently, our main products are MAP, DMP, meropenem raw material, SALBACTAM ACID, Tazobactam acid and etc. And most of them have been exported to Europe, America, Southeast Asia regions and countires.

Jiangxi Huabang is founded based on high starting point, high investment and high requirements. And our management system and enterprise culture are established according to modern enterprise management standard. WJiangxi Huabang company pays high attention on technology innovation and new products development. We make effort to develop our company be constant development, environmental friendly and progressive top grade pharmaceutical chemical enterprise.

North China Pharmaceutical Group Co., Ltd. (abbreviated as: Huayao Group) is located in Shijiazhuang, the capital of Hebei Province. The predecessor, North China Pharmaceutical Factory, was a key construction project during China's "First Five-Year Plan" period. It began preparations in June 1953 and was completed and put into operation in June 1958. It opened the history of large-scale production of antibiotics in my country, and developed for human health and the national pharmaceutical industry. It has made an important contribution to changing the shortage of doctors and drugs in my country. In 1992, it was reorganized to establish North China Pharmaceutical Co., Ltd., and was listed on the Shanghai Stock Exchange in 1994 (stock name: North China Pharmaceutical 600812). In January 1996, North China Pharmaceutical Factory was officially restructured into a wholly state-owned company-North China Pharmaceutical Group Co., Ltd. In June 2009, with the approval of the Hebei Provincial Government, Jizhong Energy Group reorganized China Pharmaceutical Group.

Over the years, Huayao Group has been adhering to the corporate tenet of "Human health first, quality always first", continuous innovation, stable operation, gradual growth, continuous expansion of business scope, excellent development performance, and main economic and technical indicators have always been in the forefront of the domestic industry . As of the end of 2018, Huayao Group had total assets of 20.6 billion yuan, nearly 15,000 employees, more than 40 subsidiaries (branch), and owned the National Engineering Research Center for Microbial Drugs, the State Key Laboratory of Antibody Drug Development, Antibiotic Enzyme Catalysis and The three national-level innovation platforms of the National and Local Joint Engineering Laboratory of Crystallization Technology. The main products involve nearly a thousand product regulations in the fields of chemical pharmaceuticals, modern biotechnology

drugs, vitamins and nutraceuticals, modern Chinese medicines, and bio-agricultural and veterinary drugs. Infectious products, cardiovascular and cerebrovascular products, nephropathy, anti-tumor and immunomodulatory products, the process routes and production layout of the main production units are all designed and implemented in accordance with the current European and American GMP standards and the new Chinese GMP standards. It has a modern pharmaceutical production platform with international leading standards. .

In 2018, Huayao Group achieved operating income of 13.2 billion yuan and profits and taxes of 910 million yuan. At present, Huayao Group adheres to the guidance of Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era, fully implements the new development concept, establishes a marketization, capitalization, and internationalization strategy, is driven by innovation, capital, and talent elements, and is based on strategic reengineering, Management reengineering, cultural reengineering and party building innovation are the starting points, consolidate the development of the chemical pharmaceutical preparation industry, focus on the development of the biopharmaceutical industry, cultivate and develop the health consumer goods and agricultural and veterinary medicine industries, actively build a competitive raw material drug industry chain, and promote product value and brand Value and corporate value enhancement, and strive to make changes every year, make big changes in three years, and reshape a Xinhua Pharmaceutical in five years, and strive to build a domestic leading international first-class modern pharmaceutical and health industry group.

The Sandoz Anti-Infectives & API business is a fully-integrated provider of affordable, high-quality pharmaceutical intermediates, active pharmaceutical ingredients (APIs) and finished dosage forms.

From our global headquarters in Kundl, Austria, we ensure excellence in manufacturing across our state-of-the-art production facilities and on-time delivery to our global network of industrial customers and partners. Production is carried out in accordance with current Good Manufacturing Practices (cGMP)

and our facilities have been approved by all major health authorities worldwide, including the European Directorate for the Quality of Medicines (EDQM) and the United States Food and Drug Administration (FDA).

Our strong European production base, close cooperation with Novartis and decades of experience in pharmaceutical development, production and commercialization, make it possible for us to set the industry standards for quality and continuity of supply.

A Global Leader in Antibiotics

As the global leader in generic antibiotics, Sandoz plays a critical role in ensuring the sustainability of global healthcare systems: antibiotics are the cornerstone of healthcare today. In addition to treating a wide range of infectious diseases, antibiotics are critical to guarantee patient safety during in-hospital medical procedures such as transplants, as well as immunological therapies including chemotherapy.

Sandoz has a rich tradition of providing high-quality antibiotics. We led the way in supplying desperately needed antibiotics to the post-war Austrian population and produced the first ever oral penicillin in 1951. Our commitment to the successful outcomes of patients using our products has elevated us to become the world's biggest producer of antibiotics by volume.

We are proud to offer a comprehensive antibiotic portfolio focused on Penicillins and Cephalosporins – the two key categories of antibiotics, and products that form the backbone of global healthcare. We are committed to shaping the optimal environment that sustains the effectiveness of all antibiotics.

Overview of Our Antibiotic Business

An investment in the long-term success of this important medicine:

- Sandoz is the largest generic antibiotic manufacturer in the world, with 300 million packs of antibiotics produced annually

- Sandoz owns the last remaining fully integrated production facility in Western Europe, located in Kundl, Austria
- In addition to our leading portfolio of Sandoz medicines, we also produce active pharmaceutical ingredients (API) for other leading companies
- The Sandoz portfolio of antibiotics covers over 50% of the antibiotics available giving us the opportunity to serve a broad majority of today's antibiotic needs

Strong Commitment to Advancing Antibiotic Treatment

Our leadership position comes with a responsibility to promote not only awareness of the importance of antibiotics, but also of how to use them responsibly, including best stewardship practices. Growing antimicrobial resistance (AMR) is one of the major threats to global health today. Indeed, global health experts estimate that it could lead to an additional 10 million annual deaths by 2050 if uncontrolled – more than the total number of deaths from all infectious diseases worldwide per year. Sandoz is committed to work with other stakeholders to tackle the root causes of AMR, with a particular focus on increasing understanding of AMR and rational use of antibiotics, promoting the appropriate use of antibiotics (implementation of therapeutic guidelines, for instance on first and second line use, as well as driving prescription-only use), and ensuring stable manufacturing and secure supply.

We also support measures for the adoption of novel formulations and incremental Innovations. While novel antibiotics may take years to develop, manufacturers are able to develop new formulations much more quickly. These novel formulations – such as pediatric dosage forms – can help decrease non-adherence to therapy, which is also an important cause of AMR.

Through our own Development efforts, Sandoz is actively working to ensure the broadest generic portfolio is always available, providing the opportunity for targeted treatments to match the infection. We plan to add to this portfolio over the next few years.

Hebei Zhongrun Pharmaceutical Co., Ltd (CSPC Zhongrun is one of China's largest producers of bulk antibiotic active pharmaceutical ingredients. CSPC Zhongrun produces both penicillin and cephalosporin series API.

A joint venture established in 1989 by China Pharmaceutical Group Ltd (CHINA PHARMA, SEHK: 1093), CSPC Zhongrun employs more than 3,600 workers.
CSPC Zhongrun penicillin and cephalosporin Beta-lactam antibiotic products include 16 varieties of API and intermediates. The penicillin series includes penicillin G potassium crude, penicillin G potassium, penicillin G sodium, 6-APA, amoxicillin trihydrate, ampicillin trihydrate and ampicillin sodium.

The cephalosporin series includes intermediate 7-ACA, cefazolin sodium, cefazolin acid and ceftriaxone sodium. Meropenem API is also produced.

i.

2.4 Process Flow Chart

Penicillin G that is obtained via fermentation. The fermentation broth is supplied broth as filtered broth (Permeate) which is filtered to remove the mycelium via Microfiltration and as whole broth direct from V-5124 feeds surge. The broth/permeate is then extracted with MIBK to concentrate the Penicillin G. The rich MIBK is then de-watered. The Penicillin G is back extracted into water with ammonia. Dissolved solvent in the aqueous stream is distilled off in a vacuum stripper. The aqueous stream is then cooled and stored prior to Enzymation. The final MIBK is then washed with water to recover the Penicillin G. The aqueous layer is then recycled back into back extraction. The aqueous stream from back extraction is brought into contact with an enzyme, which splits the Penicillin G into 6-APA and Phenyl acetic Acid (PAA). This reaction is temperature and pH controlled. After enzymation the solution is further cooled. The PAA is removed via a counter current extraction process with n-butanol at low pH and temperature. Most of the impurities are removed at this stage. The PAA rich n-butanol is washed with water followed by a pH increase with potassium hydroxide. The n-butanol in the by-product PAA stream is removed by distillation.

The concentrated Potassium phenyl acetate (KPA) is worked up to produce crude KPA. 6KPA is crystallised via a two-stage continuous crystallisation procedure near its isoelectric point and at a low temperature. The 6APA slurry is isolated via centrifugation. The crystals are washed with cold process water in a centrifuge, to remove inorganic salts, before being spun dry. The 6APA is then dried under vacuum, micronised, collected and then packed.

To manufacture 1MT 6-APA, 40 million litre of MIBK and 20 Million liter of Butanol is used in the process.

[illegible]

The current method of generating the inoculum for a Production Fermenter is via a two-stage seed. The first stage (Primary Seed) is run in either an 80m³ seed fermenter, for a 80m³ second stage seed, or in a 15m³ primary seed fermenter, (V1/2/3/4/8) for a 60m³ second stage seed.

Adjust the medium pH to 3.0-3.8 with caustic from head tank. Add Calcium Carbonate to V1/2/8/4 or V1/4/8B. Sterilize the batched medium and blend medium tank with water to give a final volume in the seed fermenter. Batch the following components in the quantities appropriate for the Seed Vessel to be used into Batch Tank V1/4/8A or V1/4/8B. (Citric acid, Ferrous Sulphate, Copper Sulphate, Manganese Sulphate, Zinc Sulphate, Magnesium Sulphate, Sodium Sulphate, Ammonium Sulphate, Mono-ammonium Phosphate, Potassium di-Hydrogen Phosphate, Raxidrin, Water). Adjust the medium pH to 3.0-3.8 with caustic from head tank. Add Calcium Carbonate to V1/2/8A or V1/4/8B. The seed stage fermentation progress until the biomass has developed to the appropriate level, when it should be transferred to the final stage fermenter. This is indicated by a pH trajectory and process condition. The water must be heated to 35°C before batching begins, and the materials must be added in the order listed. The citric acid must be allowed to mix for 10-15 minutes before any other materials are added. Adjust the pH of the medium to 4.0±0.1 using caustic. Transfer the sterilized medium to the previously sterilized fermenter. Adjust medium to operational temperature of 37°C ± 0.5°C by activating the Tower water cooling system. Ensure that the calibration of the pH and DO2 is carried out. Adjust the medium pH to 6.5±0.1 using ammonia. Inoculate the final stage by transferring the seed stage to it.

Sugar Feed – Add sugar and water are batched into V1/3/5/6/7/8 in the correct ratio to give a 62% w/w solution. Precursor (SFS) – Batch "fresh" or "recovered" SFS into V1/4/8A/B as delivered. Antifoam – Batch 10000 L of RO1 and add 200L of Raxidrin antifoam via the main way. Conditions in the fermenter are continuously monitored and adjusted during the batch, to optimize them for

maximum Pen G production. Incubation continues until the scheduled harvest time. The fermenter contents are then chilled, the pH reduced to around 5.1-5.3 using acetic acid and transferred to extraction.

(xxi) 6-APA

6-APA is manufactured from Penicillin G that is obtained via fermentation. The fermentation broth is supplied both as filtered broth (pavisacin) which is filtered to remove the mycelium via Microfiltration and as whole broth direct from 9 L/Ltr broth range. The broth/pavisacin is then extracted with MIBK to concentrate the Penicillin G. The rich MIBK is then de-watered.

The Penicillin G is back extracted into water with ammonia. Dissolved solvent in the aqueous steam is distilled off in a vacuum stripper. The aqueous stream is then cooled and stored prior to enzymation. The final MIBK is then washed with water to recover the Penicillin G. The aqueous layer is then recycled back into back extraction.

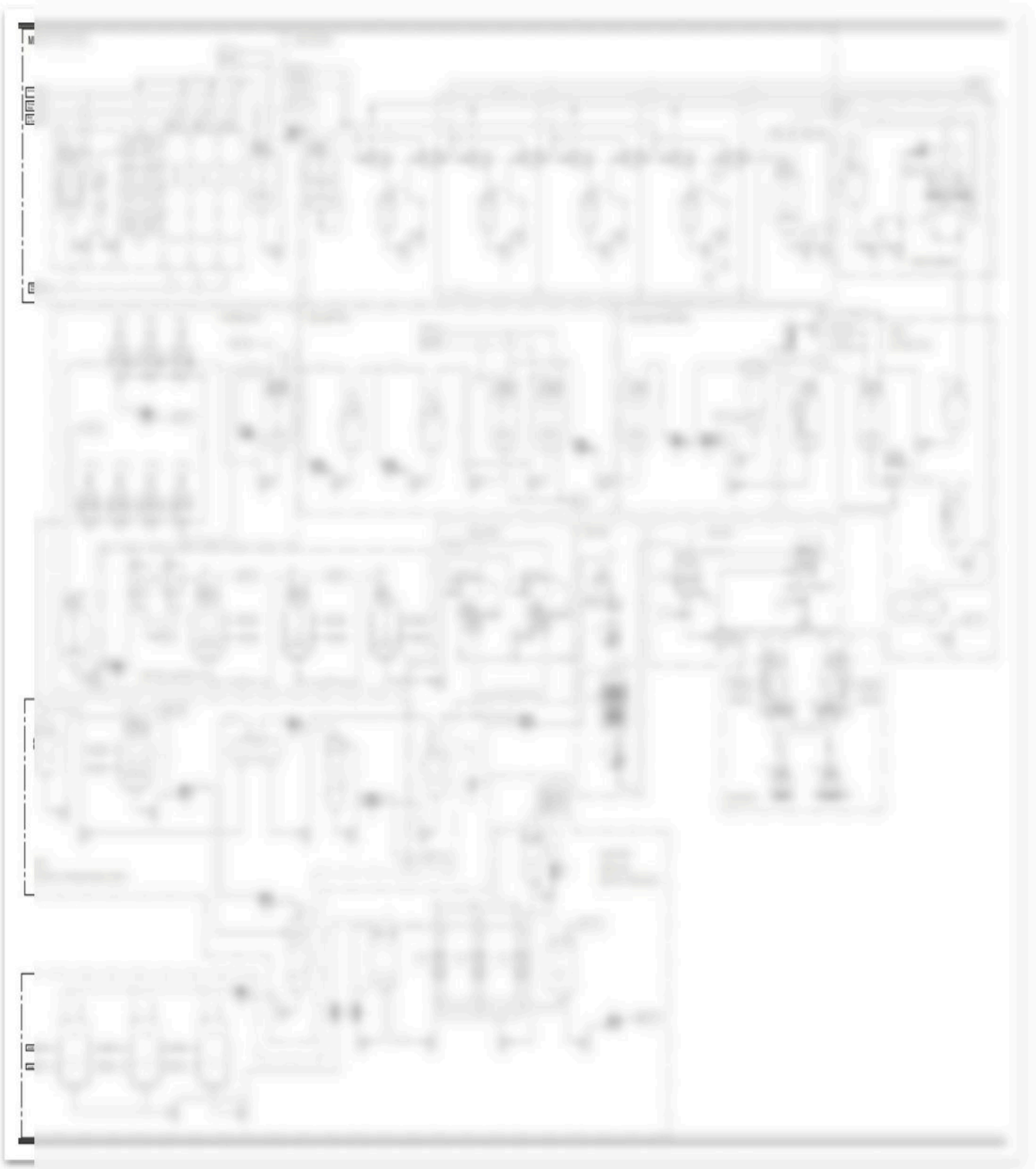
The aqueous stream from back extraction is brought into contact with an enzyme, which splits the Penicillin G into 6-APA and Phenyl acetic Acid (PAA). This reaction is temperature and pH controlled. After enzymation the solution is further cooled.

The PAA is removed via a counter current extraction process with n-butanol at low pH and temperature. Most of the impurities are removed at this stage. The PAA rich n-butanol is washed with water followed by a pH increase with potassium hydroxide.

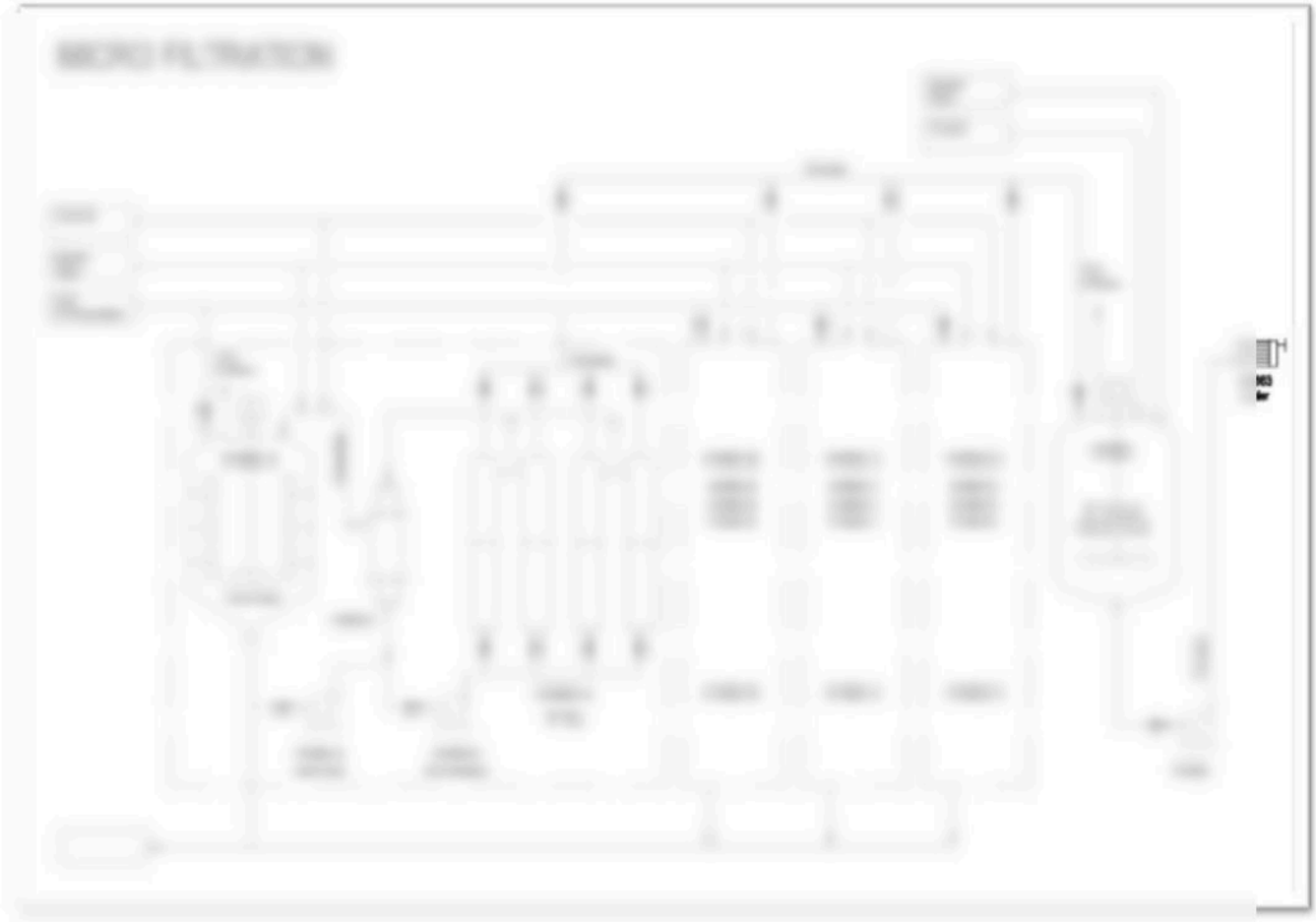
The n-butanol in the by-product PAA formate is removed by distillation. The concentrated potassium phenylacetate (KPAA) is worked up to produce crude KPA.

6-APA is crystallised via a two-stage continuous crystallisation procedure near its isoelectric point and at a low temperature. The 6-APA slurry is isolated via centrifugation. The crystals are washed with cold process water in the centrifuge, to remove inorganic salts, before being spun dry.

The 6-APA is then dried under vacuum, micronised, collected and then packed.



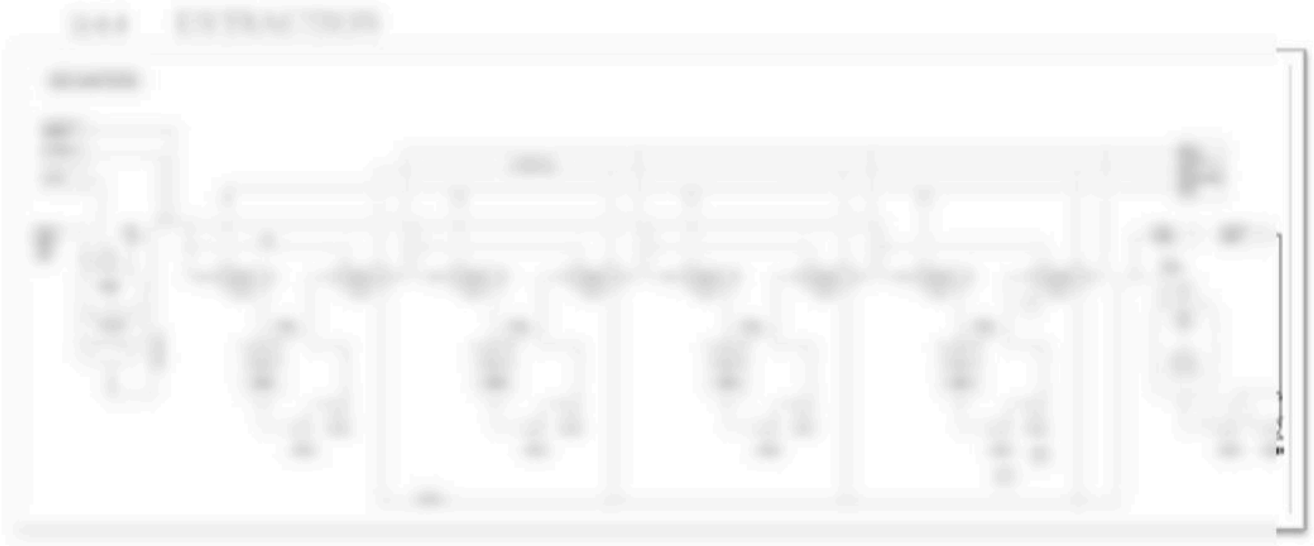
2.4.3 MICROFILTRATION SYSTEM SECTION:



Microfiltration (MF) consists of four rigs operating in parallel that filter the Pen-G broth from T-1126. Formalin is added at a rate of 0.5lt of the permeate flow to kill any bugs. Each rig consists of a feed vessel, a transfer pump that feeds the microfiltration ceramic membrane, recycle pump and a heat exchanger. The system provides almost solids free aqueous solutions permeate which is then send to the forward extraction. The discarded material retentate is routed to the effluent treatment plant via the effluent sumps. After each production run the microfiltration rigs and V-1069 vessels are auto cleaned using hot caustic, nitric acid and water.

The Microfiltration system (4 sets) has been considered to remove solids & large undissolved molecules, leaving a purified filtrate (permeate) product (Pen-G) which is sent to forward extraction. Pen-G broth is fed to the feed tank, which then pumps through the filter units. The retentate is recycled back to the feed tank, where it is diluted with water & the pH controlled to 6.4 using 25% w/w Ammonia & is reprocessed through the filter units until the sequence is ended. The permeate is fed forward to a holding vessel prior to feeding to the solvent extraction

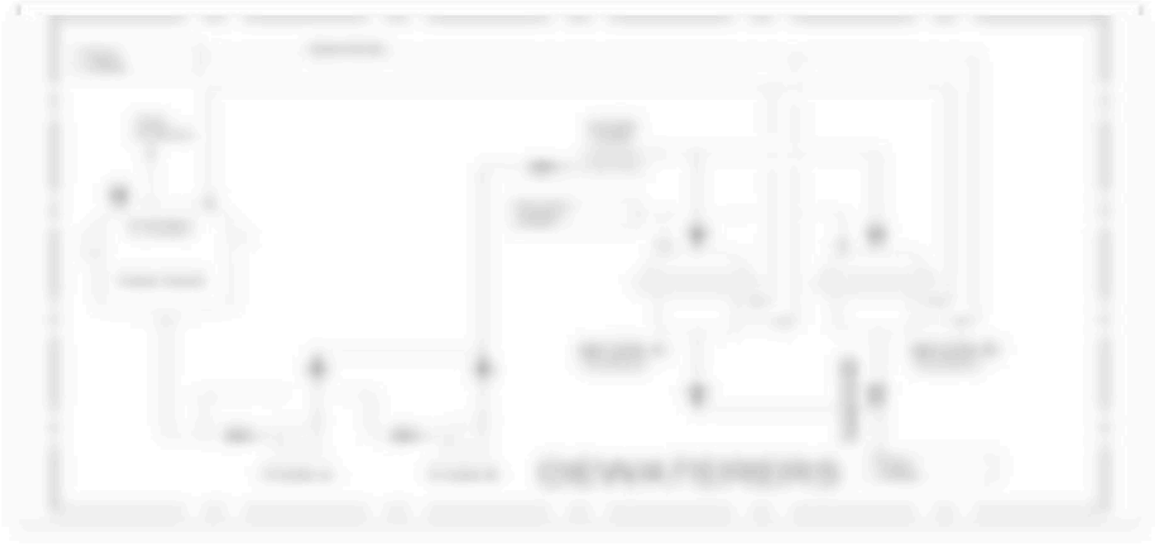
vessel which feeds the forward extraction decanters. Waste retentate is pumped to the waste



The object of the Whole Broth Extraction step is to clean and concentrate the Penicillin G by extracting Penicillin G directly into MIBK from the Whole Broth supplied from Fermentation and the Permeate supplied from Micro-filtration. Broth Flow Decanters can be fed either whole broth ex. V1424 via P1424 or Permeate (Filtered Broth) ex. V1406. Sulphuric acid and de-emulsifying agent (and MIBK if processing permeate) are added to M'RCH.E BRCTR or PERMEATE prior to entering Decanter 'A'. The low potency broth is screwed out of the discharge end of Decanter 'A' and pumped via a receiver, after which its pH is measured, into Decanter 'B' where the final Pen G extraction takes place. The spent broth then leaves Decanter 'B', drops by gravity down where it is neutralised prior to being pumped to Solvent Recovery.

MIBK Flow Recovered MIBK is pumped into Decanter 'D' where it mixes with LP Broth ex. Decanter 'A'. Any Pen G present transfers to the MIBK. The part rich MIBK is transferred to Decanter 'A' where it mixes with the acidified whole broth. Pen G present transfers to the partially rich MIBK. The now RICH MIBK leaves Decanter 'A' and is pumped via manifold to RICH MIBK surge vessel.

2.4.5 DEWATERERS



MATERIALS: Manufactu Centrifuges (Dewaterers) are part of the Dewatering stage. The dewaterers take the solvent, Petrol, rich, MIBK phase from the decanters via a holding vessel. The material is cooled prior to feeding in to the centrifuges, where excess water is separated from the MIBK. The dewatered MIBK stream is fed on to the Back Extraction stage. The heavy aqueous phase is fed on to the spent fresh vessel for neutralisation & feed to ETP, for recovery of MIBK.

2.4.6 BACK EXTRACTION:

The MIBK Pre-U Solution from the Decoanter surge is sent to V-1005, this solution is then sent to V-1002 where water is added to achieve a specific concentration of Pre-U. Effate ammonia is added to V-1002 to increase the pH to 7-5, at this pH the penicillin in the solution will extract into water phase. The solution is then sent to a Robatel Centrifugal extractor (MC002) where the water and solvent phases are separated. The light phase which contains the solvent is sent to recovery via V-1020, and the heavy phase which contains the water and Pre-U Solution is sent to V-1004 for further processing.

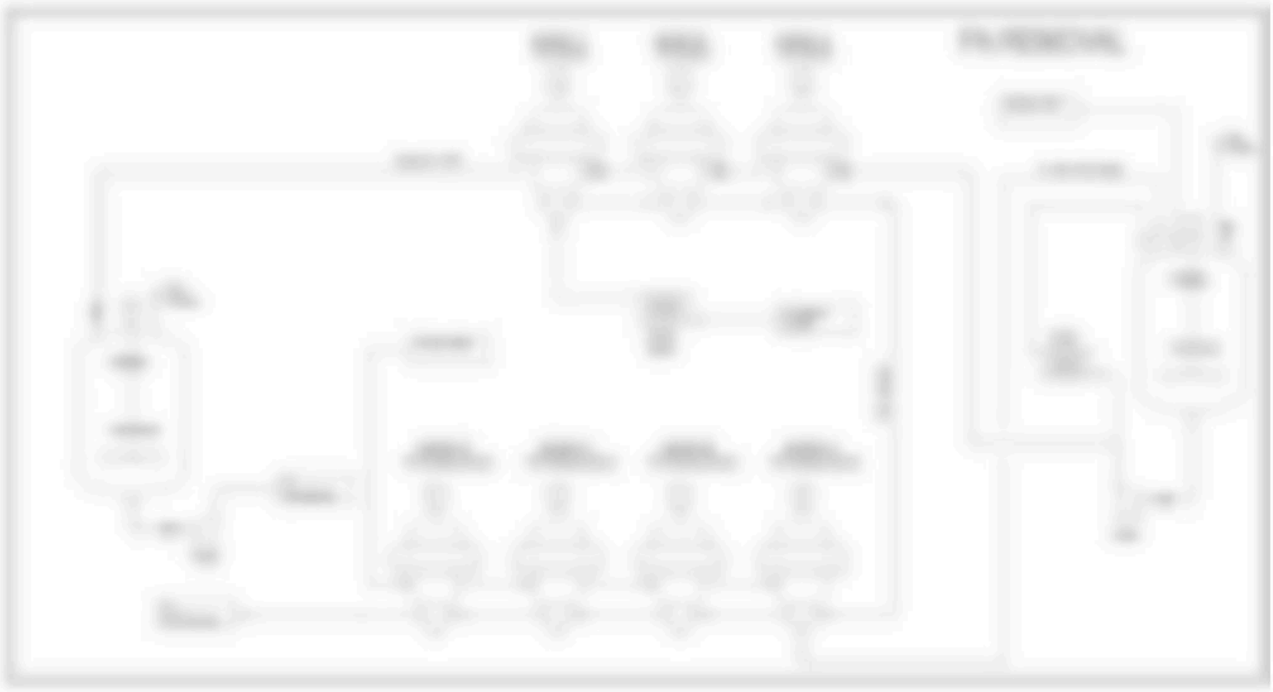
M1601 is used to extract Pen-G from MIBK. The Pen-G aqueous phase is then sent forward to

2.4.8 ENZYMATION:

Vessel V1012 is part of the Enzymation stage & used as a buffer vessel taking filtered 6-APA material from the 1st buffer storage vessel. Reprocessed 6-APA material & drained 6-APA material from Crystallization are also sent to this vessel. The 6-APA material is further cooled & then sent on to PA Removal.

V1600A/B, Vessels V1600A/B are used in the Enzymation stage to convert Pen-G solution to 6-APA material using Hot Water to reach a set concentration & Sodium Hydroxide to reach a pH of 8.4. Once stirred for a set time, the contents are transferred to a buffer storage vessel. V1609 Vessel is used to hold aqueous Pen-G solution from Vacuum Stripping prior to sending on to enzymation for conversion to 6-APA.

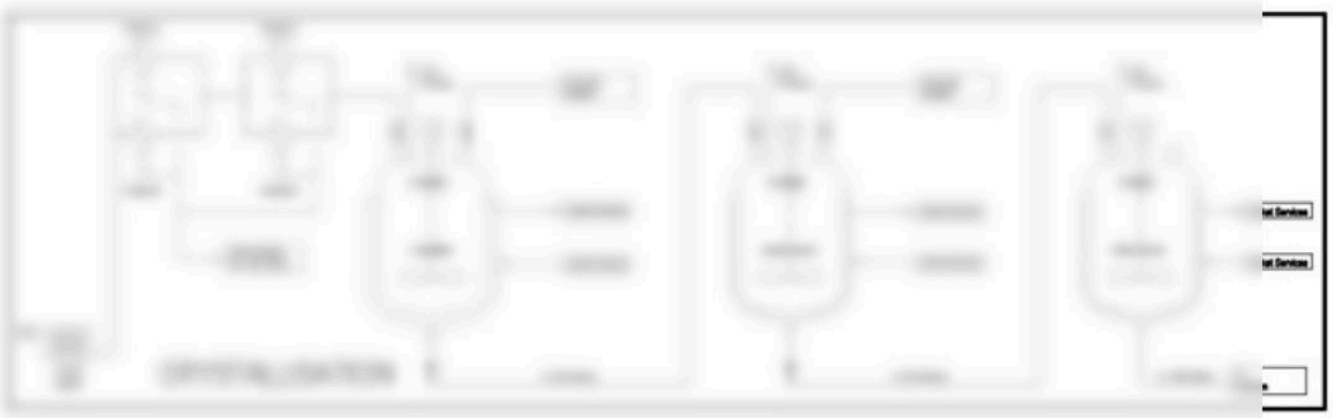
2.4.9 PA REMOVAL



V1625: Vessel is part of the PA Removal stage & used as a receiver vessel for 'feed' Butanol / PA from the Reboil1 centrifuges. This material is fed forward to a neutralisation vessel prior to separation in the IOPA Column V1611. Vessel V1611 is part of the PA Removal stage & used to control the pH of aqueous 6-APA to 1.5 with Sulphuric Acid & n-Butanol. The mixture is transferred to a series of Reboil1 centrifuges for separation of the 6-APA from PAA.

M 1602 A/B/C: PA extraction centrifuges M1602A, M1602B, and M1602C contents featured. Butanol back extraction centrifuges M1603A, M1603B, M1603C and M1603D contents featured.

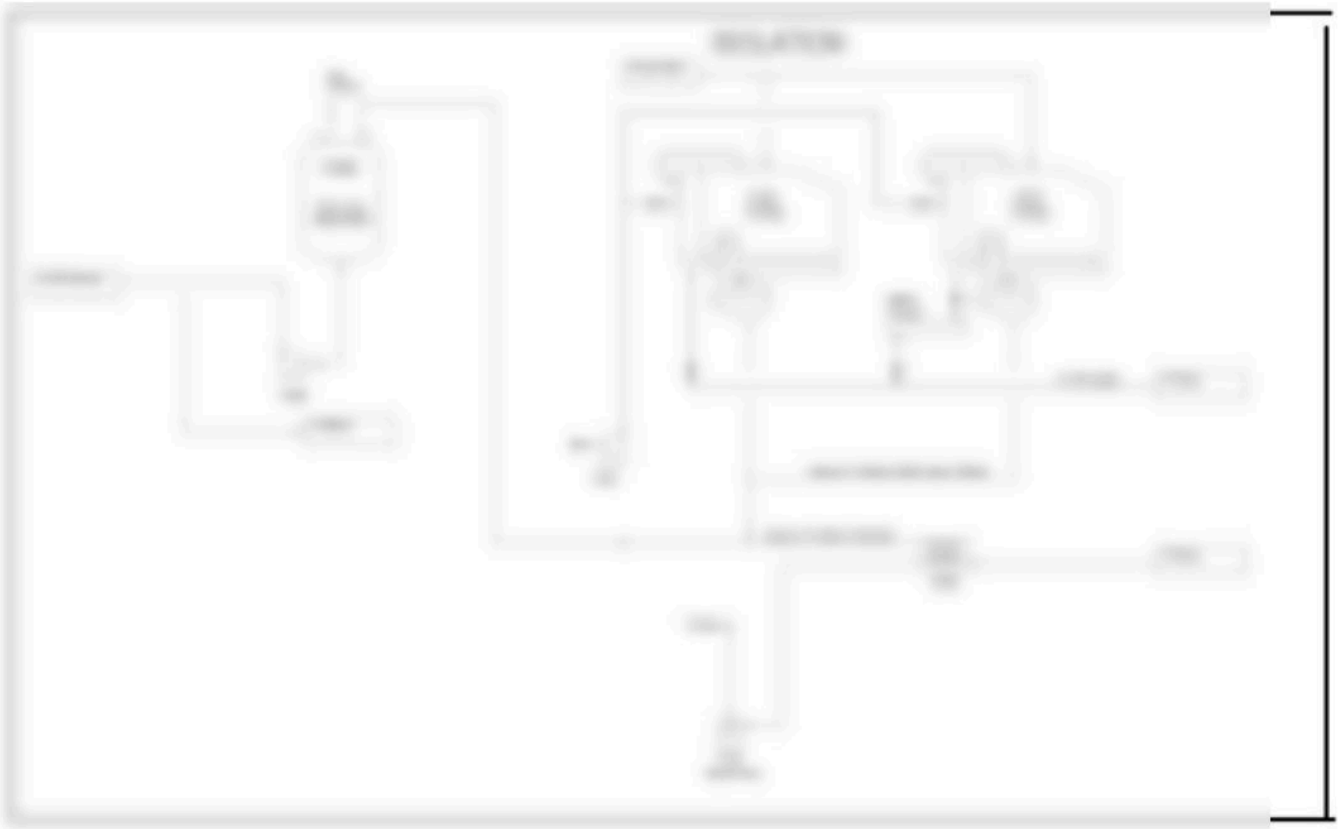
2.4.10 CRYSTALLIZATION:



V1615, V 1616 Vessels are part of the Crystallization stage & is used to cool the 6-APA slurry overflow to increase yield. The crystal slurry is fed on to the Heated centrifuges via a buffer vessel. Process monitoring of the PA extraction system is the mechanism by which the levels of exchanged fed forward to V1616, V1615 and ultimately V1630 are controlled. In addition, H2O2 cools the stream prior to entry into V1615/V1616. The dilution effect of these vessels on any transient high exchanged level during start-up or process upset acts to further reduce the likelihood of a flammable atmosphere being present.

Vessel V1615 is part of the Crystallization stage & is used to crystallize the 6-APA solution at pH 4.0, using Ammonia. The 6-APA slurry overflows to an Agitated Vessel to increase yield

2.4.11 ISOLATION:

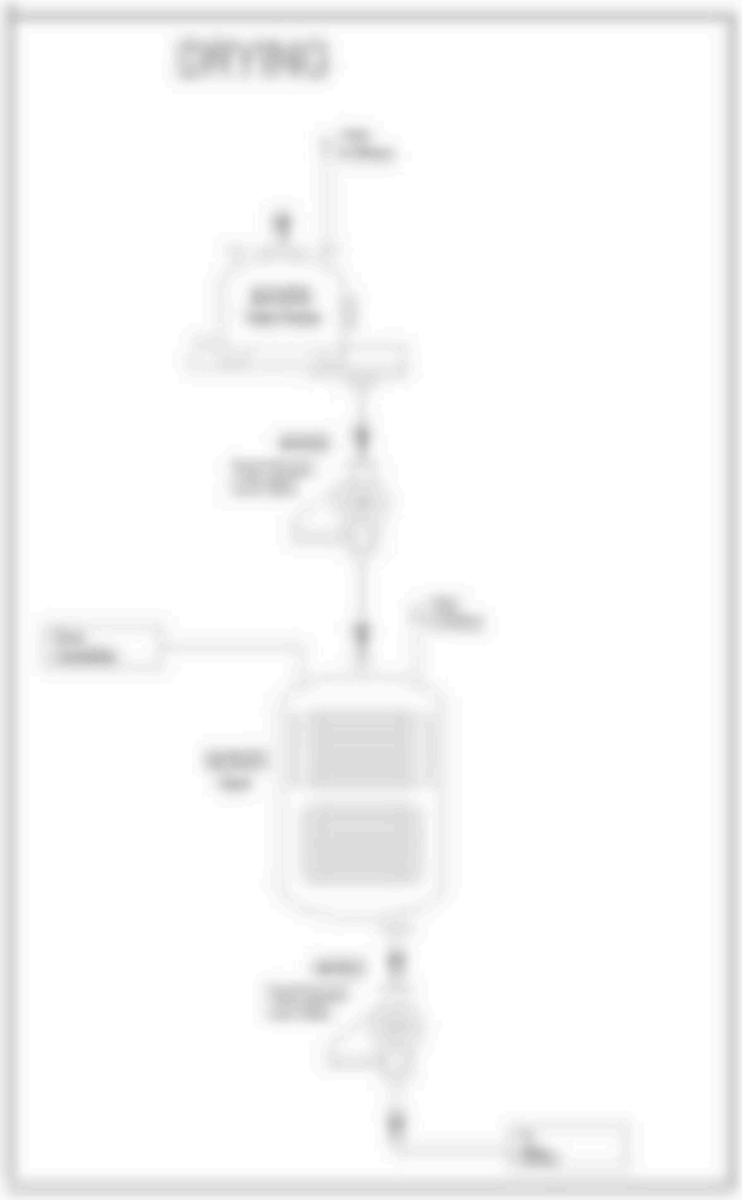


API Isolation: The isolation equipment two Nitrided inverted centrifuges are considered. The crystallized slurry from V16/2 is transferred in batches to one of two Nitrided Inverted Centrifuges (MOA/B, M16/9). These Centrifuges spin the slurry at 1200 rpm which forces the mother liquors within the slurry to pass through a filter leaving a pure dry layer of S-API. cake.

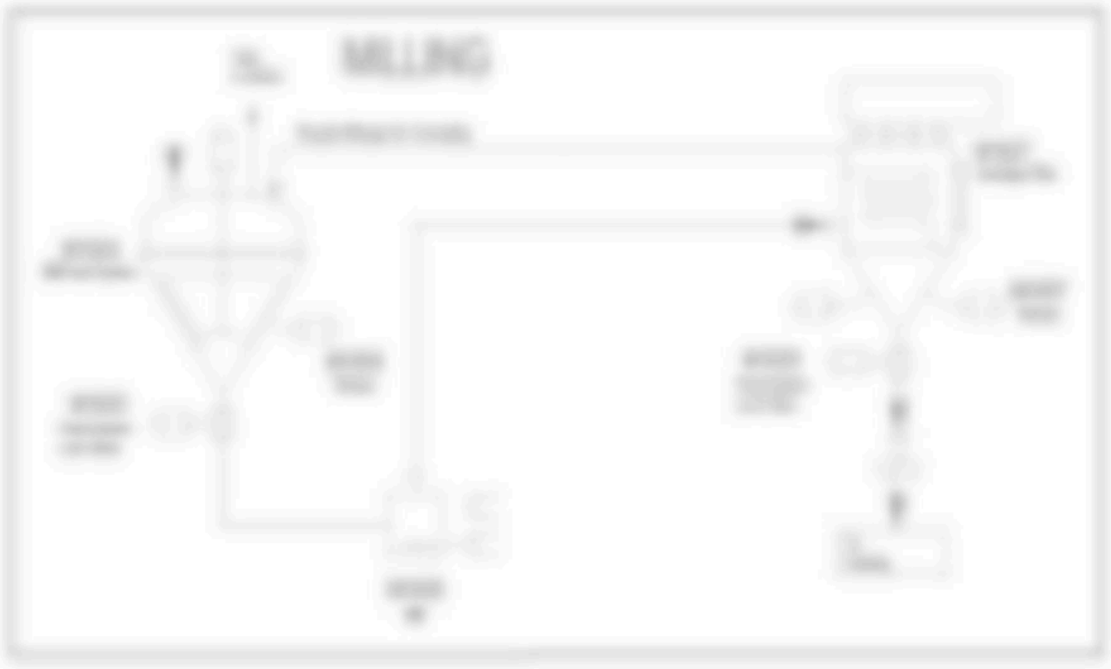
The cake is washed with cold water and then a discharged after a final spin onto the table feeder (M16/10). This cycle is continuously repeated, with one centrifuge processing approximately 150 Kg/Hour of S-API.

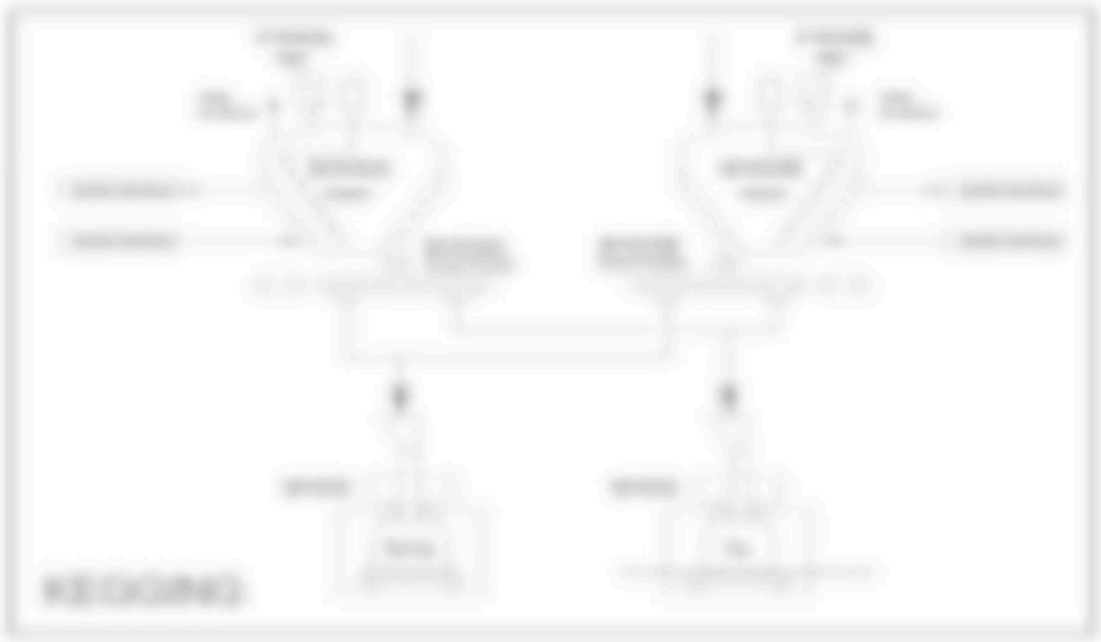
Centrifuge M16/9 is part of the Isolation stage & used to isolate the mother liquors from the product cake mass, which is then sent on to the dryer to remove the remaining water/mother liquors.

2.4.12 DRYING:



2.4.13 MILLING & KEGGING:





Mill Feed Hopper MH426 is part of the Milling stage & is used to transfer the 6-APA product powder to the product mill, where the powder particle size is reduced. Milled 6-APA is carried in the nitrogen stream and discharged to storage hoppers in the drying compartment.

2.5 Alternative technologies and comparative analysis

No alternate technology for this product.

[illegible]

[illegible]

[illegible]

SAMPLING SCHEDULE

1. Seed Stage
Primary seed pH is only required per inoc. Secondary seed pH samples are only required if the pH probe is faulty, in which case they are required per inoc, and every 2 hours from 24 log hours onwards.

Sterility samples are required pre and post inoc, and pre-transfer. Additional daily sterility samples are taken by Culture Maintenance.

2. Final Stage Fermenters

PAA	Assay 4 hourly from 12 LH to Harvest.
MPA1	Assay 12 hourly from 48 LH to Harvest.
NH3	Assay 12 hourly from 0 LH to Harvest.
STERILITY	Testing is carried out in conjunction with culture Maintenance, at least 24 hourly.

3. Sugar.
4 hourly MPA1 samples, and 24 hourly sterility test.

Sugar Feed Rates

FRIPPING – any loss or reduction in air is top priority. Sugar should not be put back fully unless all the air is restored.

EXCESS LOSS – will cause all other variables to go out of control. Take KPA feed off during failures.

CO2 – should be below 4.5% at all times. If above 4.0% and no means are available make 5% cuts in sugar.

DO2 – should always be above 25%. Check the rotor of the probe before making sugar cuts. If in doubt, believe the probe and cut feeds

pH CONTROL – should be 6.4 after inoculation unless the PAA assay is 700 ppm or more. After inoc, trim and run on the top probe.

PAA – control point is 450 ppm. If PAA assay more than 700 put pH set point to 6.7.

Level (Mass) – are any vessels at target level? Are any adding more than 25kg/hour sulfuric?

Ammonia should be between 300-2,000 ug/ml. Always have ammonia available for pH control (Should be in “AUTO” mode)

If any FAA assays are above 700, adjust pH setpoint to 6.7. If any assays are outwith 250 – 450 make manual adjustments to feed rate to bring the concentration back into the control range. Make manual changes to acid feeds in response to ammonia assays.

Check feeds, level increases, and antifoam, pH control, CO_2 / DO_2, temperature plots every hour.

Monitor changes and take appropriate action before they reach alarm conditions.

Make a note of CO_2, DO_2 problems, high FAA, etc and any site issues in SAPS, Utilities or WWTP for handover to next shift.

After a Mini-Harvest, check whether any setpoints need to be put in auto due to changes e.g. pressure, air or oxygen for CO_2, DO_2 problems? Make a note of these for shift handover.

CONTROL PARAMETERS

- CO_2 always less than 4.5%
- DO_2 always less than 25%
- pH at 6.4 (6.7 if FAA 700 ppm or more)
- FAA at 450 ppm
- Ammonia 300 – 2,000 ug/ml
- If sugar is ran/low, run SAPA by same proportion
- Antifoam addition less than 20 kg/hr (40 kg/hr for 1st wine)
- Control DO_2 level at 92 to maximum
- Control CO_2 level at 180 to maximum
- Reverse any changes as soon as conditions allow
- For further information, refer to:

CO_2 CONTROL

- [illegible]
- [illegible]
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- Check for pH deviations at the start of every shift.
- If running with one only working probe, the trim must be checked by shift instrument

Sr.No	Name of Equipment	Capacity	Quantity	MOC	Design Condition
[illegible]					

Sr.No	Name of Equipment	Capacity	Quantity	MOC	Design Condition
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Design Condition

					Design- (Shell/Jacket)
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

2.8 List of major raw materials

Material	For 100 Nos' Primary Seed	For 1 Unit' Primary Seed
Citric Acid Ferrous Sulphate Copper Sulphate Manganese Sulphate Zinc Sulphate Magnesium Sulphate Sodium Sulphate Ammonium Sulphate Micro ammonium Phosphate Potassium di Hydrogen Phosphate Water	15 Kg 2 Kg 0.02 Kg 0.2 Kg 0.4 Kg 1.5 Kg 1.5 Kg 50 Kg 25 Kg 1.5 Kg 3 litres 4000 litres	25 Kg 4 Kg 0.04 Kg 0.4 Kg 0.8 Kg 25 Kg 25 Kg 50 Kg 50 Kg 25 Kg 50 litres 5000 litres
Material	**For 100 Nos' Primary Seed**	**For 10 Nos' Primary Seed**
Calcium Carbonate	62.5 kg	150 kg
	4m³ Seed	15 m³ Seed
Airflow (Nos/hr.)	150 Nos/hr.	250 Nos/hr.
Sugar	450 kg	1100 kg
Calcium Carbonate	225 kg	
Final Total Volume	21,000 L	30,000 L
Air Flow	400 Nos/hr.	800 Nos/hr.
Sugar	1750 kg	2950

2.9 Basis of facility design



Site selection criteria

Site selection criteria and factors to be taken into account for the location of the facility.

The project proponents will usually identify certain basic factors while selecting the site for the project. Such factors are usually related to the infra of the property, commercial viability, location of the site, availability of raw materials and resources required etc. In addition to this the environmental setting of the proposed location is also an important factor while deciding the site for a project. All these criteria are favorable for the establishment of M/s. Private Limited, since the project site proposal at KIADB Industrial Area.

The project well connected by NH-7 road at about 0.06 km. Therefore the project site is well connected by roadways. Hindalga Railway Station is at a distance of about 2.09 km towards East direction. Hence the raw materials and the other utilities required by the industry can be easily transported.

From the view point of basic infrastructural facilities required for the industry Viz. power supply, water supply and sanitation facilities will not be a problem as the industry is coming up in a designated industrial area. So far as the environmental setting is concerned the proposed project site is located at [illegible] & [illegible] industrial area, surroundings have industries, individual residential units, few commercial establishments.

The general topographical features of the area reveal that the proposed project site and its surroundings is generally a plain land with slight undulations.

This plot is located at an elevation of about [illegible] m above MSL, the climatic conditions is temperate (semi arid) with moderate annual rainfall varies from [illegible] mm to [illegible] mm.

The efficient functioning of any industry mainly depends on the availability of its basic requirements viz. raw materials, fuel, power, water, manpower etc. The industry is proposed to be established in [illegible] Industrial Area, The choice of the land confers several advantages, which are summarized below.

1. The site is well connected by roadways.
2. Water will be supplied from Borewell.
3. Power will be supplied from [illegible].
4. Housing colonies, educational facilities, hospitals and other amenities are expected to be developed due to proposed industrial area development.
5. No incidences of cyclones, earthquakes, floods or landslides in the region.

Meteorological Data

Assessment of the micro and macro meteorology is important from the standpoint of understanding the nature and extent of air pollution in the study area. Climate has an important role in the build up of pollution levels in Bangalore. The climatic condition of the area may be classified as moderately or seasonally dry, tropical or temperate savanna climate with four seasons in a year. Winter is critical for air pollution build-up because of

frequent calm conditions with temperature inversions resulting in poor atmospheric mixing,

91.4%, 93.5%, 87.6% in the months of May, September, November & December during the

Rainfall

The monsoons in this region usually occurs twice in a year i.e. from June to September and from October to November. The maximum annual rate of precipitation over this region ranges between 1.02 to 4.83 mm/hr.

Atmospheric pressure

The maximum and the minimum atmospheric pressures are recorded during all seasons. In the summer season, the mean maximum and minimum pressure values are observed to be 917 mb in the month of March and 905 mb in the month of May respectively. During monsoon season, the maximum pressure is 913 mb and minimum 904 mb. The maximum pressure during the postmonsoon season is observed to be 915 mb in November and minimum pressure is 904 mb in the month of October. During the winter season the minimum atmospheric pressure is 906 mb in December and the maximum is 915 mb in the month of January.

Wind

The data on wind patterns are pictorially represented by means of wind rose diagrams for the entire year (for different seasons).

Inversion height

The maximum inversion heights at the project site during the day time & night time for all the months of the year. The maximum mixing height of 4000 m is observed during the month of June during the night time and 3535 m during the month of May during the day time. The minimum inversion heights are 1726 m in the month of December during the day and 1786 m during the night in the month of February.

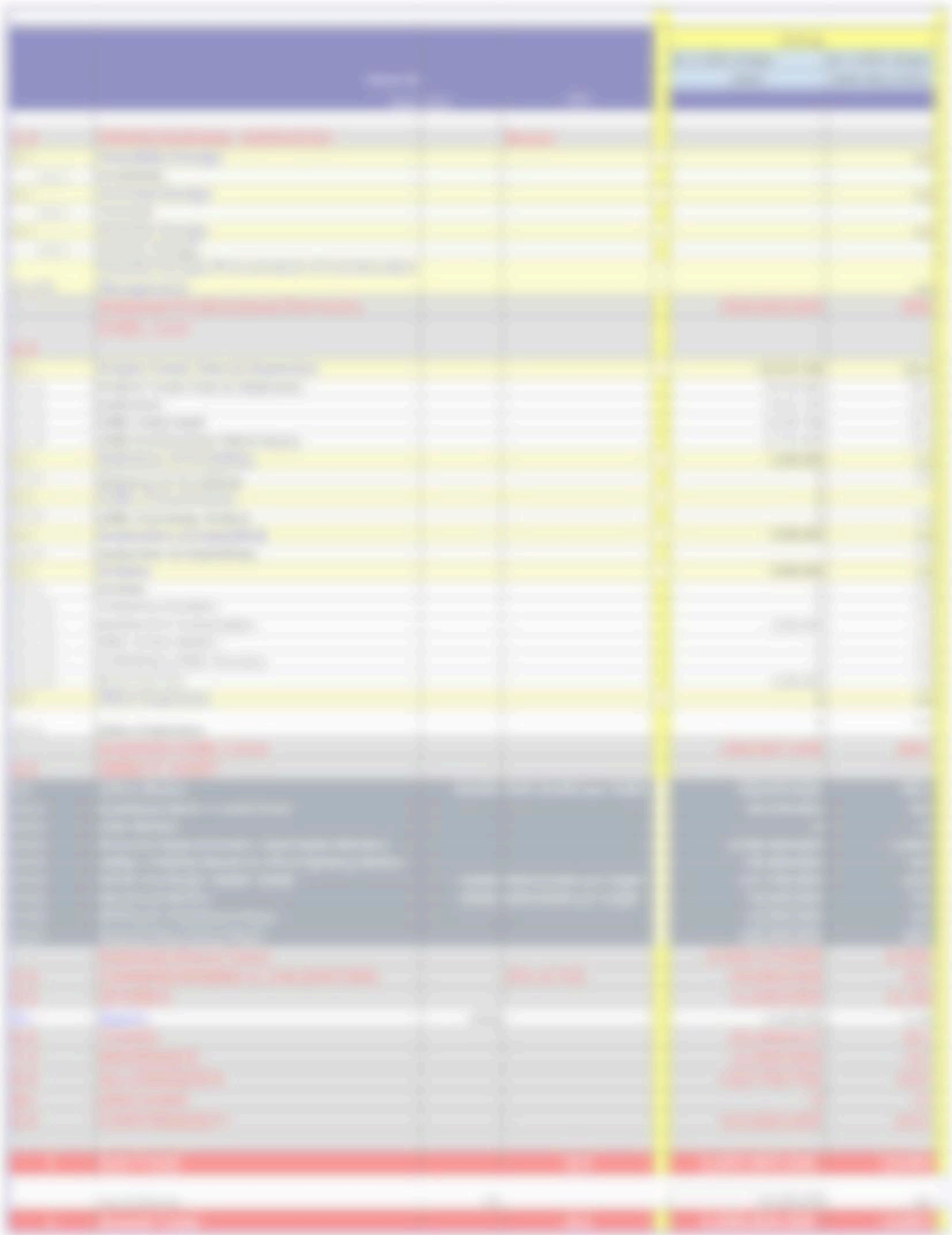
Cloud cover

The minimum cover measured in the unit of tenths is 2 during most of the months. The

2.10 Plant Economics

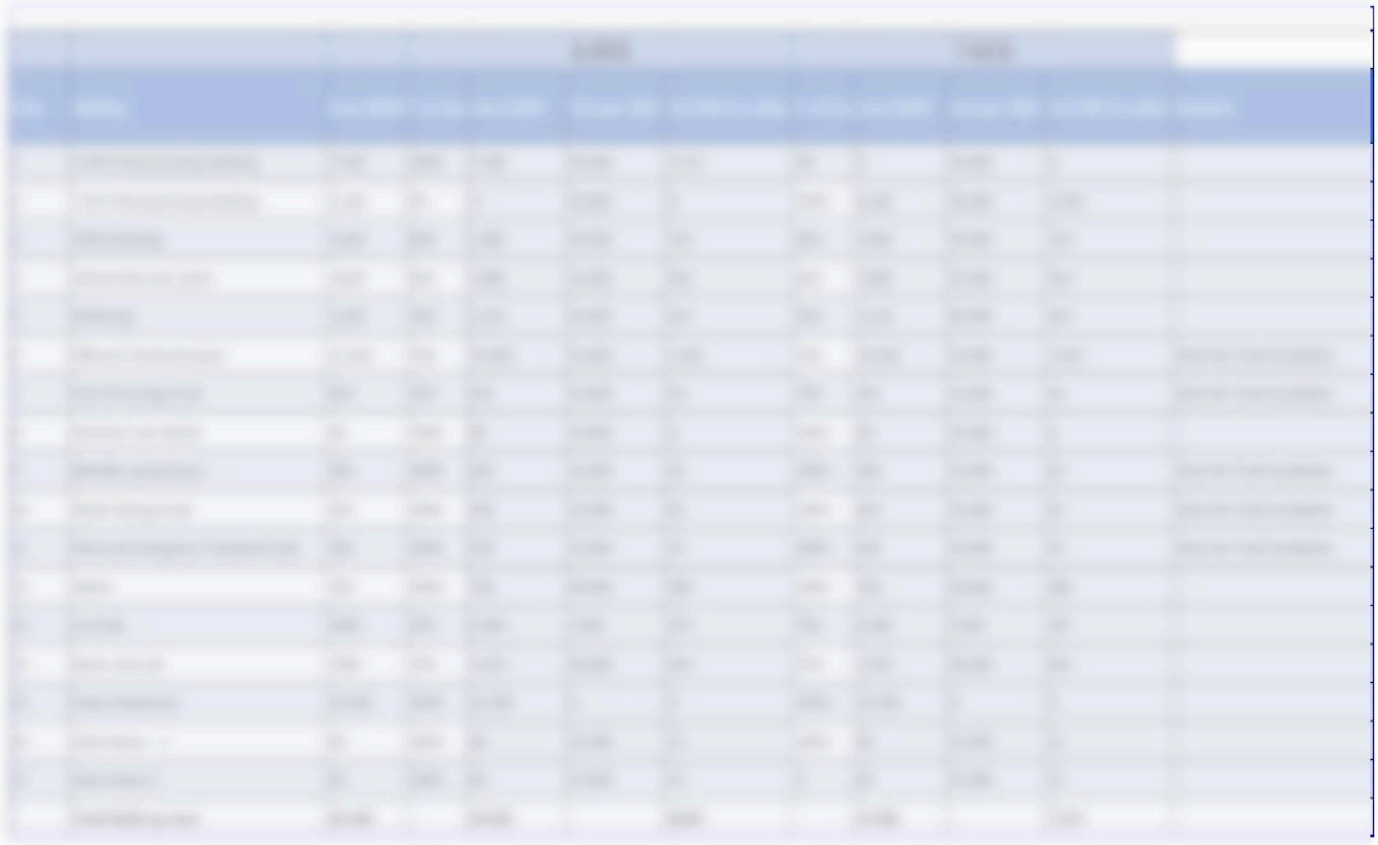
2.10.1 Total Project Cost

Total Project cost is approximately INR 324 Crores, including the entire site requirement as listed in the below table.



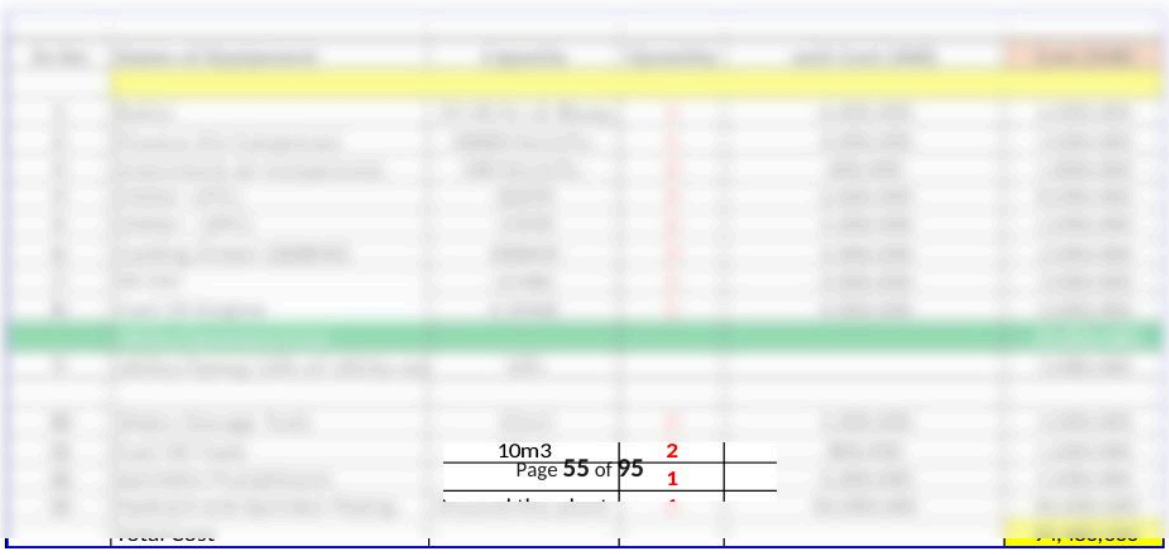
2.10.2 Civil Cost

Total area required for S-MP4 manufacturing is 30,000 SQM, if we consider both S-MP4 and V-MC-A the building area required is 70,000 SQM (3 floors). However, we have considered 30 Acres for the site Master plan considering the future expansion.



2.10.3 Utility Equipment Cost

Total Utility Equipment cost is approx. INR 10 Crores



2.10.4 Effluent Treatment Equipment Cost

Total Effluent Treatment Equipment cost is approx. INR 4.5 Crore.

S.No.	Name of Equipment	Capacity	Quantity	unit Cost (INR)	Cost (INR)
1	ETP tank	30cu	1	2,500,000	2,500,000
2	ETP tank allied Equipment	20cu	1	1,000,000	1,000,000
	ETP Instrument Panel	400 m/cmp	1	1,000,000	1,000,000
3	Lab and instrument	Each	1	1,000,000	1,000,000
	Total cost				5,500,000

2.10.5 Land Cost

Sr.No	Name of Equipment	Capacity	Quantity	unit Cost (INR)	Cost (INR)
1	Land Cost	4500sq m	01	1,000,000	10,000,000
	Total Cost				10,000,000

2.10.6 Assumption made for establishing the projected Balance Sheet

	Assumptions made					
1	Interest cost for CC limit (WC finance) is @10.00%					
2	Semi Variable & Fixed Expenses are done on 40:60 basis on full capacity utilization in 5th Year of operation.					
3	For working capital calculation, the WC cycle is considered by taking following assumptions are made					
a	Stock in hand i.e. Raw material cost @ 1 month, Finished goods @ 1 months and WIP cost taken for 15 days.					
b	Receivables @1 months					
c	Current liabilities @ 1 months					
d	Creditors is [illegible] Month's [illegible] Cost [illegible] & Stock					in some cases

PLANT ECONOMICS		6-Aminopenicillanic acid	

Land & Building Cost

Particulars of proposed Assets (USM)	UOM	Quantity		Rate	Total
Land Area Required	Acre	50		1000000	50,000,000
Factory Building					
6-APA Manufacturing Building	sq.mtrs.	7,500		40,000	3,00,00,000
7-ACA Manufacturing Building	sq.mtrs.	0		40,000	0
Utility Building	sq.mtrs.	1,000		40,000	40,000,000
Solvent Recovery plant	sq.mtrs.	1,000		25,000	25,000,000
Workshop	sq.mtrs.	1,000		40,000	40,000,000
Effluent Treatment plant	sq.mtrs.	10,000		30,000	3,00,00,000
Fuel Oil storage tank	sq.mtrs.	400		40,000	1,60,00,000
Electrical sub station	sq.mtrs.	80		30,000	24,00,000
Sprinkler pump house	sq.mtrs.	200		40,000	1,00,00,000
Water Storage tank	sq.mtrs.	600		30,000	1,80,00,000

Particulars of proposed Assets (UOM)	UOM	Quantity		Rate	Total
[illegible]	[illegible]	[illegible]		[illegible]	[illegible]
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[illegible]	[illegible]	[illegible]		[illegible]	[illegible]

2.6.1 Working Capital required per Month

Working capital required per month to produce the 6 API is approx. INR 80 Crores

2.10.8 Salary & Wages

Salary and wages (Annum ₹)

Salary and wages	UOM	Quantity	Rate	Amount
General Manager	Nos.	1	[illegible]	[illegible]
Production, Engineering, Personnel, Sales, Purchase, Quality Control & Accounts Manager	Nos.	05	75000	3,375,000
HR Manager	Nos.	1	[illegible]	[illegible]
Electrical, Mechanical & Chemical Engineers	Nos.	04	[illegible]	[illegible]
Quality Control Analyst	Nos.	02	[illegible]	[illegible]
Laboratory Chemist	Nos.	02	[illegible]	[illegible]
Production Supervisors	Nos.	04	[illegible]	[illegible]
Quality Control Supervisors	Nos.	1	[illegible]	[illegible]
Skilled Workers	Nos.	04	[illegible]	[illegible]
Electricians	Nos.	02	[illegible]	[illegible]
Fitters	Nos.	02	[illegible]	[illegible]
Unskilled Workers	Nos.	08	[illegible]	[illegible]
Accountant	Nos.	1	[illegible]	[illegible]
Computer Operators	Nos.	1	[illegible]	[illegible]
Office Staffs	Nos.	3	[illegible]	[illegible]
Sales Executives	Nos.	1	[illegible]	[illegible]
Store Keepers	Nos.	1	[illegible]	[illegible]
Peons	Nos.	1	[illegible]	[illegible]
Security Officer	Nos.	1	[illegible]	[illegible]
Security Guards	Nos.	04	[illegible]	[illegible]
TOTAL BASIC SALARY		Lot		6,225,000
Plus Perks (20 % p.a. of Basic Salaries)			20.00%	1,245,000
Per month			₹ [illegible]	1,245,000
Per Annum				14,940,000

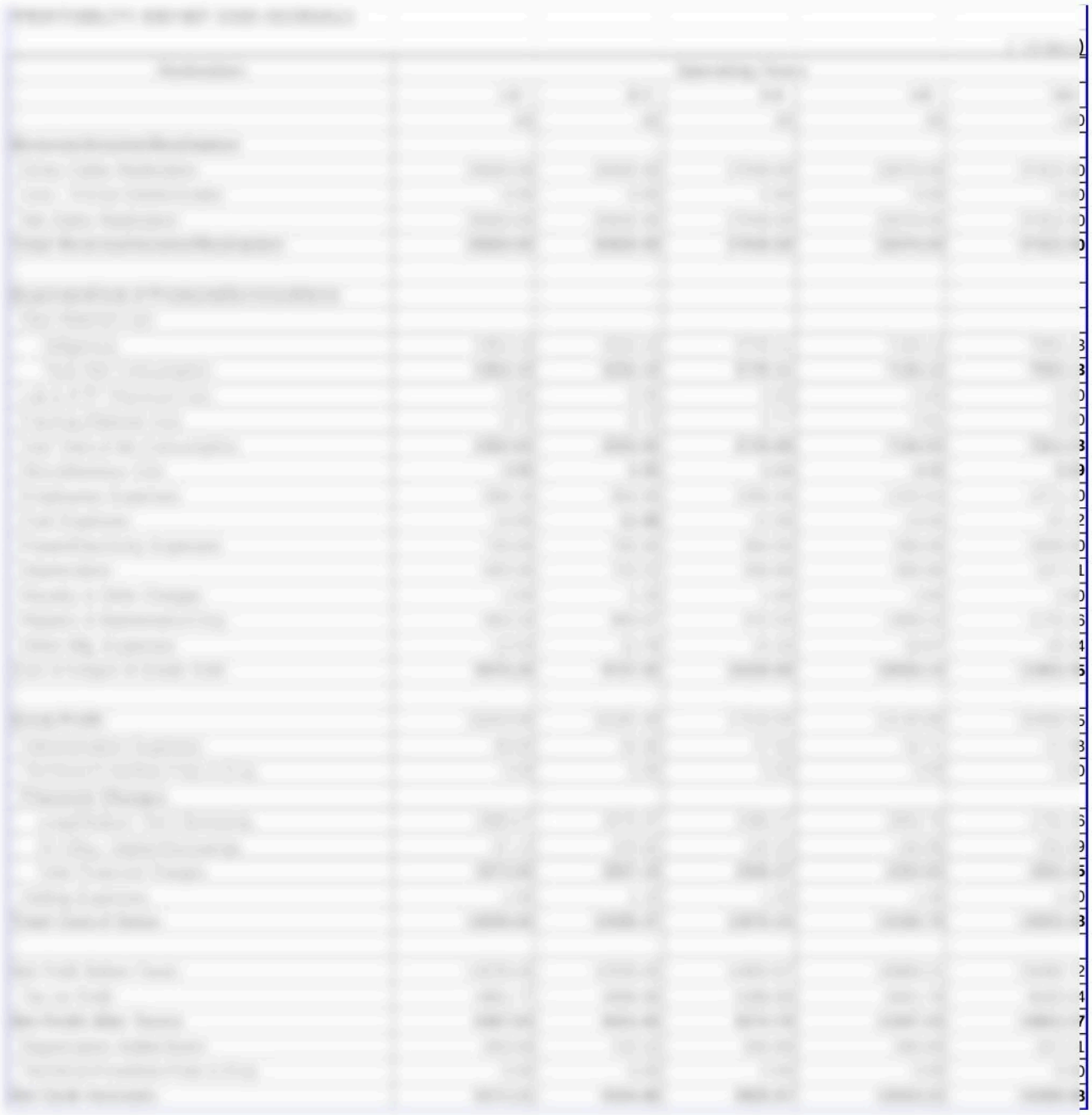
[illegible]

2.10.9 . Means of Finance

Capital of Rs. 13.49 Crores will be financed from internal sources and the remaining Rs. 320 Crores will be financed through the bank as long-term borrowing.

[illegible]	[illegible]
Equity Share Capital	1,349
Others - Preference Share Capital	0
Total Equity Share Capital	1,349
Long/Medium Term Borrowings	
PNCbl Ltmtb	0.320
From Other Financial Institutions	0
Total Long/Medium Term Borrowings	0.320
Total Means of Finance	0.320

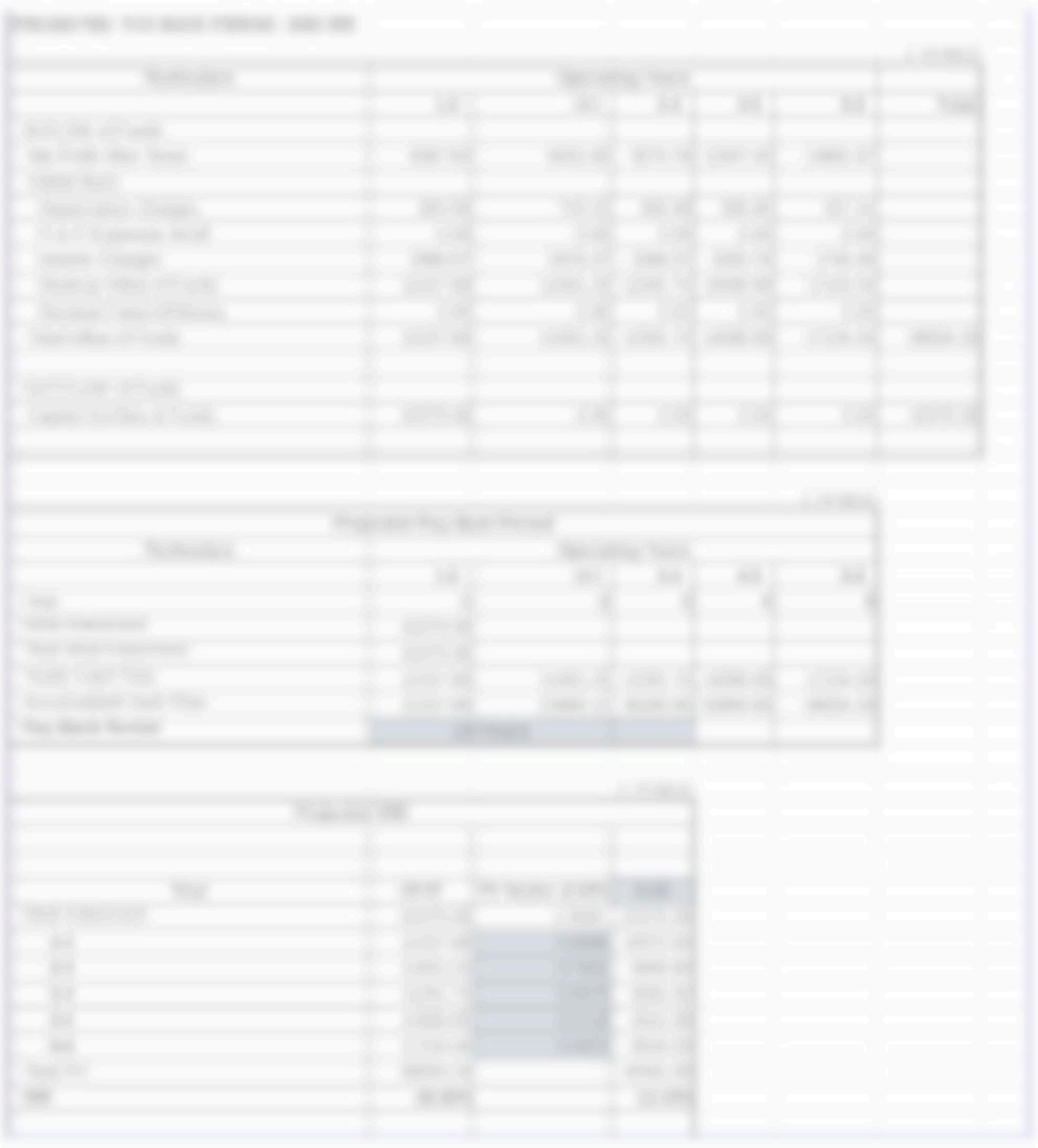
2.10.10 Projected Cash Flow



2.10.11 Project Balance Sheet

2.10.12 Projects Pay-back period

Payback period for the 6-APA manufacturing is **2.8 Years + 2.5 years for construction period**.



2.10.13 . Project At a glance

Asset turnover ratio indicates the efficiency of the plant i.e., how efficient company use the assets. At the e nd of the fifth year the Asset turnover ratio is 0.51 (USD).

The current ratio is a liquidity ratio that measures a company's ability to pay short-term obligations or those due within one year. It tells investors and analysts how a company can maximize the current assets on its balance sheet to satisfy its current debt and other payables. The Current ratio at the end of fifth year is 0.37 which shows company is managing the liabilities.

3. Suppliers of Plant & Machinery

[illegible]

[illegible]

Canadian Crystalline Water India India Ltd
Sathish Kumar (President)
[redacted]

[redacted]

[redacted]

Progati Engineers
[redacted]

[redacted]

Fresnel's
[redacted]

[redacted]

FILTER

[redacted]

Chemech Engineering
R. J. Mewada(Proprietor)
[redacted]

Chinnan Engineers
[redacted]

Cronalive Engineers
[redacted]

Mini Mac Dosing Pumps
[redacted]

STORAGE TANK

Swastik Engineering Works
Address: A2, Pankaj Building, Kanjalwani ST Park, Near Meganagar Hall
Chembrah, Andheri East, Mumbai - 400071, Maharashtra, India.
Telephone Nr. - 2526674823 / +91 - 2526674827
Email: rajarsh.panchal@swastikengineering.net, marketing@swastikengineering.net
Email: directors@swastikengineering.net
Website: www.swastikengineering.net

Nisha Enterprise
Bhavesh Jhaveri(Proprietor)
Address: Shop No. 4, Building No. 2, Ashi Apartment, Jeetiwadi Cross Road 2 Near Vasant
Sankwarya, Kandivali West, Mumbai - 400067, Maharashtra, India
Mobile: +91-9833143436, +91-9820622232
Telephone: +91-22-28624402
Website: http://www.nishaenterprise.com/

Chandrish International
Kumar Gupta(Proprietor)
Address: No. 114, Daryaganj, New Delhi - 110002, Delhi, India
Mobile: +91-9899736384, +91-9811147123
Telephone: +91-11-23277863, +91-11-23274387
Fax: +91-11-23270874
Website: http://www.chandrish.in/

Lunar Engineers
F. C. Shah (CEO)
Address: No. 37 C, Anand Darshan, No. 13, Peddar Road, Mumbai - 400026, Maharashtra,
India
Mobile: +91-9820827436, +91-9820036236
Telephone: +91-22-2740 2182
Website: http://www.lunarengineers.net/

GRANULATOR

Tableting Machine Rotary Type
Address: 1-45/16, Phase IV, Near Nesky Tube Cross Road G.I.D.C., Vatva, Ahmedabad - 382445, Gujarat, India
Website: http://www.fluidpack.in

Pharma Tech International
Raju Dasgupta(Owner)
Address: 30, Chandpatty Road, P.O. Beleghata, Kolkata - 700010, West Bengal, India
Website: http://www.pharmatechint.net/

RiddhiPharma Machinery Limited
Hiren Shah (Marketing Director)
Address: One Shivam, No. 2, Tarun Bharat, Chakala, Sahar Road, Andheri East
Website: http://www.riddhipharma.net

Unnati Industries
Sandip(Proprietor)
Address: C/7, Anup Estate, Near Bharat Party Plot 9/0/4, Amraiwadi, Ahmedabad - 380026, Gujarat, India
Website: http://www.unnatipharmamachinery.com

Pankaj Industries
Hemantbhai Jain (Director)
Address: Gala No. 3, Amit Industrial Estate, No. 3, Saraghat Village, Vasai Road East, Vasai East, Thane - 401210, Maharashtra, India
Website: http://www.pankajindustries.com

Mantech Machinery
Address: B - 18, Trilok Park, Near Trivesi Park, Vastral Road, Ahmedabad - 382418, Gujarat, India
Website: http://www.mantechmachinery.co.in

REFRIGERATION UNIT

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

Om Metals And Engineering
Address: S. R. No. 5, Ekata Housing Society, Bapujibuwa Nagar, Thergaon - Pune - 411033,
[illegible]

[illegible]
[illegible]

[illegible]
[illegible]

[illegible]
[illegible]

[illegible]
[illegible]

[illegible]
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COOLING TOWERS

Akshaya Enterprises
Mr. V Ruban
Address: No. 4-1, Tawy Nagar, 5th Cross West, Meena Estate, Coimbatore - 641 028, Tamil Nadu, India
Mobile: +[illegible]
Telephone: +[illegible]
Fax: +[illegible]
Email: [illegible]
Website: [illegible]

Adva Tech Engineers
Address: A-17/18, Hirabaug Industrial Estate, Plot No.30, Phase-1, Nr.Chekul Tube, GIDC, Vatva, Ahmedabad-382445
Phone No: +91 - 79 [illegible]
Mobile no: +91 [illegible]
Fax No: +91 - 79 - [illegible]
E - Mail: [illegible]
Website: [illegible]

Everest Refrigeration
Address: 201 W Artesia Blvd, Compton, CA 90220
Phone: [illegible]
Fax: [illegible]
E mail: [illegible]
Website: [illegible]

Thermal Engineering Services
Mr. P. N. Vishwakarma
Address: A - 115, Vishwanathan Nagar, Sukhliya, Indore - 452010, Madhya Pradesh, India
Mobile: [illegible]
Telephone: [illegible]
Email: [illegible]

Star Cooling Tower Pvt Ltd
Mr. K. Shanmugam
Address: No. 30 - A, Reddy Street, Nerkundram, Chennai - 600107, Tamil Nadu, India
Mobile: [illegible]
Telephone: [illegible]
Fax: [illegible]
Email: [illegible]
Website: [illegible]

BOILER

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

Swagat Steel & Alloy
Address: No. 73, 1st Bhandari Street, 1st Kumbharwada, S. V. P. Road, Opposite Round
[illegible]

[illegible]
[illegible]

[illegible]
[illegible]

[illegible]
[illegible]

[illegible]
[illegible]

[illegible]
[illegible]

[illegible]
[illegible]

BVK Fibrotek Engineers Pvt Ltd.
Address: B- 4. Maharani Flats. 1st Floor. No. 16. Kamala Nagar Porur. Chennai - 600 116.
[illegible]

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PURIFICATION SYSTEM

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INSTRUMENTATION

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

FILLING & PACKING STATION

[redacted]

FUEL STORAGE

[redacted]

Mr. Rajesh Kumar
Address: 34. Corner Market. Millennium Business Center. Malviya Nagar. Delhi - 110017. India
[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

LEHRA FUEL TECH PVT LTD

Address: Ludhiana – Malerkotla Road, Opposite BP Petrol Pump, Near Shanti Tara College,

[illegible]

Excel Pharm & Equipment Pvt Ltd

[illegible]

Rollcast Technolab India Pvt Ltd

[illegible]

Premium Polmac Pvt Ltd

[illegible]

Trimark Engineers Pvt. Ltd.

[illegible]

MAINTENANCE EQUIPMENTS

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

LABORATORY EQUIPMENT

Apothecaries Sundries Mfg. Co.
Address: A-8/13 Room, 1 St (A.S.Ext) Nagar, New Delhi – 110 012, India
Phone: +(91)-(11)-25420[illegible]
Fax: +(91)-(11)-25467[illegible]
Website: http://www.asconindia.com/

Rajco Scientific and Engineering Products
Address: 12/17, Ist Floor, Ashok Nagar, Behind Tilak Nagar, Police Station, New Delhi – 110 018, India
Phone: +(91)-(11)-25[illegible]
Fax: +(91)-(11)-25[illegible]
Website: http://www.rajcoscientific.com/

SGM Lab Solutions
Ms. Shivangi Gupta
Address: B-8, 11, Mangolpuri Industrial Area, Phase 2, New Delhi – 110 034, India
Mobile: +(91)-97[illegible]
Telephone: +(91)-(11)-4[illegible]
E-mail: shivangi@labsgm.co.in
Website: http://www.laboratory-equipments.in/

Indowise Equipments & Instrument Company
Mr. Ajay Mane (Proprietor)
Address: C. E. S. No. 123, Sh. Bharat Mata Seva Society, M Cleri Road, S.D. Compound, Gandhi Nagar, Charkop, Kandivali (W)Mumbai – 400067, Maharashtra, India
Mobile: +(91)-982[illegible]
Telephone: +(91)-(22)-2[illegible]
Website: http://www.indowise.in/

Kanda Instruments Company
Mr. Kanda Chamil (CEO)
Address: C-124, SIDC Complex, Vanagaram Road, Ashgate, Ambattur, Industrial Estate, Chennai – 600058, Tamil Nadu, India
Mobile: +(91)-984[illegible]
Telephone: +(91)-(44)-2653[illegible], +(91)-(44)-2[illegible]
Email: [illegible]@gmail.com
Website: http://www.laboratoryequipmentsmanufacturers.com/

Mech Lab Equipments India Pvt Ltd.
Mr. Ananda Subramanian (Director)
[redacted]

K. Pan Instruments Engineers (India Private Limited
[redacted]

Sahar Scientific
[redacted]

Swastik Scientific Company
[redacted]

PIPELINE & FITTINGS

[redacted]

Rupam Industries
Address: M-73 New Sivagani. Indore - 452 001. India
[redacted]

[redacted]
[redacted]

[redacted]
[redacted]

[redacted]
[redacted]

[redacted]
[redacted]

[redacted]
[redacted]

PIPELINE AND VALVES

[illegible]

[illegible]

[illegible]

SCHWITZ BIOTECH

Address: 405. 4th Floor. Harvy Tower. Himalaya Complex. Subhash Chowk. Gurukul Road

[redacted]

ENZYMES D – AMINO ACID OXIDASE

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

SUBSTRATE

[redacted]

PRINTED PACKING MATERIAL (POLYPACK)

[redacted]

LAB CHEMICALS

A. B. Enterprises
Mr. Manoharlal Jhang (Partner)
Address: No. 202, Moodymanil Building, No. 272/ 274, Samuel Street, Mumbai - 400003, Maharashtra, India
Mobile: +[illegible]
Telephone: +[illegible]
Website: http://www.abenterprisesindia.com/

Shri Krishna Enterprises
Mr. Sales Manager
Delhi - India
Mobile: +[illegible]
Telephone: +[illegible]
Website: http://www.shrikrishna.co.in/

Farben Pharmaceuticals
Contact Person: Mr. Aparva Kamdar / Mr. Mudit Kamdar
Address: Corporate Office: 307, Business Park, Dawane Road Corner, Hingwala Lane, Vidit Road, Ghatkopar(E), Mumbai - 400 077 (India)
Tel: +[illegible]
Mobile: +[illegible]
Fax: +[illegible]
Email: info@farbenpharma.in, farbenpharma@hotmail.com
Website: http://www.metadyn-farm.com/

R. K. Chemicals
Mr. A Mishra (Director)
Address: B - 2, Shivalik Apartment, 1st Floor, Near Century Fabia Colony No. 1, Pune - Nashik Highway, Bhosari, Pune - 411039, Maharashtra, India
Mobile: +[illegible]
Telephone: +[illegible]
Website: http://www.rkchemicals.in/

Ekta International, Mumbai (Export Division of Varia Chemicals)
Mr. Rajeshwari Patel
Address: 310, Shyamkamal "B" Bldg, Vile Parle (East), Mumbai - 400 057, Maharashtra, India
Mobile: +[illegible]
Phone: +[illegible]
Fax: +[illegible]
Website: http://www.ekta-international.com/

New Alliance Dye Chem Private Limited
Mr. Anand (Sales Manager)
[redacted]

[redacted]
[redacted]

[redacted]
[redacted]

[redacted]
[redacted]

[redacted]
[redacted]

END OF DOCUMENT

Sincerely,



R. Senthil Kumar
Director-CoP Operations
Isha's GMP Consultancy
New No. 2 (Old No.6) A, 2nd Floor(Behind pantry)
4th Street,Bharathi Nagar, T.Nagar, Chennai,
Land Mark : Opposite to CBI(HO), Show room, India
Mobile : +91 9841*****, +91 8939*****
e-mail : info@ishasgmp.com, gmp.isha@gmail.com