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MARKETING STUDIES OF GUYANA NATIONAL ENGINEERING CORPORATION
IN THE CO-OPERATIVE REPUBLIC OF GUYANA

DP/GUY/86/008

GUYANA

Terminal report*

Prepared for the Government of the Republic of Guyana
by the United Nations Industrial Development Organization,
acting as executing agency for the United Nations Development Programme

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* This document has not been edited.

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EXECUTIVE SUMMARY

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The present report, is a Marketing Study, of two Divisions of the Guyana National Engineering Corporation - the Foundry Division and the Ship Building and Ship Repair Division. The report covers in detail; the current status of the two Divisions, production and performance, constraints faced and competition; Domestic and Export Market Field Research; Analysis of market data, identification of potential products, strategies, plans and options open, financial analysis, and recommendations for future courses of action.

FOUNDRY DIVISION

(i) Current Status

- The performance of the Foundry, has been poor, with consistent losses over the years. Profits before Tax (000), since 1986 have been (4245), (10669), (3579) and (2307) respectively (10 months) in 1989.
- The Foundry has been producing small volumes of ferrous and non ferrous castings, highest production being in 1985 of 157 tons and 32.50 tons. 1989 production was 35 tons and 12 tons respectively.
- Capital intensive assets installed in 1985 - Induction Furnaces, Auto Sand Handling Plant and Auto Molding Line; have hardly been operated since installation, but have been a tremendous burden on the Division, in terms of debt servicing and very high fixed costs.
- Capacity utilisation has been as low as 11.55% and 3.42% taking only the currently achievable capacities of the Ferrous and Non-ferrous lines of 300 tons and 130 tons. Figures could be very much lower, if real nominal capacities are considered. Induction furnace line has had practically no utilisation.
- Foundry has been plagued with a variety of constraints, major ones being; electric power supply; high turnover of skilled and experienced labour and managerial and technical personnel; foreign exchange constraints and non-availability in time of imported and local materials. Constraints discussed in detail in Para. 1.9.

ii) - Market Research

- Detailed country Market Research studies, conducted both for Domestic and Export Markets; in Guyana; Jamaica; Trinidad and Tobago; Barbados; Antigua; St. Kitts and St. Vincent are outlined in appendices 3 to 9 and Tables 5 - 26. Country studies highlight and analyse market demand, current and future, sectorwise and productwise, and also current developments taking place in each sector.
- Demand summaries, countrywise and sectorwise have been analysed in paragraph 2.3. Demand is highest in Jamaica, followed by Barbados, Guyana, Trinidad, St. Kitts, Antigua and St. Vincent. Total current and future demand, in region, for ferrous castings is 6340 tons and 5973 tons respectively; out of which 3908 and 3024 tons are in ductile iron and 19.5 tons and 31.5 tons in Nihard; the balance of 2432 and 2549 tons being cast iron. Domestic demand is 644 and 789 tons respectively. Country wise summary's of total market demand are indicated in Tables 34 and 35.
- Sectorwise summaries, indicate water and sewage sector as the largest for ferrous castings, with 4177 tons and 3706 tons respectively, bulk of which is ductile iron. Sugar sector has a constant demand of around 1420 tons, all cast iron. Other sizeable demands are from Manufacturing and Telecom Sectors contributing around 250 tons each. Small requirements exist in the Quarrying, Public Works, Forestry and Mining Sectors. Summary of demands, sectorwise are indicated in Tables 36 to 39.
- Major developments expected in the Telecom Sector, with entry of m/s Cable and Wireless, in most Caribbean countries, and m/s ATN in Guyana. Entry of m/s Bookers in Guyana Sugar Sector, and m/s Reynolds and m/s Alcan in the Mining sector should also generate good demands, considering expected investments for rehabilitation and resultant stepping up of production. Major rehabilitation is also planned in the Water and Sewage Sector in all countries, especially Guyana, Jamaica and Barbados. Details in Para 2.3.
- Domestic competition is from m/s BACIF, and imports from international corporations, apart from other small smelting facilities. BACIF plans expansion, and GUYSUOC also plans to expand its facility into a full fledged Foundry.

- Regional competition is from four foundries each, in Jamaica and Trinidad. Other countries have no foundries. Caribbean Castings of Jamaica, is the largest Foundry and has produced around 1075 tons of ferrous and 7 tons of non ferrous castings in 1989. Details of competition are highlighted in paragraph 2.4 and the Foundry Profiles (competition) are enclosed in Appendices 10 to 19.
- Production and supply from all regional foundries has been only 1335 tons, ferrous and 159 tons, non ferrous, against an overall capacity of 4695 tons ferrous and 719 tons non-ferrous; i.e. an overall capacity utilisation in the region of only 29% ferrous and 22% non-ferrous. Details in paragraph 2.5. Supply potentials (Caribbean Foundries) indicated in Tables 40 and 41.
- Market opportunity therefore, taking into consideration the poor supply, from the regional foundries, is around 4895 tons ferrous and 514 tons non ferrous, uncatered for. This is currently, being catered to, by imports mainly from the USA, UK, Cuba and other countries.

Domestic market opportunity, after taking supplies from GNEC and BACOIF of 100 tons ferrous and 67 tons non ferrous, is around 543 tons ferrous and 43 tons non ferrous, uncatered for.

Detailed Market demand estimates vs supply potentials; and actual supplies and market opportunity have been analysed in detail in paragraphs 2.5 to 2.7 and Tables 42 and 43 respectively.

iii) Future Prospects

- Market trends indicate, that cast iron markets have been shrinking all over the world, and in this region, in preference for materials like ductile iron, malleable iron, nihard and steel. Sectorwise market trends have been analysed in detail in paragraph 3.1.
- Potential products, ferrous and non ferrous, have been identified and analysed in para 3.2. Potential products in the ferrous sector include sugar mill roller shells; trash and scraper plates, coupling boxes; manhole covers and frames and fire hydrants; gully grids/grills and step irons; pipes and bends, valves, saddles and couplings; and Telecom Junction Boxes/manhole covers.

On the non ferrous side, major requirements are Sugar Industry requirements - mill bearings, bushings, water and sewage sector - valves, saddles, fire hydrant accessories, etc.

GNEC Possibilities and Options are analysed in para 3.3.

- The probable marketing plan, considering potential products and taking into account; possibilities of entry into the export regional and extra regional markets; has been analysed and detailed in Para 3.4. Extent of market penetration and market shares achievable have been assessed in consultation with Executive Director - Marketing and Planning.
- Proposed costing, pricing and financial analysis, to determine competitiveness of GNEC Foundry, with respect to competition, in terms of price; determination of a pricing policy and also determination of future viability of the Division; was not possible in view of inconsistent and unreliable cost and financial data furnished by the Corporation.

Several inconsistencies were noticed in information provided, and this was taken up with the GNEC Management. It was felt that this type of information, would not form a good base for any determination of pricing policy, and a basis for vital management decisions, about viability of the Division. Any analysis, based on this data would give a very misleading picture about costs, selling prices and projected financial performance and profitability.

It was decided by GNEC Management, that no further analysis will be made, based on this data and that, this current study would be concluded without the costing, pricing and financial analysis. This decision was also communicated to UNDP, UNIDO headquarters by the Consultant, and to the National Project Leader, Mr. W. Lynch, by the GNEC Management.

Following internal discussions, GNEC's Management decided that a more detailed and reliable costing and financial exercise would be carried out by its Financial Department, and that, as per indications of the Executive Director - Finance, would take about a month's time.

Further, that UNDP would be approached through the National Team Leader, for a later update of the study in the form of an addendum, to include the financial analysis.

Correspondence between the Consultant and GNEC Management, highlighting some examples of major inconsistencies in data, are discussed in Para 3.5 and Attachments.

iv) Strategies and Plans

- Strategies and plans open to GNEC have been discussed in detail in para 3.6. Major strategies that suggest themselves, for the foundry, to be a viable proposition are:
 - Maximise production in the foundry, at profitable production levels. Para 3.6 (i-a).
 - Cater initially to, and capture domestic market demand by aggressive marketing. Para 3.6 (i-b).
 - Produce a wider range of products in cast iron. Para 3.6 (i-c).
 - Diversify into other materials like ductile iron and nihard. Para 3.6 (i-d).
 - Produce certain specialised product lines with good potential like pumps, valves, pipe and pipe fittings for distribution and retail sale. Technical collaboration with reputed international manufacturers of these products, with distribution and marketing arrangements for overseas markets. Para 3.6 (i-e).
 - Make thrusts into Regional Caricom Markets by
 - direct marketing thrusts by GNEC
 - distributor tie up, in certain potential areas
 - tie up and mutual marketing arrangements with other Foundries in region for certain products. Para 3.6 (i-f).

- Attempt entry into extra regional markets; especially the large volume markets in USA and Europe, for items like pumps, valves, pipe and pipe fittings and manhole covers. Only possible route would be a manufacturing and marketing/distribution tie up, with reputed international manufacturers. Para 3.6 (i-g).
- Cater to the domestic market demand for non ferrous castings, enter and consolidate in the Caricom markets, especially for bushings and bearings. Para 3.6 (ii-a&b).
- Utilise existing Centrifugal Casting Machine to produce non ferrous sleeves, cored and solid bushings, of standard sizes, for direct sales and retail sales to hardware outlets.
- Consider investment for a small die casting machine, to cater to large market requirements, for aluminium domestic fittings, water and furniture fittings.

v) Management Actions

- The major management actions required to implement and put in place the strategies and plans have been discussed in detail in Para 3.7. Major actions being:
- Detailed feasibility study and cost benefit analysis to determine, a better cost effective option of operating the induction furnace line vs the option of additional cupolas (60 inches diameter).
- Necessary investments for equipment and auxiliaries for the proposed range of products and material diversification contemplated.
- Enter into technical collaboration for modern cost effective technologies and product development assistance, with some reputed international manufacturer of castings.
- Ensure uninterrupted electricity supplies from GEC. Alternatively invest on captive generators. Para 3.7 (iv).

- Augment staff capabilities of Foundry with required Managerial and Technical personnel and skilled workforce. Very little managerial and technical skills currently exist in the Foundry and this aspect requires priority attention. Details in para 3.7 (v).
- Create an exclusive, technically competent Foundry Marketing Team. To start with, there should be a Marketing Manager and a Product Manager, supported by existing staff.
- Ensure proper planning, ordering and receipt, of imported and local materials, in time, by effective inventory control systems.
- Introduce scientific standard costing systems, for realistic costing and pricing of products, and cost and budgetary control systems, to monitor and control costs on a continuing basis.
- Enter into suitable marketing arrangements, especially for export marketing, with other foundries in the region for certain products. Distributor tie up in certain countries for marketing specialised products. Tie up with international manufacturers of Foundry products. Para 3.7 (vii).
- In conclusion, the best route open to the Management, would be a Joint Venture and Collaboration tie up, with a reputed international producer of foundry castings.

The Joint Venture package to include; inputs by way of required financial investments for new equipment/auxiliaries, and for rehabilitation of existing equipment; transfer of modern cost effective technologies; product development assistance; training of local personnel; buyback and marketing distribution arrangements for overseas markets, through distribution channels already established.

SHIPBUILDING/SHIP REPAIR DIVISION

i) Current Status

- The SB/SR Division has made profits in 1965, after which, in all years, there have been losses. Profits after tax (000), have been 1219, (1084), (1809) (218) and (925) in 1969 (upto June).

- Production of the Division, during 1986, has been only around 30% of capacity, and in 1987 much less, due to a variety of constraints.

In 1986 and 1989, the performance was poor, due to both docks being locked up, for almost the entire period, with vessels under litigation, or awaiting much needed imported materials, for extensive repair. As such, no other vessels could be catered to, during this period.

- Ship building activity in the region, has been very negligible and the mainstay of the divisions activity has been Ship Repair. A cursory study of the future order bookings revealed, a confirmed workload for the next 3 to 4 years of ship repairs.
- In view of the tremendous market potentials, already existing, it was decided to shift the emphasis of study; to concentrate mainly on identifying current production and management constraints; and categorizing the types of inputs required for improving capability of the division; improving through put times; maximising output and performance, in order to facilitate speedier servicing of outstanding demand.
- The dockyard, has been experiencing several constraints, major ones being; heavy turnover of skilled manpower to private competition, present strength being 92 against 178 required; Electric Power Supply; shortages of Foreign Exchange for procurement and stocking of imported materials like steel, paints, essential machinery spares, cutting tools, special welding electrodes etc; Age and condition of machinery and equipment, many requiring replacement/extensive rehabilitation. Further details in Para. 1.6.

Market Research

a) Domestic Market

- Market research conducted, in the domestic market identified, around 20 major owners of vessels; including ships, ferry boats, patrol boats, barges, tugs and trawlers. Table 5 indicates the number and type of major vessels owned in the Region.

There are also, in addition a number of smaller craft operating in the region, including fishing trawlers, pontoons and punts for internal transportation.

- Most vessels in the region are very old and in need of very extensive repair. Also the economic situation in the region, has influenced ship owners, to enter docks only when absolutely necessary, or only in emergent circumstances. Trends therefore, have shifted to longer and extended docking times per vessel.
- Most larger vessels are serviced by GNEC. As regards smaller craft, however, competition from smaller docks/shipways in the region, has resulted in loss of revenue/workload for GNEC.
- Ship Building activity worldwide, and in the region, has been very negligible over the years. Also the tendency of ship owners in recent times, to invest in larger cargo vessels, beyond the capability of the Division; has resulted in work for the division being diverted to larger dockyards overseas.
- Ship repair activity, as mentioned earlier, has been the mainstay of the Division in recent years. Table 7 highlights, current requests; confirmed orders and the future docking schedule, with estimated docking times expected, depending on extent and nature of repairs.

Twenty one (21) vessels are registered for docking in the Northern docks, with estimated docking time of around 29 months i.e. around 2 1/2 years.

The Southern, dock has 10 vessels registered for docking, with an estimated docking time of around 38 months, i.e. around 3 1/4 years.

- Para 1.4 analyses, the trend of the actual docking times, far exceeding the estimated docking times, in view of ship owners not fully indicating the extent and nature of repair activity.

Current order bookings therefore, are expected to keep the docks, fully engaged for another 3 1/2 to 4 years. Slipways; however are not likely to be fully utilised, in view of competition for smaller crafts in the region.

(b) Regional Markets

- Survey covered six (5) countries, i.e. Jamaica, Trinidad & Tobago, Barbados, Antigua, St. Kitts and St. Vincent. List of Organisations contacted in each country is enclosed at Table 8.
- Tables 9 to 12 indicate, the number of ships/other crafts registered in Jamaica, Barbados, Antigua and St. Vincent, operating within Caribbean region. Tables also indicate type of craft, size, specifications and owners. Trinidad & Tobago and St. Kitts have no vessels registered.

There are also vessels registered, in countries like Suriname, Venezuela, St. Lucia, Grenada, etc., operating in the region. Survey however, did not cover these regions.

- Discussions and correspondence with ship owners in neighbouring countries like St. Vincent, Barbados, Suriname indicate that there is interest for docking facilities in Guyana. Jamaica, Antigua and other, not so proximately close countries to Guyana, however, expressed interest in docking facilities much nearer.

i:ii) Market Opportunity

- Tremendous potential exists for ship repair activity in domestic, and from neighbouring regional markets. GNEC Ship Building/Ship Repair Division has got enough confirmed work for the next 3 to 4 years, only from the domestic market (not considering other demands from neighbouring countries), and will have to gear itself to full capability in order to satisfy and cater to this potential demand, for ship repair activity.
- Competition exists from several dockyards in the region. Para 2.4 highlights competition in the region. However, there is enough domestic demand, as highlighted earlier, as well as potentials from neighbouring countries, to sustain the division for the next few years.

iv) Future Prospects

- Tremendous potential exists for the division as analysed earlier.

Ship Building

- Ship Building activity is on the decline and does not indicate any significant increase in activity, unless there is change in the economic situation in the region.
- Divestment of Fisheries, Sugar and Mining industries however, could generate some additional demand.
- Unless rapid changes take place in these sectors, no appreciable increase in activity is expected.

Ship Repair

- Tremendous potential exists, as analysed earlier. Almost 3-4 years of future confirmed work.

Dry Docks

- Dry docks are likely to be fully utilised with the tremendous ship repair potentials. The problem, however, will be to gear up and cater to this demand; improve capability and through put times; capitalise on opportunity and cater for a greater number of vessels.

Slipways

- Competition from other smaller docks and slipways in the country, and the limited number of smaller crafts in the region; indicate that slipway capacity is likely to be underutilised, unless steps are taken to improve facility and service, costs and through put times in relation to competition and the recapture of markets lost to competition.

v) Management Actions

- The potential demand, if to be protected from competition, and catered for by GNEC; several Management Actions/inputs would be required to optimise production and performance and overcome existing constraints. Detailed actions required are outlined in Para 3.5. The major actions being:
- Shortfall of around 50% of skilled and experienced workforce to be put in place and trained to achieve the skill and competence required. Details in Para. 3.5 (i).

- Augment Technical and Managerial capabilities, by filling up vacancies in division, in areas of Marine Engineering, Architecture and Design, and other management and supervisory personnel, to be groomed, under present section heads, for future succession.
- Build up adequate stocks of steel, paints and other imported raw materials, so as to ensure uninterrupted production. Suitable foreign exchange measures to be worked out.
- Ensure uninterrupted electrical power supply.
- Provide one more overhead crane over slipways and two more mobile cranes for the Division, to ensure easier material handling and reduced manual effort.
- Restore the "Outfitting Quay" by removal of old piles and dredging. Alternate location would be the wharf behind foundry area. Will ensure better utilisation of docks and slipways and carrying out work, not requiring docking, out of the docks.
- Modify slipways to take bigger pontoons, fishing trawlers and other smaller crafts. Installation of a central rail in the slipway or facility to reduce span of slipways. Will facilitate accommodating a wider range of smaller craft and improve utilisation of the slipways.
- Repairs to Northern Dock gate and cementing of dock floor.
- Investments to replace very old and obsolete machinery and equipment, spares for which are not available; extensive rehabilitation of machinery, currently operating, well below their precision and capability requirements due to age. Details of machinery and equipment to be replaced and rehabilitated are indicated in Para 3.5 - ix (a and d).
- Procure critically required spare parts, to put back into commission, several machines, lying idle, mostly due to foreign exchange constraints. Details in Para 3.5 - ix (b).

- Procure long awaited, critical imported cutting tools. Special cutting torches and regulators, special electrodes, hand tools and measuring instruments. Details in Para 3.5 - ix (c to e).
- As a long range measure, may be worthwhile considering investments for an additional larger floating or dry docking facility, capable of handling larger and more sophisticated vessels. Details in Para 3.5 - (x).

In conclusion, there is immediate need to improve capabilities of the division, through put times at docks/slipways, modernise the existing facilities, optimise production and performance; and improve customer servicing and satisfaction, if the potential demand is to be protected from competition.

Technical, Managerial and workers skills will have to be strengthened and augmented, and sizeable investments made towards replacement/rehabilitation of machinery and equipment; import of necessary raw materials, spares, cutting tools and auxiliaries.

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I INTRODUCTION

The UNDP funded project DP/GUY/86/008 was initiated in 1986 as an Institution Building project for strengthening of the Guyana State Corporation (GUYSTAC up to December 1986) now called the Public Corporations Secretariat (PCS). The execution of the project was entrusted to the United Nations Industrial Development Organisation (UNIDO) and the implementation to the Public Corporations Secretariat.

PCS has overall responsibility of 28 Public Corporations, in a wide variety of sectors, including agro-based industries, utilities, trading and manufacturing. Most of these Corporations were owned by multi-national Corporations and were nationalised during the 1970's.

The development objective of the project is to improve the performance and operational efficiency of the Public Sector Corporations, thereby enhancing their overall contribution to the economic and social goals of the country.

The immediate objective is to enable the Government to achieve improved monitoring and upgrading of the performance of the Public Sector Corporations grouped under the Public Corporations Secretariat (PCS). Emphasis to be laid on strengthening capability of the Secretariat to monitor performance of the Public Corporations and providing direct comprehensive management assistance to the Corporations to improve management systems, overcome operational problems and improving performance.

The current short term consultancy project for a six months duration has been designed to provide marketing assistance to one of the Corporations under PCS, the Guyana National Engineering Corporation (GNEC).

GNEC is a Public Corporation with a variety of Engineering Operations including Manufacturing; Trading; Shipbuilding and Ship Repair; Traffic and Automotive and Agricultural Equipment Agencies. The current project involves the market study of two of its operations, the Foundry Division and the Shipbuilding and Ship Repair Division. The production aspects have already been studied and dealt with earlier by the long term UNIDO Industrial Specialist attached to this project.

The study has been undertaken in four phases as follows:

- | | |
|-----------|---|
| Phase I | Assessment of current status of the Divisions under study; production and performance; constraints faced and competition. |
| Phase II | Domestic Market Field Research |
| Phase III | Export Market Field Research |
| Phase IV | Compilation and analysis of market data; identification of potential products; financial analysis and recommendations for future courses of action. |

The detailed work programme is enclosed in Appendix I.

It was decided that, within the short time frame available to restrict the export market research to the Caribbean Region and to cover six potential countries in the region - Jamaica; Trinidad & Tobago; Barbados; Antigua; St. Kitts and St. Vincent.

As regards the SB/SR Division, a cursory study indicated that there is enough market demand and work load for the Division, the confirmed pending orders for docking space and the future docking schedule indicated a work-load for the Division for the next three to four years.

The emphasis of the study, for SB/SR division, ^{therefore} has/been shifted to identify the bottlenecks/constraints and suggest future courses of action by the division to gear up and meet the potential demand

On the job training, was imparted to the counterpart staff, in the Corporation throughout the period of study. No formal training programmes were planned, as no funds were allocated in the project for this activity.

The report covers in detail the various phases of the project, analysis, findings, observations and recommendations for the two divisions, the foundry division and ship building/ship repair division.

II GNEC FOUNDRY DIVISION

1. CURRENT STATUS

1.1 BACKGROUND

GNEC's foundry was set up primarily to service the bouyant Sugar Industry in Guyana. The foundry was then owned by M/S Bookers, who also owned the Sugar Industry in Guyana.

The foundry was nationalised in 1976 and brought under The Guyana National Engineering Corporation, along with a few other manufacturing operations and ship building and ship repair facilities.

The foundry initially, was a small operation, with only Cupolas and Crucible furnaces with conventional floor moulding facilities, for production of cast iron and non-ferrous castings. Outputs from the foundry were inadequate to supply the Sugar industries demand, both in terms of tonnage and delivery periods. Demand also existed in other sectors like rice, bauxite, timber, manufacturing, water and sewerage which requirements of castings, the local foundry was unable to meet.

In 1978, GNEC felt the need for a larger foundry to expand its operations in the foundry division and intensify its production of ferrous and non-ferrous castings, based on the then demand of castings in the country. Decisions were taken to expand the ferrous line with Induction Furnaces, a modern sand preparation plant and an automatic moulding line with hydraulic presses, and adequate funding was sought from external sources.

BACKGROUND (CONT'D)

The foundry, was in 1985 finally expanded and the new plant and equipment was supplied by M/S Maverex Foundry Equipment Limited with an overall capacity to produce 1700 tons of molten metal per shift and 845 tons of grey iron and 300 tons of Nihard as finished castings, on a single shift operation, per year.

The foundry has not been performing well and has over the years been producing a very small tonnage of cast iron and non-ferrous castings, the maximum production in recent years being in 1985 of around 157 tons of cast iron and 32.50 tons of non-ferrous castings.

Since 1985, there has been a further decline in the activity of the foundry with 1989 production levels being 35 tons of cast iron and 12 tons of non-ferrous castings.

The new Induction Furnaces, the Sand preparation plant and the automatic moulding line have hardly been used since installation in 1985, for various reasons and constraints which will be discussed in the report.

The performance of the Foundry Division has been poor and the division has been consistently making losses. Latest figures from the GNEC balance sheet/reflect that the foundry division recorded a loss of G\$2.0 Million. Detailed figures of capacity, production levels and constraints faced will be reflected in later parts of the report.

1.2 PRODUCTS MANUFACTURED

The major products manufactured have been coupling boxes, trash plates and scraper plates for the sugar industry; manhole covers and frames (very small quantities on trial basis) for the water and sewerage sector and small miscellaneous castings of iron like replacement parts, loco wheels, furnace doors, pulleys, firebars etc.

On the non-ferrous side the main products have been top gear bearings, bottom/side bearings for the sugar industry sector and miscellaneous non-ferrous castings like; impellers, pump housings, bearings, bushings etc.

The poor delivery image of the Foundry has led to potential products being lost to the only competitive foundry in Guyana M/S BACIF, especially in the non-ferrous segment.

1.3 MAJOR EQUIPMENT

The major equipment in the foundry in the ferrous and the non-ferrous production lines are as follows:

Ferrous Line

- Two (2) x 6.4 tons Induction Furnaces
- Maverex Sand Mixer, Sand preparation and storage plant.
- Auto moulding machine with capacity of 30 moulds per hour.
- Cupola 24" with a draw of 700/800 lbs.

Non-Ferrous Line

- Two (2) x 1200 lbs oil fired crucibles.
- Centrifugal casting machine for manufacturing of bushings and hollow castings (6 inches diameter + 18 inches long).

Auxiliary Equipment

- 1 x 15 ton crane in casting area (Ferrous)
- Crane facility for non-ferrous products (moulding and fettling)
- Fettling/shot blasting facility
- Well equipped pattern shop (wood turning lathes, electric wood plane, circular saws etc)
- Quality Control laboratory (equipment for microscopic examination, metal composition etc.
- Core making facility.
- Well equipped machine shop - large lathes, vertical and horizontal boring machines, double head shaper, radial drilling machines, milling machine, shapers and planing machines, geared to machine small medium to heavy castings.
- Annealing furnace with facility to accommodate products up to 210 inches length and 25 inches diameter.

1.4 PRODUCTION CAPACITY

The Production capacity of the foundry in terms of the ferrous line and the non-ferrous section are as follows:

a) Ferrous Section

Ferrous section has two types of furnaces, the induction furnaces and the cupola.

i) Induction Furnace

The two induction furnaces of 6.4 tons each have been designed to have a melting and finished casting capacity as follows:

Melting Capacity per year - 1700 tons on single shift

Finished casting capacity:

- Grey Iron	-	845 tons
- Nihard	-	300 tons

Total capacity

(finished casting)

1145 tons/SHIFT IN A YEAR

ii) Cupola

The Cupola operation has a capacity; restricted by current infrastructure, balancing equipment, moulding boxes etc; of around 300 tons per year on single shift operation . This also takes into account the age and condition of the Cupola.

iii) Total capacity

The total capacity of the ferrous section is around 1445 tons per year on a single shift basis.

b) Non-ferrous section

The two crucible furnaces, taken with the moulding and casting equipment, has a capacity of around 130 tons per year on single shift basis.

1.5 PRODUCTION

The production achieved by the foundry, product wise, both ferrous and non-ferrous, from 1985 to 1989 is enclosed at Table 1.

Cast iron production was as follows:

<u>Year</u>	<u>Production (tons)</u>
1985	157.00
1986	131.30
1987	76.50
1988	86.90
1989	34.66

The production has been dropping progressively year to year.

Non Ferrous castings production was as follows:

<u>Year</u>	<u>Production (tOns)</u>
1985	32.50
1986	20.50
1987	21.90
1988	27.80
1989	12.25

1.6 CAPACITY UTILISATION

The production in both the ferrous sections and the non-ferrous sections has been very low and the capacity utilisation achieved is as follows:

<u>Year</u>	<u>Capacity Utilisation (%)</u>	
	<u>Ferrous*</u>	<u>Non-ferrous*</u>
1985	52.33	25.00
1986	43.76	15.76
1987	25.50	16.85
1988	28.97	21.38
1989	11.55	9.42

* The above utilisation figures take only the current achievable capacities of the ferrous and non-ferrous sections of 300 tons of cupola operation and 130 tons non-ferrous respectively. Figures would be very low if the real nominal capacities are considered.

Induction furnace capacity not considered. The furnaces have had practically no utilisation at all since 1985, except for short trial runs.

1.7 FOUNDRY PERFORMANCE

The profit and loss statement and the balance sheets for the foundry for the years 1985 to 1989 (until October) are highlighted in Tables 2 and 3.

FOUNDRY PERFORMANCE (CONT'D)

	<u>PROFIT BEFORE TAX ('000)</u>
1985	23
1986	(4.945)
1987	(10.669)
1988	(3.579)
1989	(2.307)

It is seen that the foundry has been consistently making losses in all years mainly because of a host of problems/ constraints, low volume of production and idle capacity.

1.8 PRODUCT PRICES

The trend of product prices offered by the foundry over the years 1985 - 1989 for the products manufactured are indicated in Table 4.

The prices indicate a three to four fold increase in prices from 1989 (Jan to March) and 1989 (April to October) mainly because of the devaluation of the Guyanese dollar. The increases in other years has not been sizeable.

1.9 MAJOR CONSTRAINTS

The general performance of the foundry has been poor over the years due to a variety of constraints. The major reasons for low production are:

MAJOR CONSTRAINTS (CONT'D)

- Non-availability of regular uninterrupted power supply from GEC. The power situation in the country is very bad and power generation at the Power stations has dropped considerably, resulting in very long periods of black outs and downtime in manufacturing enterprises.

- Heavy turnover of skilled and experienced labour, resulting in a very small complement of skilled personnel currently present in the foundry, existing as against the required. The low remuneration package in Public enterprises, is one of the major reasons for GNEC's inability to retain experienced and skilled personnel. Existing personnel are also very poorly motivated.

Replacements have also been difficult due to severe shortage of skills in the country.

- All key managerial and technical positions in the foundry are vacant as most of the qualified and experienced personnel have left. Positions of Foundry Manager, Production Manager, Chief Metallurgist, Maintenance Engineer, Quality Control Engineer are all currently vacant.

There is therefore practically no middle management at all in existence.

MAJOR CONSTRAINTS (CONT'D)

- Inability to operate the induction furnace line, auto sand preparation line and auto moulding lines, major reasons being the power situation; no new product development activity and inability to force entry into new markets and improve market shares, in different market segments.
- Existence of only one cupola. Any breakdowns or downtime for change of liners etc, causes total operation to come to a stand-still.
- Present rate of sand preparation poor. (Auto sand handling plant not used).
- Insufficient number of moulding boxes and other auxiliary equipment.
- Auto moulding line not working due to most of the current products being much larger than capacity of machine; and no high volume jobs for the line having been identified.
- Non-arrival of imported materials ontime has led to disruption of production. This problem has also been aggravated by the lack of adequate foreign exchange.
- Inadequate stocks of broken down scrap metal, and non-availability at the required time. There is plenty of metal scrap available in the country. However, ineffective planning and organising, to breakdown the scrap, in order, to build up adequate stocks, has led to disruptions in production.

MAJOR CONSTRAINTS (CONT'D)

- Poor quality and non-availability in time of sodium silicate and carbon dioxide.
- Interruptions in supply of adequate quantities of sand of acceptable quality.

1.10 **FOUNDRY CAPABILITY**

As indicated earlier the foundry has been plagued by a variety of constraints resulting in very low production levels and poor performance. The foundry has not achieved, nor has it ever really been tried for its capability for high volume continuous production.

Only the cupola line has been in operation for small volumes of ferrous castings and the crucibles for non-ferrous castings. Present range of products is very limited, mostly for the Sugar industry.

The Induction furnace line, auto sand handling plant and the auto moulding line, have hardly been in operation, since installation in 1985.

No serious marketing thrust has been made to enlarge the current product range, or to make entry into new market segments, or the export markets.

High cost of production, very high product prices and very poor delivery image has led to sizeable volumes going to competition.

FOUNDRY CAPABILITY (CONT'D)

The foundry therefore has got equipment which have not been tried for high volume production and is plagued by several constraints and problems, for which priority measures are to be taken by the management.

If the foundry is to go in for large volume production; it would call for inputs to strengthen and reinforce the managerial and technical capabilities and the skilled work force; investments for augmenting present moulding boxes, auxiliary equipment and production floor space. Also concerted product development and marketing thrusts to enlarge the product mix; and gear up for increased sales to domestic and export markets.

The Government is taking several steps to improve the power situation in the country. However, if there is no improvement, investments may also be required by GNEC for standby generators capable of taking the induction furnace load.

1.11 DOMESTIC COMPETITION

Local competition is from the only other foundry in the country - M/S Brass, Aluminium and Cast Iron Foundry (BACIF). BACIF is a small foundry with a capacity of only around 120 tons of cast iron and 60 tons of non-ferrous castings. From small beginnings however, the foundry has been steadily increasing its production and market share and the performance has been fairly good.

DOMESTIC COMPETITION (CONT'D)

BACIF is planning an expansion of its production facilities and enlarging its product range to capture the remaining uncatered for demand in the country. Attempts are also being made to enter export markets, in Suriname and other smaller islands in the Caribbean region.

BACIF has been progressively eating into the markets dominated by GNEC and could pose a serious threat in future, with the plans for expansion and greater thrusts into the domestic market segments, as also opportunities in the export market.

In addition to BACIF, there are small smelting facilities available with GUYSUCO, GUYMINE, Willems Timber and Toolsie Persaud groups of industries. These are however not full fledged foundries and only produce rough castings, in cast iron and non-ferrous materials, for further machining and captive use.

Discussions with representatives of the above companies reveal that each of the organisations are having plans for setting up full fledged foundries in the near future, in view of the uncatered castings market demand in the country and also opportunities in the export Caribbean markets.

DOMESTIC COMPETITION (CONT'D)

The other competition in the domestic market is from imports of castings from mainly UK and USA. Caribbean foundries have so far not penetrated the Guyanese market for castings. With GNEC Foundry's performance being very poor and BACIF only being able to meet a small portion of local demand, the major portion of the domestic market is being currently met by competitive imports from the UK & USA.

GNEC Foundry is one of the largest foundries in the Caribbean region, with induction furnaces and modern semi-automated equipment, and high capital investment compared to the other foundries in the region. In order to survive, the foundry will have to improve capabilities; gear up its facilities. overcome the problems and constraints on priority and counter future threats of competition from within the country and imports of castings from the Caricom region, UK and USA.

2. MARKET RESEARCH

The Market Research Study conducted to assess the demand and supply potentials for foundry castings has been carried out in two phases, the domestic market field investigation phase followed by the export market field investigation. Three broad areas have been studied in detail i.e. the potential customer segments; competition - domestic and in the Caribbean; and information/data centres like the Statistical Agencies.

An initial cursory study of the various market segments and their potential demand conducted, narrowed down and identified the key market segments for emphasis and study. The market segments identified for study were the Agricultural sector - sugar, rice and others; mining and quarrying; water supply and sewerage; manufacturing, power; telecommunications; forestry, public works, constructions and the transport sector.

For purposes of Export Field Market Research, it was decided, within the limited time frame available, to restrict the study only to the Caribbean region and cover six countries identified to have potential demand. The countries covered were Jamaica, Trinidad and Tobago, Barbados, Antigua, St Kitts and St Vincent.

As regards competition, all the Foundries in the region - in Guyana and the other countries visited, were studied with regard to their production capacities, range of products, the actual production achieved their constraints and future plans.

MARKET RESEARCH (CONT'D)

Detailed plans were drawn up and market research questionnaires sent to all identified Agencies/Sectors in all countries under study. This was followed-up by visits to all the Agencies for discussion and data collection. The instruments used for the market study are enclosed at Appendix 2.

The detailed findings of the investigation, the demand estimates, supply potentials and actual supply, the market trends current and future have been highlighted in the country market studies, of Guyana and the Caribbean countries are highlighted in Appenix 3 to 9.

The summary of total market demand, countrywise and sectorwise; competition and supply; analysis of supply vs demand; market trends and opportunities are covered in paragraphs 2.3 to 2.6.

2.1 DOMESTIC MARKET FIELD RESEACH

The detailed domestic market field research in Guyana covers all the market sectors identified, the competition and also the areas where current and future potentials were indicated. The detailed country survey and findings for the domestic market is covered in Appendix 3.

2.2 EXPORT MARKET FIELD RESEARCH

The Export Market Field research covered six countries, Jamaica, Trinidad & Tobago, Barbados; Antigua, St Kitts and St Vincent. The detailed country surveys and findings are covered in Appencies 4 to 9.

2.3 TOTAL MARKET DEMAND

Market demand estimates for the seven countries in the Caribbean including domestic market in Guyana; Jamaica; Trinidad & Tobago; Barbados, Antigua, St Kitts and St Vincent have been consolidated summarised and projected in the enclosed tables.

2.3.1 COUNTRYWISE SUMMARY

Table 27 and table 28 highlight the countrywise summaries for ferrous and non-ferrous castings in the region, both current and future. Foundry castings demand is highest in Jamaica; followed by Barbados, Guyana, Trinidad & Tobago, St Kitts, Antigua and St Vincent.

Total current and future demand in the region for ferrous castings is 6340 tons and 5873 tons respectively. Out of this total requirement 3908 tons and 3324 tons are in ductile iron and 19.5 and 31.50 tons in Nihard respectively.

The cast iron demand therefore is only around 2432 tons and 2549 tons respectively for current and future requirements in the region. The ductile iron requirements however have been increasing year to year and has formed a substantial demand potential, with no foundry in the region producing ductile iron, all requirements being currently imported from UK and USA.

The non-ferrous market demand is around 673 tons currently and around 720 tons in the future. Again Jamaican market is the largest, followed by Guyana, Trinidad and Barbados with small requirements from Antigua and St Kitts.

2.3.2 SECTORWISE SUMMARY

The sectorwise market demand, current and future, for all the countries studied are highlighted in Tables 29 to 32. The total demands are as indicated earlier 6340 tons and 5873 tons respectively for ferrous castings and 673 tons and 720 tons for non-ferrous castings respectively.

a) CURRENT DEMAND

i) Ferrous Demand

The sugar industry sector contributes to around 1420 tons and is a steady demand. The largest demand sector however is the water & sewerage sector which contributes 4177 tons and 3706 tons respectively, out of which 3682 tons and 3127 tons respectively are in ductile iron. The cast iron requirement from this sector is therefore 495 tons and 579 tons respectively.

The other, sizeable demands are from the manufacturing and telecoms sectors, contributing each around 250 tons per annum. Smaller requirements exist in the quarrying sectors, public works and forestry and mining sectors.

The requirement from the Jamaican railway is steady but is met by the captive foundry with the railways.

CURRENT DEMAND (CONT'D)

ii) **Non-ferrous Demand**

The major sectors are the water & sewerage sector and the sugar sector followed by the manufacturing sector, other sectors have very negligible demand.

b) **FUTURE DEMAND**

Rice sector in Guyana could have fairly good demand in the future for cast iron rice crusher rolls of around 40 tons per annum. This requirement is dependent on the GNEC rubber rolls project taking off in the near future, and the foundry having an opportunity of casting the cast iron roller bosses. Currently the rubberised crusher rolls are imported from the UK.

Major rehabilitation is planned in the water sector in Guyana. Barbados has been planning consistently every year expansion and rehabilitation projects in this sector and Jamaica is planning a very large project in the very near future to rehabilitate their water supply networks.

In the Telecommunication sector, the entry of M/S Cable & Wireless in countries including Jamaica, Trinidad, Barbados, Antigua, St Vincent and St Kitts, and M/S ATN in Guyana indicates large future investments in the sector, for expansion and rehabilitation of the existing telephone systems and therefore sizeable future demand for manhole covers, joint boxes, grills and step ladders of ductile iron and cast iron.

2.4 COMPETITION

2.4.1 DOMESTIC COMPETITION

GNEC has competition within the country, only from the Brass, Aluminium and Cast Iron foundry (BACIF). There are very small smelting facilities with Sugar Industry (GUYSUCO) and Willems Timber. GUYSUCO plans to expand its facility into a full fledged foundry in the near future.

Currently however BACIF is the only foundry of any consequence as competition to GNEC in Guyana. The other competition is by way of imported cast products; mainly from UK and USA.

a) BRASS, ALUMINIUM AND CAST IRON FOUNDRY (BACIF)

BACIF is a small foundry established in 1959, and has a current capacity of around 120 tons for ferrous castings and around 60 tons for non-ferrous castings.

The foundry produced in 1989 around 65 tons of ferrous castings and around 55 tons of non-ferrous castings. A wide variety of products are manufactured, mainly for the Sugar industry (GUYSUCO), Bauxite industry (GUYMINE), Water and Sewerage Authorities and small requirements for the Forestry and Manufacturing sectors.

BRASS ALUMINIUM & CAST IRON FOUNDRY (BACIF) CONT'D)

BACIF has been operating fairly well and has two cupolas with capacities of 5 tons and 1 ton per hour respectively in the ferrous section and two oil fired crucible furnaces of 500 kgs capacity each in the non-ferrous section. The major constraint has been factory space and BACIF has plans for expansion in the floor moulding and casting area and the pattern shop. A fairly well equipped machine shop exists with general and special purpose machines for finishing the castings. Some more additional machinery are planned for the machine shop ie large lathe 40", universal milling machine and a shaping machine.

New products being planned and developed are large water cooled bearings for the sugar factories and mass production of domestic water pumps. Export markets are being explored vigorously by BACIF mainly in the Caricom region. It is understood from BACIF that the main constraint against market penetration into the other countries in the Caricom region has been the marked preference for castings imported from UK & USA and a lack of confidence regarding quality of castings made in the region.

The detailed foundry profile for BACIF is enclosed in Appendix 10.

2.4.2 REGIONAL COMPETITION (CARICOM)

If GNEC is to make entries into the Export market within the Caricom region, the main competition will be from the foundries in Jamaica and Trinidad. Barbados had a foundry, which has subsequently been closed and the assets bought over and transferred to Trinidad by Mustapha Foundry and Engineering Works, Trinidad. There are no other full fledged foundries in the region in any of the other countries. Several small smelting facilities however exist all over the region especially in Jamaica & Trinidad. Their outputs are however very small and of little consequence to the study.

Jamaica has four full fledged foundries, which are;

- Caribbean Castings & Engineering Co. Ltd (CCEC)
- Castings and Mouldings Ltd
- White Metals Ltd
- Jamaican Railway Corporation (Foundry Division)

The major foundries in Trinidad are;

- Williams Foundry
- Mustaphas Engineering Works Ltd (Foundry Division)
- Caroni Ltd, STE Madeline Sugar Factor (Foundry Division)
- Trintoc Ltd (Foundry Division)

Detailed Foundry Profiles of the above foundries in the Caricom region are enclosed at Apperdices 4-11. Analysis of their capabilities, current production; future potentials and plans; and threats by way of competition to GNEC are briefly covered below;

a) CARIBBEAN CASTINGS & ENGINEERING CO LTD (CCEC)

Caribbean Castings is the largest foundry in the region and has been performing fairly well over the past few years. CCEC was established in 1971 and has been the only foundry in the region producing sizeable tonnages of castings and supplying not only the Jamaican market, but also all the other countries in the region.

CCEC is the only foundry in the region, currently producing the heavy mill roller shells for sugar industry and competing fairly well with similar imported products from UK & USA.

With the change in Management recently, as a totally private owned foundry, CCEC has been performing very well and is seriously contemplating diversification of its product range.

CCEC with a 10 ton Induction furnace and existing moulding facility (hand & machine moulding), has a current production capacity of around 2000 metric tons per annum of non-ferrous castings with oil fired crucibles.

1989 production has been 2409713 lbs of ferrous castings ie around 1075 tons and around 7 tons of non-ferrous castings. The profile of CCEC Foundry is enclosed at Appendix 4 and indicates the capacity, equipment, market sectors serviced, production for the past three years, future production forecasts and the future plans for diversification.

CARIBBEAN CASTINGS & ENGINEERING CO LTD (CONT'D)

Production statistics reveal that out of a production of 1075 tons of ferrous castings in 1989, 800 tons was supplied to the sugar sector, 137 tons to the construction sector, 82 tons to manufacturing and the balance to the other sectors.

CCEC has been exporting sizeable requirements of cast iron castings mainly for the sugar industry to Trinidad, Haiti and French West Indies and Florida.

Major exports have been mill roller shells, trash and scraper plates, for the sugar industry. Local production has seen increases in supply of pipe fittings and firehydrants, manhole covers for the water & sewerage sector almost 200% over 1988. The devaluation of the Jamaican dollar has given CCEC a competitive edge for exports.

There is however a recent trend for competitive imports into Jamaica from Mexico; mainly for sugar mill rollers. Small volumes have been imported from Mexico, Brazil and Dominica in 1989, but this threat has to be taken into consideration for future competition from these countries in the Caribbean region.

CCEC has procured a centrifugal casting machine and plans to produce centrifugally cast products, like sleeves, spills of brass/bronze and sleeves for car cylinders.

Other diversification planned is in the areas of the production of ductile iron, alloyed iron/steel castings and also die cast products.

(The foundry profile is enclosed at Attachment.....)

b) CASTINGS AND MOULDINGS LIMITED

Castings and Mouldings Limited produces mainly non-ferrous Aluminium cast out-door furniture and a small quantity of brass/bronze bushings. There is no facility for cast iron. The Foundry has a capacity to produce up to 100 tons per year of non-ferrous castings, and employs around 10 persons.

c) WHITE METALS LIMITED

White Metals Ltd has no facility for foundry castings and only manufacturers pressure die cast products; mainly casket and furniture handles in Aluminium or zinc, with a total capacity of around 75 tons per annum.

d) JAMAICA RAILWAY CO LTD (FOUNDRY DIVISION)

The Jamaican Railway Foundry has a capacity of around 100 tons of ferrous castings per annum. There is no non-ferrous facility. The main product is cast iron wagon blocks and the entire production of the foundry is for the Jamaican Railway. No other work is taken up for commercial markets.

e) WILLIAMS FOUNDRY LTD

The Williams Foundry has a capacity to produce about 250 tons of ferrous castings and 100 tons of non-ferrous castings. Major products include manhole covers and frames, grids, water outlets, impellers weights, bushings, aluminium furniture etc. Production has been low around 60 tons of cast iron and 15 tons of non-ferrous castings.

f) MUSTAPHA ENGINEERING WORKS

Mustapha Engineering Works, in addition to owning a small foundry in Trinidad has taken over the foundries at the Swan Hunter Drydock as well as the Barbados Foundry a few years ago. The equipment from the Barbados foundry have also been integrated with the facilities at Trinidad.

The integrated foundry has a capacity to produce around 500 tons of ferrous castings and around 100 tons per annum of non-ferrous castings. The foundry has however hardly been in operation ever since, except for producing very negligible requirements of castings.

It is however understood from Mustapha Engineering that they have major plans for the existing facilities as well as diversification plans to produce sponge iron and copper alloys mainly for export markets in the USA, in the form of continuous cast bars.

G) CARONI LTD FOUNDRY

Caroni Foundry based at the STE Madeleine Sugar factory mainly produces ferrous and non-ferrous castings for captive use in the Sugar factories with occasional jobs for outside customers.

The capacity is around 100 tons for ferrous castings and around 20 tons for non-ferrous castings. The production has however been very low around 30 tons of ferrous castings and around 10 tons of non-ferrous castings.

h) TRINTOC LTD FOUNDRY

Trintoc Ltd, again produces captive requirements for the Trinidad & Tobago Oil Co. The capacity is around 180 tons for ferrous products and around 50 tons for non-ferrous castings.

The production however mainly for captive use has been only in the region of 30 tons of cast iron and 15 tons of non-ferrous requirements. Products manufactured by TRINTOC include trays, columns, bed plates, pipe fittings and bubble caps in cast iron and pump housing, bearings, bushings, fans and impellers as non-ferrous requirements.

2.4.3 EXTRA REGIONAL COMPETITION

Apart from the local Foundries in the region, a major portion of the Foundry castings requirement is imported from UK and USA. Recent trends indicate that countries like Venezuela, Mexico and Dominican Republic have been making entries into the Caribbean regional markets and supplying some quantities of castings. The supplies from these countries could pose more serious threats in the future.

2.5 CURRENT SUPPLY (CARICOM FOUNDRIES)

As mentioned earlier, there are in all ten Foundries in the Region. Tables 33 and 34 indicate the capacities of the Foundries, their actual production and their capacity utilisation for the Ferrous and Non-Ferrous Product Lines.

On the Ferrous side, as against a total overall capacity of around 4695 tons, the actual production is only 1355 tons indicating an overall utilisation of only 29% of capacity. M/S Caribbean Castings, Jamaica, and M/S BACIF, Guyana are the only two Foundries which have recorded around 54% capacity utilisation. The performance of all the other Foundries has been very poor with low capacity utilisation levels. Caribbean Castings of Jamaica has recorded the highest production of around 1075 tons of Ferrous products.

On the Non-Ferrous side, the capacity is around 710 tons, the production only 159 tons and a capacity utilisation of only 22%. BACIF has recorded a good capacity utilisation

2.6 SUPPLY VS DEMAND

The production of ferrous castings in the region is only 1355 tons against a market demand of 6340 tons per year. In other words all the foundries put together are producing only 21.5% of the total market demand in the region for ferrous castings. Table 35 & 36 give the details of capacity, production and market demand countrywise.

Only 159 tons of non-ferrous castings have been produced against a market demand of 673 tons of castings, which means only 23.6% of overall market demand is met by the regional foundries. Tables 2.7-2 indicates details.

2.7 MARKET OPPORTUNITY

Tables 35 and 36 indicate countrywise, the market opportunity, that exists uncatered for, by the foundries in each country and also overall for all countries. On the ferrous side there is a market opportunity of around 4985 tons not catered for by the foundries ie around 78.5%. Non-ferrous, 514 tons uncatered for market opportunity or 76.4% of market demand, which is now met by imports.

2.7.1 DOMESTIC MARKET

In Guyana, the two foundries GNEC and BACIF together have met only totally 100 tons of the ferrous demand of 643 tons and only 67 tons out of a total non-ferrous demand of 109 tons, leaving market opportunity of 543 tons ferrous and 42 tons non-ferrous uncatered for (84.5% and 38.5% respectively).

2.7.2 EXPORT MARKET

Overall in the Export Market from the six countries studied, production was only 1255 tons of ferrous and 92 tons non-ferrous out of a market demand of 5697 tons and 564 tons respectively leaving a market opportunity of 4447 tons and 472 tons respectively uncatered for (78% and 83.7% respectively)

In Jamaica, the market opportunity is 2037 tons ferrous and 435 tons non-ferrous. Trinidad 544 tons ferrous and non-ferrous demand almost met fully. In Barbados, Antigua, St Kitts and St Vincent the entire country's demand is a market opportunity as there are no foundries in these countries.

3. FUTURE PROSPECTS

The current status and performance of the Foundry and the findings and observations of the market research conducted have been covered in detail in earlier chapters. Future options, prospects and possible plans and strategies have been analysed below.

3.1 MARKET TRENDS

Cast iron markets have been shrinking all over the world and numerous cast iron foundries have had to close down operations or diversify, in terms of their product mix and go into other related iron and steel castings. This trend has also predominantly emerged from the Caribbean region market survey. Other trends emerging are for sizeable demands for materials like ductile iron, malleable iron, and steel in preference to cast iron; more economical and modern technology for easier and faster production of high volumes have progressively replaced traditional foundry casting technology for certain specific range of products. Detailed analysis of Caribbean market trends follows:

3.1.1 SECTORWISE TRENDS

Requirements in certain sectors have remained steady, with upsurges and declines in demand in certain other sectors, based on the development and growth patterns of the market sectors, in each country. The sectorwise requirements and preference trends are as follows;

i) Sugar Industry Sector

The Sugar Industry Sector demand is more or less steady in all countries. Steel is however being preferred in some of the countries like Jamaica, Barbados and St Kitts, in place of cast iron, for products like trash plates, scraper plates and coupling boxes.

Mill roller shells demand is steady and forms the single largest product contributing to the demand for cast iron; 1420 tons of cast iron demand and 99 tons of non-ferrous castings from this sector.

ii) Mining and Quarrying

Mining and Quarrying sectors have very little demand currently for cast iron products, in view of steel being preferred to cast iron in recent years for reasons of greater wear resistance and longer life. Most spare parts in this sector are obtained as proprietary supplies from original equipment manufacturers.

iii) Water Supply & Sewerage

The Water Supply and Sewerage sector has always been and continues to be the largest demand sector for cast iron and non-ferrous castings, with extensive rehabilitation and expansion projects being continuously undertaken. Requirements from this sector are mainly for manhole covers & frames; firehydrants; pipe and pipe fittings, saddles, grills and grids and traps etc.

Recent trends in the sector indicate a shift and marked preference for ductile iron, PVC and Asbestos for all pipes and bends, in place of cast iron. Guyana uses mostly PVC & Asbestos; Jamaica, St Vincent, Trinidad, Barbados and Antigua use ductile iron.

There is therefore a marked shrinkage of the cast iron market in the sector, ductile iron and PVC mainly replacing cast iron. The total demand in the sector is however very sizeable, 4177 tons of ferrous and 542 tons of non-ferrous castings. Ductile iron requirement forming 3682 tons of the total ferrous demand.

Future demand from this sector is likely to be much higher, as major projects are being planned in Guyana, Jamaica and Barbados.

iv) Telecommunications

Telecommunications has become a major demand sector with a current requirement of around 243 tons of ferrous castings. Future demand in the sector will be very much greater in view of major projects being planned in the sector.

The major development in the sector, is the entry of M/S Cable & Wireless in almost all countries in the Caribbean and the probable entry of M/S ATN in Guyana. Large investments in this sector are anticipated in all countries towards rehabilitation, expansion and the conversion of currently overhead lines systems to underground cable systems. This should generate very sizeable demand for ferrous castings, mainly in ductile iron.

v) **Manufacturing**

Manufacturing sector is another sector having good requirements of ferrous and non-ferrous replacement parts and spares. In the Caribbean region, the manufacturing base is still not very much developed. Jamaica and Trinidad have built up a fairly wide manufacturing infrastructure, while all the other countries have very few heavy engineering based industries. Most industries established in the sector are light engineering, electronics, textiles, food processing, chemicals, furniture, cosmetics etc; which have very little demand for heavy foundry castings. The demand therefore is mainly from Trinidad and Jamaica of around 250 tons per year.

vi) **Power**

The power sector has almost negligible demand.

vii) **Public Works & Construction**

There is considerable construction activity all over the Caribbean especially in Jamaica, Trinidad and Barbados, mostly with Private Contractors. Preferences are however for PVC pipes and mostly die cast domestic fittings. Ferrous casting requirements are mainly for manhole covers and frames, grills and grids.

viii) **Forestry**

The forestry sector exists only in Guyana with small negligible requirements of castings.

ix) Transport

Requirements for spare parts from this sector are mainly, off the shelf proprietary supplies, with very little requirement of high volume foundry casting requirements.

3.2 POTENTIAL PRODUCTS

The composition of the market demand, classified in broad product categories reveals that the Sugar industry, water & sewerage and telecommunication sectors contribute to high volume products. Major potential products contributing to current demand are:

3.2.1 FERROUS CASTINGS

<u>Potential Products</u>	<u>Domestic Demand</u>	<u>Export Demand</u>	<u>Total Demand</u>
Sugar Mill Roller shells	240	859	1099
Trash plates	32	104	136
Scraper Plates	12	86	98
Coupling boxes	66	117	183
Manhole covers & Frames	115	96	211
Firehydrants	25	152	177
Gully grids, grills & Step irons	31	67	98
Pipes & Bends, Valves Saddles coupling etc	15	3738	3753
	(cast iron)		(3669 ductile iron)
Telecoms junction boxes/manhole covers	31	234	265
	(cast iron)		(234 ductile iron)
	567	5452	6020
All other miscellaneous items	76	245	322
TOTAL	<u>643</u>	<u>5698</u>	<u>6341</u>

Above figures reveal that the major product classifications contribute to bulk, 90-95% of the total domestic and export market demands.

3.2.2 Non-Ferrous

Major products in the non-ferrous segment are Sugar mill bearings, valves, saddles, manufacturing spares and replacements, and various sizes of solid or cored bushings. Again Sugar and Water & Sewerage sectors contribute to the maximum portion of demand, as seen below:

	<u>Domestic</u> <u>Demand</u>	<u>Export</u> <u>Demand</u>	<u>Total</u> <u>Demand</u>
Sugar industry requirements (mill bearings, bushings etc)	38	62	100
Water & Sewerage requirements (valves, saddles, firehydrant accessories etc)	33	477	510
Other miscellaneous requirements	<u>20</u>	<u>26</u>	<u>46</u>
TOTAL	<u>91</u>	<u>565</u>	<u>656</u>

3.3 GNEC POSSIBILITIES AND OPTIONS

The total market demand in the region and the present and future market trends indicate, that sufficient demand exists for the GNEC foundry to increase production, both in ferrous and non-ferrous lines and reach profitable levels of capacity utilisation.

GNEC foundry, to be financially viable will have to maximise utilisation of the capital intensive induction furnace line and absorb both the variable and fixed costs, at higher levels of production. Maximising production therefore will be the prime objective for GNEC.

The capacity of the induction furnace line is around 1145 tons and the domestic demand around 643 tons, will however not be adequate to sustain this capacity. In the non-ferrous line also, the local demand is around 109 tons against a capacity of 130 tons. Competition from BACIF is also a factor to be taken into consideration.

Market demand for the current product range is very limited, both in the ferrous and non-ferrous lines and producing a wider range of products, to include other potential products, like sugar mill rollers; manhole covers and frames; firehydrants; pipes and bends becomes a necessity.

In order to satisfy foundry capacity, it would also be necessary to diversify into other materials like ductile iron, malleable iron, Nihard etc.

GNEC Possibilities and Options (Cont'd)

Entry into the export markets and also producing a wider range of products, therefore becomes a precondition to higher volumes of production. In order to be competitive however, in regional and export markets, the most important aspects will be Product Quality and Price Competitiveness.

3.4 Marketing Plans

Having identified, the potential products contributing to ferrous and non ferrous demands, domestic and export; and also analysing the various possibilities and options in para 3.2 and 3.3; an attempt has been made to draw up a probable marketing plan for the Foundry. Market penetration and market shares possible by aggressive marketing, in both domestic and export markets, for the various products, have been taken into consideration, in drawing up the plans.

i) Ferrous Line

Table 4.4 indicates the probable marketing plan for the induction furnace operation. The plan highlights probable product mixes, at various levels of capacity utilisation - at 150 tons, 500, 850 and 1200 tons production levels.

The salient features and assumptions made in drawing up the plan are:

Up to 150 Tons

- Only currently produced products have been considered - Trash Plates, Scraper Plates, Coupling Boxes and Manhole Covers and Frames.

- Total Domestic Market share, considered for the first three items, in view of BACIF not currently producing these items.
- No exports contemplated

150 - 500 Tons

- Manhole Covers increased to meet total domestic requirement i.e. 115 Tons.
- 25% of export market share, considered for Trash and Scraper Plates, Coupling Boxes and also for Manhole Covers and Frames.
- New products include 150 Tons of Sugar Mill Roller Shells, and domestic 25 Tons (50% of domestic requirements) of other municipal castings like Hydrants, Grills, Grids, Step Irons, etc.

500 - 850 Tons

- Volume of sugar mill rollers, increased to 420 Tons, which include 240 tons domestic and 180 tons export (20% of export demand).
- Small volumes of 80 tons, of popular sizes of Pipes and Bends, in Ductile Iron.

850 - 1200 Tons

- Production of sugar mill rollers increased to 500 tons (240 domestic and 260 tons export - 30% of export demand).

- Volumes of ductile iron pipes and bends increased to 300 tons.
- Small volumes of Telecom Junction Boxes, Manhole Covers in ductile iron

Summarising, it has been assumed that the entire domestic market from the sugar sector - mill roller shells, trash plates and coupling boxes will be met by GNEC. In addition 30% of mill roller export markets, and 25% for the other products from exports.

Manhole covers - entire domestic market and 25% of export market; municipal castings around 50% of domestic market; pipes and bends - less than 10% of the considerable demand in the region (around 3753 tons); Telecom junction boxes, again, around 20% of regional demand.

Volumes indicated above, against each product, in the marketing plan, are conservative estimates of market shares achievable, in the domestic and export markets, arrived at, in consultation with the Marketing Director.

Volumes and market shares could be much higher, if suitable marketing arrangements are entered into, especially for export markets, like distributor tie up or a collaboration/tie up with international manufacturers of castings, for distribution/marketing of products overseas. These aspects have been analysed in detail subsequently in paras 3.6 and 3.7.

ii) Non ferrous Line

As seen in para 3.2, identifying potential products, the non ferrous products fall under two major sectors;

sugar and water and sewerage; with several other miscellaneous items and replacement bushings and bearings. Except for sugar mill bearings which forms bulk of the tonnage, all other items are miscellaneous items, relating to each particular sector.

Assuming 60% of domestic demand .109. tons could be met by GNEC, i.e. around .55. tons, the balance of .75. tons will have to be obtained from export markets, to satisfy the non ferrous capacity of 130 tons.

Strategies, plans and management actions required to implement production and marketing plans are discussed and analysed in subsequent paras 3.6 and 3.7.

3.5 COSTING AND FINANCIAL ANALYSIS

Having assessed the market demand for Foundry castings, and analysing the possibilities and options open to GNEC; it was felt necessary, to carryout a costing and financial analysis, in order to determine the Foundry's capability to compete, in terms of costs and prices, and also the future viability of the Division in terms of contributions, margins and profitability at different levels of production.

It was proposed to study all the three production lines - the cupola line, with a production range of 0 - 300 tons; the Induction Furnace Line with a production range of 0 - 1145 tons and the non ferrous line with a range of 0 - 130 tons.

Product costing and pricing, and production costing for all three lines, followed by contribution and margin analysis and break even analysis.

In order to facilitate the exercise, the following information was requested from the Foundry Division;

i) Product costs and Selling Prices for the following products

a) Existing Products

Cast Iron

Scraper Plates

Trash Plates

Coupling Boxes

Non Ferrous

Top Bearings

Bottom Bearings

Side Bearings

b) New Products

Sugar Mill Roller Shells

Manhole covers & frames

Cast iron products to be costed for both ferrous lines;
except mill roller shells, only on the induction
furnace line.

ii) Production Costing Projections for three Production Lines

- a) Cupola operation
(0-300 tons in steps of 50 tons)
- b) Induction Furnace operation
(0-1200 tons in steps of 100 tons)
- c) Non-ferrous operation
(0-130 tons in steps of 50 tons)

iii) Contribution and margin analysis and break-even point
analysis for above three production lines at various
production levels.

iv) Additional equipment, facilities and manpower required
for the higher production levels in the three production
lines.

In a meeting on 23 March ,1990, it was decided that
the Finance Director, assisted by the Corporation's
Chief Cost and Management Accountant, would undertake
the exercise and furnish the information, within a
week or 10 days time, taking into account the time
constraints of the project.

The Finance Department in liaison with the foundry, has tried to collect the required information; estimate and build up costs and prices for the existing and new products; and also carry out the required financial exercise for all the three production lines. Considerable difficulty has however been experienced in obtaining basic cost data; the split ups of costs between ferrous and non-ferrous; complete metallurgical and technical inputs, especially for the induction furnace line and also for the new products to be developed.

The induction furnace line has been barely operated since 1985 and no historical cost data exists. Also there is very little practical experience, among the few managerial/supervisory personnel, about the production aspects of operating an induction furnace line, and also for the product development efforts required for developing new products. Most of the qualified personnel trained overseas, on these aspects, have left the Organisation, as also the only Metallurgist.

The Product Costs, Selling Prices and Financial Analysis compiled by the Finance Department are enclosed in Tables .1...to...4. Tables also highlight the assumptions and factors considered for the exercise.

The cost and financial data provided, has been based on discussions with existing foundry personnel and estimates for the induction furnace line. For the other two lines, it is based on actual costs incurred, for the very low production volumes of 35 tons of cast iron and 12 tons of non-ferrous castings, during

1989, and apportioned, prorata, based on tonnage. Inefficiencies of low efficiency and low capacity use, are inbuilt in the costs projected.

Several serious inconsistencies have been noticed in the costing, pricing and financial data provided. This inconsistency of information was taken up with the Management of the Corporation. It was felt that, this type of information, could not form a good basis for any determination of pricing policy, and a basis for vital management decisions, about future viability of the Division.

Any analysis, based on this data, would give a very misleading picture about costs, selling prices, projected financial performance and profitability.

It was decided by the GNEC Management, that no further analysis will be made, based on this data and that, this study would be concluded, without the costing, pricing and financial exercise. This decision was also communicated to UNDP and UNIDO Headquarters by the Consultant, and the National Project Manager, Mr. W. Lynch, by the GNEC Management.

Following internal discussions, GNEC's Management decided, that a more detailed and reliable costing and financial exercise, would be carried out, by its Finance Department, and thus, as per indications from the Executive Director Finance, should take about a months time.

Further that, UNDP would be approached through the National Team Leader, for later update of the study, in the form of an addendum, to include the financial analysis.

3.5.1 PRODUCT PRICES AND SELLING PRICES

As explained earlier, product costs and prices have been arrived at, on a prorata basis, on tonnage, and apportioned to products, based on the weight of each product.

No systematic product costing has been carried out for each product, taking into account the real costs involved, stage wise, in the manufacturing process which includes product development and design; pattern making; preparation; moulding; casting; fettling and machining, involved for each product.

3.5.2 COMPETITION AND SELLING PRICE

In order to ascertain, where GNEC Foundry stands, in relation to competition, with regard to price for new products, a few quotations has been obtained from overseas manufacturers, which are:

<u>PRODUCT</u>	<u>PRODUCT PRICE/ITEM</u> (C.I.F. + Taxes + Duties)
1. Sugar Mill Roller Shells (Rough machined - size 33½" x 17½" x 78")	US\$9,421.38* *Caribbean Casting & Engineering Limited, Jamaica.
2. Manhole Covers & Frames (600 x 450 mm Grey Iron, single seal solid medium duty BS497 - 1976 Grade B Covers & Frames Bitumen Coated)	US\$134.02

No comparison with GNEC costs and prices was however possible, for reasons enumerated above.

3.5.3 PRICING POLICY

In view of aforesaid, no attempts has been made to develop and formulate a scientific pricing policy for the Foundry Division.

3.5.4 BEP ANALYSIS

No projections and BEP calculations have been analysed, in view of the decisions taken earlier.

3.6 FUTURE STRATEGIES AND PLANS

The Foundry in order to be viable, will necessarily have to produce at higher volumes of production and sales, so as to absorb the very large component of fixed overheads, including the very heavy burden of depreciation, mainly from the assets acquired in 1985, the Induction Furnaces, Sand Preparation Plant and the Auto Moulding Line.

Several new products will have to be developed and produced, diversification into other materials will have to be considered, and the entry into export regional and extra-regional markets becomes a necessity.

Considerable product development effort and inputs of cost effective modern technology will have to go into the design and development of the new products.

The major strategies that suggest themselves are:

i) Ferrous Line

a) Higher Volume of Production & Sales

Operate the Induction Furnaces and maximise production at profitable capacity utilisation levels.

Alternatively go in for a two Cupola operation, by the addition of a 60" Cupola.

Higher Volume of Production & Sales (Cont'd)

This may be more cost effective, given the prevailing conditions of no guarantees for uninterrupted power supply and also the very high cost of electricity in the country.

A detailed Cost Benefit Analysis will have to be carried out to decide between the two options.

An attempt was made to study the relative economies of the two options, but not much progress could be made, due to the non-availability of ready and reliable cost and financial data for the two processes.

The absence of reliable data is mainly with respect to the induction furnace operation, as the equipment has so far been hardly operated and very little experience exists of the costs involved in operating the line. Also the recent cost data available for cupola operations are based on the very low output levels of around 35 tons achieved during 1989, with all the inefficiencies of extremely low volume production, unutilised capacities in built into these costs.

Reliable data will have to be estimated and built up, before a detailed exercise can be carried out, based on which decisions could be taken.

Operation of the Induction Furnaces will be extremely power intensive, and in Guyana very expensive, due to the very high electricity costs. Also some guaranteed, uninterrupted source of power will have to be ensured, either from GEC, or by further investments for captive generators, capable of catering to load from the furnaces.

If the induction furnaces are found to be non-viable even at high volumes, in view of the high initial capital cost and also operating expenses, the only alternative would be to dispose of these assets at favourable prices.

b) Domestic Market

Cater initially to, and capture the domestic market demand by aggressive marketing. Sectors for market thrusts are mainly Sugar, Water and Sewerage, Telecommunications, Mining and Quarrying.

The domestic market consists of only a few potential customers, having large requirements, and marketing efforts to increase market share in these segments, should not be difficult, provided good quality, price competitive products are produced.

c) Product Range

Produce a wider range of products in Cast Iron, the product mix to include potential high volume products like Sugar mill roller shells; manhole covers and frames; firehydrants; pipe and bends; gully grids, grills and step irons, along with a miscellaneous range of equipment replacement spares.

d) Material Diversification

Diversify into production of other materials; capabilities for which exist in the foundry, with existing equipment.

- Cater to the Mining and Quarrying requirements for Nihard Castings.
- Get into ductile iron production and cater to a portion of the very large emerging potential demand in the region, especially for pipes and bends; pipe fittings for the water & sewerage sectors; manhole covers and frames and junction boxes for the telecom sector.

Material Diversification (Cont'd)

- Caribbean region has also got tremendous demand for cast steel products; the manufacture of which could be considered, as a long range plan, with suitable technical collaboration. There is currently no cast steel foundry in the region.

Technological inputs will be required to produce the different grades of materials.

- **Product Development**

Considerable product development activity will have to be carried out in order to develop these new products, for which skills and expertise; currently available in the foundry is grossly inadequate.

e) **Specialised Product Lines**

Produce certain specialised product lines having large volume potential, like water and irrigation pumps; gate and other valves for water supply and sewerage, pipes and pipe fittings etc; for distribution and retail sales. The large demand for these items has been discussed in detailed in earlier chapter 2 of the report.

A selected range of these products can be produced in technical collaboration with some reputed international manufacturer of these products. The collaboration/tie up could also cover distribution and marketing of these products in markets overseas.

f) Regional Caricom Markets

Make thrusts into the Regional Caricom markets with the wider range of products; by aggressive marketing and competitiveness, in terms of quality and price; and try to capture a portion of the large demand that exists for castings.

Entry and penetration into the Caricom markets could be achieved by a combination of the following:

- Direct marketing thrusts by GNEC
- Distributor tie up in certain potential areas.
- Tie up and mutual marketing arrangements with other foundries in the region for certain products manufactured.

g) Extra Regional Markets

Attempt to enter extra regional markets, especially the USA and Europe , where considerably large markets exist for items like pumps; valves; pipes and pipe fittings; manhole covers etc.

Entry, however into these specialised markets in the USA or Europe will be extremely difficult; in competition with large multinational manufacturers of these specialised products.

Extra Regional Markets (cont'd)

The only possible and feasible route, for entry into these very large lucrative markets, would be a manufacturing, marketing and distribution tie up with large reputed international manufacturers.

h) **Auto Moulding Line**

Consider maximising utilisation of the auto moulding line, by developing a range of small sized volume products, for production on this line.

i) **Cost Effective Technology**

Review existing technology and cost structures and obtain cost effective modern technology for the production of the wider range of products and the materials diversification contemplated.

Cost effective technological inputs will be an absolute necessity, considering the present technical capabilities at the foundry.

J) Joint Venture/Collaboration Tie up

Consider a Joint Venture/Collaboration tie up with reputed overseas manufacturers, for the production and marketing of certain select specialised product lines, for both domestic and export markets.

The tie up should ensure necessary investments for the foundry, technology, marketing buyback and distribution arrangements for overseas markets,.

The tie up could have a buyback and export marketing arrangement, so that products are manufactured in Guyana under licence and re-exported to other countries like USA, Europe and neighbouring countries through the distribution channels available with the collaborating Corporation.

ii) Non-Ferrous Line

a) Domestic Market

Cater to the domestic market demand of around 109 tons and capture the largest market share, by aggressive marketing. Greater thrust in areas of Mining, Quarrying, Water & Sewerage Sectors.

b) Caricom Markets

Enter and consolidate in the Caricom markets especially for products like bearings and bushings, in order to satisfy the remaining production capacity.

c) Centrifugal Castings

Utilise the existing centrifugal casting machine and produce sleeves, spills, cored and solid bushings of standard sizes for sale to direct customers and also to hardware retail outlets.

There is very good potential for these items in domestic and export markets.

d) Die Casting

Consider investment for a small die casting machine, to cater to the large market requirements for domestic fittings, water fittings & furniture fittings, which have good demand.

3.7 MANAGEMENT ACTION

The possibilities, options, strategies and plans open to the foundry have been detailed in paras 3.3 and 3.5. Current constraints and the capabilities of the foundry have been identified in chapter 1, paras 1.9 and 1.10.

If the foundry is to be a viable proposition, priority actions are required by the Management, to reactivise the operation, maximise production and profitability.

The major management actions required to implement and put in place the strategies and plans and improve supply capabilities of the foundry are:

i) COST BENEFIT ANALYSIS

Detailed feasibility study and cost benefit analysis to determine the better cost effective option of operating the induction furnaces vs the option of additional cupolas (60" diameter).

This study was not possible, as explained earlier, due to the non-availability of reliable and complete data, especially on induction furnace operation. Also the data on cupola operation being based on actuals costs of 1989, when the production was only 35 tons against a capacity of 1445 tons, with all inefficiencies of low volume production and low capacity utilisation, inbuilt in the cost structure.

ii) INVESTMENTS

Necessary investments for equipment and auxiliaries for the proposed range of products, and material diversification contemplated.

iii) COST EFFECTIVE TECHNOLOGY

With the contemplated large volume operation; wider range of products; material diversification and the plans to enter and compete in export regional and international markets, with products manufactured to international standards; there is need to review the existing technology and its cost effectiveness, and consider technical collaboration, with some reputed international manufacturer of foundry products.

Present technical capability of foundry suggests the necessity of such a collaboration for inputs of cost effective modern technology and inputs for product development.

iv) ELECTRIC POWER SUPPLY

Ensure uninterrupted power supply by guarantees from GNEC or alternatively invest on captive generating sets capable of catering to the induction furnace and other foundry requirements. Induction furnaces alone require a minimum of around 3.1 MW.

Suitable generator sets, say 3 off 1.5MW Diesel Generator sets, would not only meet the requirements of the foundry, but also, if properly managed, cater to the entire Lombard Street complex. Operating costs could be spread over the complex, thus reducing the burden on the foundry.

v) Production Organisation

Augment staff capabilities of Foundry with respect to Managerial, Technical and Skilled workforce.

The present staff in the Foundry is very depleted with most of the Managerial, Technical staff and a major portion of the skilled worker force, having left the organisation for better prospects within the country and overseas. Major reasons being the very low remuneration package offered by the Public Corporations in the country.

a) Managerial/Technical Staff

GNEC Foundry has barely any managerial and technical capability, having lost most of the qualified and technical experienced personnel over the years. The existing organisation indicates, a Director, followed by Departmental Foremen and Supervisors, with no technical or managerial personnel existing in the middle management.

A minimum of the following additional Managerial and Technical Staff would be required to augment capabilities of the Foundry

- Production Manager
- Foundry Technologist (Metallurgy & Quality Control)
- Product Development Manager
- Maintenance Manager
- Pattern Shop Specialist
- Design Draughtsman

vii) Imported Material

Ensure that all imported material is planned for, and procured on time, by effective inventory control and material management procedures, so that no disruption of the production process occurs.

viii) Local Materials

Ensure that there are adequate stocks of sodium silicate, carbon dioxide, sand and broken down scrap metal built up, so that production is not affected, as has occurred in earlier years till date.

ix) Delivery Image

Improve on the delivery image of the Corporation, which has been very poor till now, so that a confidence is developed with customers about supply capabilities.

x) Standard Costing & Product Pricing

Introduce a scientific standard costing system for the costing of products and establishment of realistic selling prices for products.

Currently products are costed based on historical costing on the basis of actual costs incurred with increments for profit margins, with no considerations for labour efficiency levels, material utilisation, wastages and scrap, capacity utilisation and productivity.

xi) Cost and Budgeting Control

Design and introduce effective cost and budgeting control systems, to monitor and control the costs at the Foundry. The Foundry operation will not be viable, unless it is cost effective, and this aspect gains very great importance and will have to be implemented on priority.

b) Skilled Personnel

Table⁵⁰ indicates the schedule of sectionise staff required for present level of production and increased levels of production.

Ferrous Line

Present Level	-	26
Increased Level (Cupola 300 Tons)	-	43
Increased Level (Indn Furnace) 1145 Tons)	-	72

Non Ferrous

Present Level	-	10
Increased Level (130 Tons)	-	15

vi) Marketing Organisation

Create an exclusive, technically competent group for Foundry products marketing. To start with, there should be a Marketing Manager and a Product Manager, supplemented by the existing Marketing Assistant.

The Foundry Marketing Group could still form part of the centralised Marketing Division of the Corporation, but would deal only with Foundry products, both for domestic and export markets.

The Sales Manager and the Production Manager in addition to marketing products, will be also responsible for product development of new products, in liaison with the Product Development Manager in the Production Division, following the Product Development Corporate approach.

xii) Marketing Arrangements

Domestic Marketing, as explained earlier, should not pose much of a problem, in view of there being only a few major potential customers of Foundry Castings, like Water and Sewage, Sugar Industry, Mining and Quarrying, Forestry and the Telecom Sectors.

Entry, however into export markets will be extremely difficult in the face of competition from the other Foundries in the region, and above all, the presence of multinational manufacturers of these products, in the Caricom, as well as other extra regional markets.

In order to make entry into these markets, the Management will have to consider the following:

- a) Very aggressive marketing thrusts into the export markets
- b) Marketing arrangements with other Foundries within the Caricom and also in other countries, to mutually market certain products agreed upon.
- c) Distributor - Tie up, in key potential countries for marketing of certain specialised products, especially consumer oriented products, which can be volume produced for retail sales, like pipe and pipe fittings, valves, pumps, bearings, bushings, etc
- d) Tie up with reputed international manufacturers of Foundry products, for production and marketing of products, through the distribution channels already existing with these large Corporations. Alternatively a buyback arrangement.

xiii) Joint Venture/Collaboration Tie Up

Enter into a Joint Venture and Collaboration Tie Up, with reputed multinational producers of Foundry Castings. Arrangements to include inputs of modern cost effective technology, necessary investments for new equipment; product development assistance; training; and marketing and distribution arrangements for overseas markets.

3.8 CONCLUSIONS

In order for the Foundry to be viable, production will have to be maximised to profitable levels, totally absorbing the very high Fixed Costs.

Sufficient demand exists for the Foundry to step up its activity and achieve higher levels of production performance and profitability.

Domestic market demand will however not be sufficient, both in ferrous and non ferrous lines, to satisfy the capacity of the Foundry, necessitating entry into export markets. Domestic competition will also have to be considered.

Wider range of products will have to be produced, as the present product mix has very limited demand. The range of potential items that could be produced has been discussed in detail in paragraph 3.2.

Cast iron markets are shrinking, in preference for other materials like ductile iron, malleable iron, ni-hard and cast steel. Cast iron has also been replaced by PVC and Asbestos in certain product lines. Diversification, therefore into production of materials like ductile iron, malleable iron and ni-hard have to be seriously considered.

The Induction Furnace Line has barely been operated since 1985 though it constitutes the single largest asset of the division. This line will have to be reactivated and operated at high volumes of capacity utilisation.

Major constraints exist in the Foundry, which have been categorised and highlighted. The strategies and plans open to

the Foundry have been discussed in detail in earlier paragraphs.

Several Management actions highlighted, required on priority, have been overcome, the problems and constraints; and also various other inputs required, by way of sizeable investments; modern cost effective technology, considerable product development activity and the establishment of marketing arrangements for aggressive marketing, both in the domestic and export markets.

The best course opens to the Management, would be to enter into a Joint Venture/Collaboration Tie Up with reputed international manufacturers of Foundry products.

The joint venture package, should include inputs, by way of required financial investments for new equipment and auxiliaries and rehabilitation of existing equipment; transfer of modern cost effective technology; product development assistance; training of local personnel; and marketing and distribution arrangements for overseas markets.

Marketing arrangements could be a buyback package, or the use of the collaborators, already established, marketing and distribution channels in the overseas markets.

Manufacturing under licence for the Collaborator/Partner could also be considered.

III GNEC SHIP BUILDING/SHIP REPAIR DIVISION

1. CURRENT STATUS

1.1 BACKGROUND

The GNEC Ship building/Ship repair facility was established over 150 years ago. Prior to Nationalisation in 1976, the operation was owned by M/S Sproston. The dockyard is one of the largest in the Caribbean region and has been specialising in Naval Architecture (Ship design); Ship Building (New construction); Ship Repairs and conversion; inspection and evaluation of existing vessels for repairs or sale, and other related maritime consultancy services.

Up to 1984-1985, the dockyard had undertaken several significant Ship building works for overseas and local clients. Types of vessels built included steel cargo vessels, dredgers, shrimp trawlers, cargo boats, pontoons, punts, fishing vessels etc. Prior to nationalisation the docks had constructed and delivered a total of 113 ships, 20 of these for overseas owners from the Caribbean and S. America. After nationalisation a total of 18 vessels have been constructed.

After 1985, the Ship building activity has been on the decline, mainly due to the economic situation and foreign exchange problems experienced by most of the countries in the region.

In addition to Ship Building, the mainstay of the dockyard has been ship repair activities. Ship repair includes routine periodic preventive maintenance of the vessels; small repair jobs; extensive and emergency repair.

BACKGROUND (CONT'D)

The demand for ship repair works is very good and GNEC has had to turn down requests for docking facilities, due to the very heavy advance bookings for docking time and outstanding work orders for repair work on hand.

The Company has therefore over the years concentrated mainly on utilising the facilities for ship repair activities with occasional building works for small pontoons, punts, trawlers etc.

A cursory study of the market and the order books of the division revealed that the market demand, mainly for ship repair is very good and the current order books indicate a confirmed future work-load for the division for the next three to four years.

In view of the tremendous market potentials already identified and established, it was decided to change the emphasis of the study to concentrate mainly on identifying the current production and management constraints and categorise the type of inputs required to improve throughout of the docks/slipways; maximise output, performance and efficiency in order to facilitate speedier servicing of the outstanding current and future demands.

1.2 **FACILITIES & EQUIPMENT**

The Ship building /Ship repair division (SB/SR Division) has two large drydocks and two slipways, an outfitting quay, craneage facilities and large engineering workshops
Details are as follows:

i) DRYDOCKS

a) Northern Drydock

Overall length - 79.60 metres
Width at Dockgate - 11.50 metres
Width at centre of dock - 13.55 metres
Depth over sill - 3.35 metres

b) Southern Drydock

Overall length - 62.55 metres
Width of centre dock - 14.00 metres
Depth over sill - 3.05 metres

Each of the Drydocks has a capacity of approximately 800 tons dead weight. The northern dock is used for both ship building and repair activities, while the southern dock is used primarily for docking and repair.

ii) SLIPWAYS

a) Main Slipway

Effective length - 45.00 metres
Effective width - 13.80 metres

Used mainly for construction of pontoons and barges.

b) Small Slip way

Effective length - 26.00 metres
Effective width - 6.00 metres

Used for construction and repairs of trawlers, tugs and smaller crafts.

iii) Craneage Facilities

Mobile Cranes - Only one existing in division.

Overhead Cranes - 2 existing in machine shop and light fabrication area.

iv) Engineering Workshops

SB/SR division has a well equipped machine shop; Inside and marine outfitting shop; fabrication shop; electrical shop; refrigeration shop and an allied trades shop.

Though the engineering workshops are well equipped, having all types of machines and equipment, most of the machines are very old (20 to 30 years old) and in need of extensive rehabilitation or replacement.

1.3 INSTALLED CAPACITY

The facilities at the division, based on historical performance are capable of handling both ship building and ship repair activities and the present capability is as follows:

i) SHIP BUILDING

One steel hull vessel of approximately 800 tonnes dwt; together with six steel or four wooden hull fishing vessels between 65 ft to 80 ft long or four steel hull pontoons of 600 to 800 tonnes carrying capacity.

ii) SHIP REPAIR

The facility has a capacity of handling a throughput of around 36 to 40 ships per year.

1.4 PRODUCTION

SB/SR Production for 1986 and 1987 is highlighted in Tables 1.1 and 1.2 respectively. As can be seen, it covers only ship repair activity as there was practically no ship building activity during the period.

Later years 1988 and 1989 have not been considered as they were very poor years for the division, with both docks being non-operable for building or repair activity for almost the entire period, in view of the northern dock being occupied by a vessel under litigation and the southern dock by vessels having very extensive repair and also awaiting imported raw materials for completion of the work (foreign exchange constraints).

Summary of ship repair activity for 1986 and 1987 classified based on category is:

i) <u>Type of Vessel</u>	<u>1986</u>	<u>1987</u>
Cargo Vessels	14	8
Tugs, Trawlers & Patrol Boats	4	-
Tanker type vessels	2	2
Ferry Boats	-	1
ii) <u>Slipways</u>		
Fibreglass patrol boats	4	-

PRODUCTION (CONT'D)

It is seen in 1986, the production has been only around 30% of capacity and in 1987 very much less, due to a variety of constraints, which have been identified and analysed, later in the report. 1988 and 1989 have poorer capacity utilisation levels.

Table 1 also highlights the hours estimated for each vessel against actual hours taken for the jobs in the major sections of Ship repair; welding; mechanical and marine outfitting. There is a wide variation between hours initially estimated and the actual hours taken in all the sections, mainly due to owners of vessels not stipulating clearly and in detail the extent and nature of repair, and also, to some extent on inaccurate estimation of work involved. This has been throwing out of gear, the dock and slipway forward planning and also the effective utilisation of the facility.

The sections ship repair, welding and mechanical/marine outfitting contribute to the bulk of ship repair activity and the other sections are mostly supporting services.

Average docking time, for repairs of cargo vessels has been around 35 days. Tanker type vessels 20 days; ferry boat 13 days, tugs, trawlers and patrol boats 10 days and fibre glass patrol boats on slipways 16 days.

This trend has changed over the years, in view of most of the vessels plying in this region being very old, and the extent of repair. The docking times have been increasing over the years.

1.5 PRESENT PERFORMANCE

The condensed profit and loss account and balance sheet of the division for year 1985 to 1989 are enclosed at Table 2 and 3.

The division has made profits in 1985, after which in all years there have been losses. The profit after tax has been:

	<u>Profit after Tax ('000)</u>
1985	1.219
1986	(1084)
1987	(1809)
1988	(218)
1989 up to June	(985)

1.6 PRODUCTION CONSTRAINTS

The dockyard has been experiencing very severe constraints in the past few years, affecting performance of the division. The major problems and constraints are:

- One of the biggest constraints is the very heavy turnover of skilled manpower in the past few years to private competition. Table 4 indicates the present strength of the division work force (designation wise) as against the required strength. Total strength currently, of skilled workers is only 92 as against 178 required for full scale operation. Short-falls in major sections is highlighted below:

<u>Department</u>	<u>Existing Strength</u>	<u>Required Strength</u>	<u>Shortfall</u>
Docks	6	14	8
Allied Trades	5	15	10
Welding	23	37	14
Ship Fabrication	12	31	19
Marine Outfitting	22	35	13
Machine shop	15	26	11
Inside fitting	<u>9</u>	<u>20</u>	<u>11</u>
Total	<u>92</u>	<u>178</u>	<u>86</u>

It is seen that the division has currently only around 50% of its skilled work force and almost all departments have been affected.

The skilled workers have been lured away by private competition mainly because of the very low package of remuneration and fringe benefits offered by the Public Corporations.

- Shortage of foreign exchange has affected the procurement and stocking of imported materials like steel marine paints, etc. Sufficient stocks of these materials were earlier maintained to ensure smooth and uninterrupted operation. Shortage of materials has affected production causing delays and lost/unutilised dock-time.

For the past few years customers have been asked to procure and supply the imported steel, paints and other materials required, also contributing to delays and and lost time.

Also GNEC has by this arrangement lost the benefits of profits from self procurement of materials and is restricted to profits only from ^{the} labour component.

- The machinery and equipment in the machine shop, fabrication shop as well as docks are all very old (20 to 30 years) and in need for replacement. Lack of adequate foreign exchange has affected progressive replacement and rehabilitation. Spares are not obtainable for rehabilitation, ^{the equipment} and need to be replaced.
- Need for extensive rehabilitation of most of the machines and equipment. The equipment, though operating are performing well below their capacities and capabilities.
- A number of machines are down for long periods for want of spares and foreign exchange constraints have hindered imports and rehabilitation.
- Critical shortage of basic imported cutting tools for several machines in the machine shop; cutting torches and special electrodes for cast iron, Aluminium brass, copper and stainless steel in the welding section; and essential hand tools in the mechanical and outfitting section.

- Lack of uninterrupted electric power supply from GEC affects production. The existing generator is able to supply most areas during the day, however emergency night shift operation is not possible.
- Inadequate number of overhead cranes and mobile cranes. Currently only 2 two overhead cranes exist in machine shop area and light fabrication area; and only one mobile crane for the whole division. Provision of one more overhead crane over slipways and two more mobile cranes will greatly reduce labour inputs, ease and hasten production.
- Currently there is no berthing facility outside the docks for carrying out outfitting and other minor repairs outside the docks. Such an "outfitting quay" facility would go a long way in releasing the docks for major dock work.

It is understood such a facility existed earlier and after the collapse of the existing wharf, the old piles have not been removed and causes danger of hitting the bottom of the ships at low tide.

- The existing slipways are not able to take the bigger pontoons and also fishing trawlers, and have to be handled at the docks. Some modifications to the slipways will release dock time for larger ships and also improve the low utilisation of the slip ways.

- Gate of Northern dock needs extensive repair. Also the northern dock floor needs concreting.

- Performance of the Division has also been affected considerably by the occupancy of the docks by vessels over extended periods of time during 1988 & 1989 due to litigation and inadequate supply of required imported raw materials due to foreign exchange limitations.

The northern dock was not available for any alternate work due to litigation and occupancy by one vessel "Alcanamari" for the period September 1988 to end December 1989 (16 months)

The other dock was occupied for almost the same period - October 1988 to November 1989 by two vessels, a tug and a GNEC owned vessel "Providence" due to extensive repairs for these vessels and also waiting for urgently required imported materials.

1.7 DOMESTIC COMPETITION

GNEC's SB/SR Division has the largest facility in the region and until recently very little competition. In recent years a few small dry docks and slipways have been constructed, both in the Public and Private sectors, used mainly for ship repair activities.

DOMESTIC COMPETITION (CONT'D)

As regards ship building, there is practically no competition except for M/S Toolsie Persaud Ltd building a few pontoons for their use.

The drydocks and slipways currently in existence are:

i) TRANSPORT & HARBOURS DEPARTMENT

Small drydock at Mazononi undertaking mainly repair activities for vessels belonging to the department.

ii) GUYMINE

Guymine has a small floating dock and a slipway in Berbice undertaking minor repairs. Plan to go in for also major repairs, but so far not able to, due to inadequate skills.

iii) FISHERIES DEPARTMENT

Small slipway capable of handling fishing trawlers, small tugs. Most of the fishing trawlers are being serviced by this slipway.

iv) CARIBBEAN RESOURCES

Small slipway capable of repair of tugs and pontoons.

v) FRIENDSHIP SLIPWAY

Large slipway capable of handling big pontoons and vessels.

vi) D'SILVA'S SLIPWAY

Small slipway servicing small vessels.

vii) GUYSUCO

Guysuco also undertakes minor repairs of their pontoons and punts, though no slipway exists. The craft are pulled up to bank and minor repairs carried out.

Apart from the above repair facilities existing, there are a number of private contractors who pull up craft on to a bank and carry out minor repair, outfitting, and some amount of hull work.

IMPACT OF COMPETITION

GNEC has been progressively losing out to competition mainly for repair of small crafts like trawlers, pontoons, tugs, punts etc.

2. MARKET RESEARCH

2.1 DOMESTIC MARKET

2.1.1 POTENTIAL DEMAND

There are around 20 major companies both in public and private sectors, owning vessels in the country and operating in this region. Vessels include cargo ships, ferry boats, patrol boats, barges tugs and trawlers. Table 5 indicates the number and type of vessels owned.

In addition, there are a number of smaller craft operating in the region, including private fishing trawlers. GUYMINE and GUYSUCCO also have a number of pontoons and punts for internal transportation.

The survey involved sending questionnaires to all the major companies, followed with personal visits and discussions regarding their ship building and ship repair requirements. List of organisations contacted is enclosed at Table 6.

Discussions revealed that most of the vessels in the region are old, 25 to 30 years old, and in need of very extensive repair and rehabilitation. Very little of periodic and preventive maintenance is currently being done on the vessels and the vessels get into the dock mainly when it is absolutely essential, that extensive and emergency repairs are to be carried out. Reasons for this change in trend over the years is mainly because of the drop in trade in the region, economic and foreign exchange limitations.

POTENTIAL DEMAND (CONT'D)

The trend therefore is for vessels getting into the docks only for very extensive and emergency repairs involving long occupancy of the docks.

Most of the larger vessels are all serviced by GNEC, but with regard to the smaller craft, as pointed out earlier, there is competition from the smaller slipways in the region.

There has been very little of ship building activity in the region, mainly because of the poor economic situation and also foreign exchange constraints. Also the tendency of owners to plan and invest in larger cargo vessels, which are beyond the capability of GNEC. Ship owners have therefore been going to larger dock yards for building requirements.

2.1.2 CURRENT PENDING ORDERS

Table 7 highlights current requests, confirmed orders and the schedule of docking of ships for repairs, together with the estimated docking time expected, depending on the extent and nature of jobs to be carried out on the vessels.

It is seen that 21 ships are registered for docking in the Norther dock and the estimated docking time is around 29 months ie around 2½ years of confirmed jobs for the dock. The schedule also shows the Southern dock having 10 ships registered for docking with an estimated docking time of around 38 months ie 3¼ years of confirmed work.

CURRENT PENDING ORDERS (CONT'D)

As pointed out earlier in para 1.4, the actual docking times have always far exceeded the initial estimated docking times, as most ship owners do not fully indicate or outline the extent and nature of repairs. After docking, it has in-variably been found that much more extensive repairs are warranted, thereby extending the docking time.

It is therefore expected that the current order bookings will engage fully the docks for at least another four years. The slipways will however, not be fully utilised in view of competition and also fewer smaller crafts for repair.

2.2 REGIONAL MARKETS

The survey covered six countries visited: Jamaica, Trinidad and Tobago, Barbados, Antigua, St Kitts and St Vincent and the list of organisations contacted in each country is enclosed at Table 8.

Tables 9 to 12 enclosed indicate the number of ships and other craft registered in Jamaica, Barbados, Antigua and St Vincent and operating within the Caribbean region. Tables also indicate the type of craft, size and specification and the owners of the ships. Trinidad and Tobago and St Kitts have no ships or crafts registered.

REGIONAL MARKETS (CONT'D)

There are also vessels registered in other countries in the region like Suriname, Venezuela, St Lucia, Grenada etc but the survey did not cover these countries.

Discussions with some ship owners indicates interest by ship owners from St Vincent, Barbados & Suriname for utilising docking facilities in Guyana. Jamaica and Antiguan owners felt that Guyana is too far away and that they would rather use docking facilities available much nearer.

2.3 MARKET OPPORTUNITY

It is clear from the aforesaid that there exists tremendous opportunity and potential for ship repair work, both in the domestic market and in the neighbouring regional markets. GNEC Ship building/Ship repair Division has got enough demand for the next few years, and will only have to gear itself ^{up} to full capability in order to cater and satisfy this potential demand.

2.4 REGIONAL COMPETITION

The major dock yards in the region are in Barbados, Jamaica, Martinique, St Thomas, Netherland Antilles and Trinidad Major facilities existing at each centre are:

- Barbados:** - Bridgetown - 1000 tl mechanical lift dock
73.13 m long
- Bermuda:** - Hamilton - Minor hull and machinery repair
undertaken
- St Georges - Meyor Industries Ltd 1000 tl
marine railway
- Bermuda Machine & casting Co Ltd - General repair
work
- Dominica** - Santo Domingo - Maritina Dominican SA
- Astilleros Benitez
- Jamaica** - Kingston - Belmont Dry dock 800 tl slip with 51.8m
cradle
- Port Esquivel - General repair workshops
- Martinique:** - Fort De France - Dept of Public Works Drydock 199.94 x
33.52 x 8.43.
- St Thomas**
(Virgin islands) - Creque Marine Slinway 1000 tl slip 41m long.
- Netherland Antilles:** SINT Nicholas (Aruba) Limited workshop repairs
- Willemstad - Curacao Drydock Co.
2 Drydocks - 193 x 26 x 613, 28000 dwt
- 290 x 48 x 8.5, 150,000 dwt
- 1 Floating dock - 165 x 29.1 1000 lt.
- Trinidad:** - Caribbean Drydock (Chaguaramas)
175.4 x 24.4 x 16.5 1100 tl
- Caribbean Dockyard & Eng Ltd (Port of Spain)
175.4 x 24.4 x 16.51, 11000 lt
- Port Authority of Trinidad & Tobago
2 Slipways.

3. FUTURE PROSPECTS

Ship Building/Ship Repair Division, has got very good prospects by way of potential market demand, both in the domestic and from the Regional Markets.

3.1 SHIP BUILDING

Prospects of Ship Building activity stepping up in the region does not look very bright, unless there is rapid improvement in the economic situation and increase in trade, within the Caricom region, and also to and from other countries.

With the proposed divestment of the Fisheries operations in the country, however, it is expected that there will be investments to the sector and increase in fishing activity in the region. This could generate need for more fishing vessels and trawlers and could be an opportunity for increased building activity.

Also the divestment and expected revitalisation of the potential sugar and mining industries, could lead to increased trade and shipping activity and potential for increased ship building activity.

Unless changes take place in these sectors, the current future potential for ship building activity is restricted to building only a few barges, pontoons and punts.

3.2 SHIP REPAIR

As outlined above, there is tremendous potential and demand for ship repair in the domestic market itself. GNEC has pending firm orders for the next few years and this could be the mainstay of the Divisions activity, provided the Management gears up and improves the capability of the Division, by improving/modernizing the facility and the throughput times at the docks. The actions to be taken by the Management in this direction are highlighted later in the report.

There is also potential for additional ship repair work from other neighbouring countries in the region, mainly from countries, not having any ship building/ship repair facilities.

3.3 DRY DOCKS

The dry docks are likely to be fully utilised, with considerable ship repair activity, current and future, in the country and overseas. The problem however, will be to gear up to improve throughput times, capitalise on opportunity and cater to a greater number of vessels.

3.4 SLIPWAYS

In view of the competition from other slipway facilities in the country, and the limited number of small vessels/crafts in the region, the slipways are likely to be under utilised, unless steps are taken to improve facility and service; throughout times; in relation to competition; modification of slipways to cater for smaller craft like fishing trawlers; and the recapture of markets lost to competition.

3.5 MANAGEMENT ACTIONS

The potential market for the SB/SR Division is extremely good, mainly in the Ship Repair activity, domestic and if necessary in the Caribbean region. However, GNEC has not been able to capitalize on this demand and utilise the existing capacities and capabilities to cater to this potential demand. Several constraints, outlined earlier, have contributed to poor performance of the Division.

This potential demand, if to be protected from competition, and catered to by GNEC, several management actions/inputs would be required to optimise production and performance; rehabilitate and modernise existing facilities; improve throughout times on the drydocks and slipways; improve customer servicing and customer satisfaction and above all, to improve and maximise capability of the Division.

Actions by the Management, identified to improve performance of the Division are as follows:

i) Skilled Workforce

Shortfall of around 50% of skilled and experienced workforce, to be put in place and trained, to achieve the skill and competence required, to achieve total capability in the Division.

In this connection, it should be pointed out that the capability and competence of freshly recruited skilled workers from the Technical Institutes, leaves much to be desired. They have to be retrained all over again, on skills, and regular training programmes will have to be put in place.

ii) **Technical & Managerial Personnel**

Recruit qualified and trained technical and managerial personnel, to fill up vacancies in the Division, mainly in areas of Marine Engineering, Design and personnel for Supervisory and Management Positions, to be groomed under the present sectional heads, for future succession.

iii) **Imported Raw Materials**

Adequate stocks of steel, paints and other imported raw materials, so as to ensure continuous and uninterrupted production and no loss of precious dock time, due to lack of materials. Suitable foreign exchange measures to be worked out.

iv) **Electric Power Supply**

Adequate electric power supply in the division, to ensure uninterrupted power supply to all Sections of the Division. Increased captive generation, or a total agreement with GEC for uninterrupted power supply.

v) **Craneage Facilities**

Provision of one more overhead crane over the slipways and two more mobile cranes to facilitate easier material handling; reduced manual labour effort and improved efficiency.

vi) Outfitting Quay

Restoration of the "Outfitting Quay", existing earlier, by removal of old piles and dredging and cleaning the area, in order to provide the facility for doing minor repairs, outfitting and internal ship work outside the docks. Alternate location, would be the wharf behind foundry area. Will ensure better utilisation of docks and slipways and carrying out all work, not requiring docking, being done out of the docks.

vii) Slipway Modification

Modification of Slipways, to take bigger pontoons, fishing trawlers and other small craft in order to improve utilisation of slipways. Installation of a central rail in the slipways; or facility to reduce the span of the slipways to also support fishing trawlers.

Will facilitate accommodating a wider range of smaller craft on the slipways.

viii) Dock Gate

Necessary repair to Northern dock gate and cementing/concreting of dock floor.

ix) Machinery & Equipment

Investments to rehabilitate/replace machinery and equipment mainly in machine shop; fabrication shop; welding and the docks/slipways, where most of the equipment are 20 to 30 years old. Some of the machinery and equipment are obsolete with no spare parts obtainable.

Discussions with Section Heads in all Sections in the division, indicate that the following actions are called for, in order to improve capability of the Division in the major sections:

a) Replacement of Machinery/Equipment (obsolete)

Machine Shop

- Two of the lathes (C&W Canadian Ware finish and Mclelen) need to be replaced.
- The two boring bars (horizontal and vertical) to be replaced.
- One Pedestal Grinder
- One boring mill (4ft x 6ft table size)

Fabrication Shop

- Small 14 ft rolling machine to be replaced on priority.
- Buffalo all purpose cutting and punching machine, which is most of the time out of commission.

Welding Section

- Originally there were 24 electrical welding sets, currently only 17, out of which there are only 11 working.
- Portable welding sets originally 4, currently only one in working condition; 3 additional portable sets required.

b) Machinery down for want of spares

Major and vital machines are down for long periods for want of spare parts, some of the spares not available due to the machinery being obsolete and others not procured for reasons of mostly foreign exchange constraints.

- 6 lathes out of 14 down waiting for spares.
- 1 gear cutting machine not commissioned since 1982 for want of cutting tools not received.
- Large Guillotine shear not working for past one year for want of spares.
- Flanging machine down for a year for want of clutch spring.
- Electrical welding sets out of order awaiting spares.

c) Machinery awaiting cutting tools

The performance of many of vital equipment are affected for want of cutting tools, mostly imported and some procurable, in local currency, from local importers. Major machines affected are:

- 3 Milling machines for want of cutters. Existing cutting tools very old.
- Gear cutting machine not commissioned since installation for want of cutting tools.
- Surface grinders, crankshaft grinder for want of grinding wheels.
- Threading machines short of cutters.

Overall; there is an acute shortage of cutting tools and measuring instruments which needs priority attention.

d) Rehabilitation of old machinery

Almost all machinery and equipment are very old, and though operating, in need of extensive rehabilitation. These old machines are operating well below their capabilities and need investments, towards replacement of worn out parts and total rehabilitation. Assessments will have to be made and decisions taken; as to which machines could be rehabilitated and which ones would have to be replaced, in order to improve capability of the division.

- e) Shortage of imported cutting torches and regulators; special electrodes of cast iron, Aluminium, Brass, Copper and stainless steel, and arc holders in the welding section; hand tools for the mechanical and outfitting section.

x) Additional Docking Facility

As a long range plan, the management could consider investments for an additional larger modern floating or dry docking facility, capable of handling the larger and more sophisticated vessels.

The trend is for ship owners to go in for larger vessels and most cargo is currently containerised and sizes of vessels are getting larger.

Currently these vessels cannot be serviced in the region. With the anticipated increase in trade in the region, this large docking facility will be able to attract and cater to the servicing of the larger vessels.

A suitable location would be in the Parrika area on the Essequibo river, which is much deeper and having less of siltation. This could however call for considerable development work and sizeable investments, and the market demand at that time will have to be reviewed before a decision is made.

3.6 CONCLUSIONS

Shipbuilding/Ship Repair Division has a long outstanding list of confirmed bookings, for docking facilities in terms of time frame, extending for the next 3 to 4 years of confirmed Ship Repair work for the Division. This will keep the Docks fully utilised for the next few years, mainly with Ship Repair activities.

Slipways, however will not be fully utilised, mainly due to competition from other smaller docking and slipway facilities in the country. Some measures have been suggested to modify slipways, so as to attract other types of smaller craft like Fishing Trawlers. However slipway utilisation is still likely to be underutilised, and GNEC should consider building of smaller craft like Tugs, Pontoons, Trawlers, to maximise slipway utilisation.

Shipbuilding activity, all over the world is on the decline and retrenchment has been heavy in several large dockyards overseas. In the region also, there is practically no building activity and this trend is likely to continue in future years. The SB/SR Division will therefore have to rely on mainly Repair activities, demand for which is considerable.

SB/SR Division will have to gear up its capabilities to cater for the large demand existing in the region; maximise production and improve throughput times; and improve utilisation of the docks, so as to cater for an increased number of vessels.

Several constraints however exist, in the Division, mainly due to age and condition of most of the machinery and equipment (20 to 30 years old); serious shortage of labour and managerial and technical skills lost, due to heavy turnover; foreign exchange constraints to import and maintain stocks of steel, paints, other imported materials, shortage of cutting tools, welding electrodes and auxiliaries.

The constraints and the management actions required to overcome them, have been covered in detail in paragraphs 1.6 and 3.5 respectively.

Many of the equipment are obsolete and beyond repair, and will have to be replaced; — equipment requiring extensive rehabilitation and machinery lying idle, waiting for spares and imported cutting tools; will have to be attended to on priority.

In order therefore to improve capabilities of the Division, skills will have to be augmented, and sizeable investments made, towards replacement/rehabilitation of machinery and equipment, import of necessary spares, cutting tools and equipment.

APPENDIXES

ACTIVITY/TIME SCHEDULE

ACTIVITY	W E E K											N U M B E R																
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25		
PHASE I : <u>DETERMINATION OF SUPPLY CAPABILITIES</u>																												
1.1 Programme Plans	←-----→																											
1.2 Capacity and Product Assessment (Internal)	←-----→																											
1.3 Capacity and Product Assessment (Competitors)	←-----→																											
PHASE II : <u>DEMAND/INVESTIGATION AND DATA COLLECTION</u>																												
2.1 Assessment of data and development of field research plans.	←-----→																											
2.2 Local field investigation and data collection (Foundry)	←-----→																											
2.3 Local field investigation and data collection (SB & SR)	←-----→																											
2.4 Export field investigation and data collection (Caricom) i.e. Supply and Demand	←-----→																											

LOCAL MARKET SECTORS/AGENCIES FOR STUDY - FOUNDRY SECTOR

1. SUGAR
Mr Tyrell - Technical Director - GUYSUCO
Mr E. Hanoman - Finance Director - GUYSUCO
2. RICE
Mr G. Kennard - GRMMA
- KAYMAN SANKAR
3. WATER
Mr R. Rajnarine - General Manager - Guyana Water Authority
Ms. R. Ali Khan - Georgetown Sewerage & Water Commission
Mayor C. Young - Georgetown City Council
4. MINING
Mr B.O.F Holder - Finance/Planning Coordinator Guyana Mining Enterprise Ltd Linden (Bauxite)
President - Guyana Gold & Diamond Mining Association
5. QUARRYING
Mr Toolsie Persaud - Interior Forest Industries
Mr Joe Singh - Dir General - Guyana National Service
6. POWER
Mr N. Persaud - Gen Manager - Guyana Electricity Corporation
7. MANUFACTURING
Mr S. Ming - Gen. Manager - Industrial Eng Ltd.
Mr U. Pilgrim, Gen. Manager - Sanata Textiles
Mr Bert Carter - Gen. Manager - Industrial Equipment. & Appliances Ltd
8. FORESTRY
Mr Toolsie Persaud - Toolsie Persaud Limited
Mr Peter Willems - Willems Timber Ltd
General Manager - Guyana Saw Mills
General Manager - Negarsa Saw Mills
General Manager - Demerara Woods Ltd
9. HARDWARE
10. ENGINEERING
11. CONSTRUCTION
12. TRANSPORT
13. GENERAL MARKETS

LOCAL AGENCIES FOR STUDY - SHIP BUILDING/SHIP REPAIRS SECTOR

- | | | | |
|-----|---|------|--|
| (1) | Cde Dunston Barrow
Chairman & Chief Executive Officer
Guyana Mining Enterprise Limited
Linden | (10) | The General Manager
Guyana National Shipping Corporation
5-9, Lombard Street
La Penitence
Georgetown |
| (2) | Cde Harold Davis
Executive Chairman
Guyana Sugar Corporation
Church Street
Georgetown | (11) | Mr. Yacoub Ally
Managing Director
A. Mazarally & Sons
27, Wright's Lane
Kingston |
| (3) | The Executive Chairman
Guyana Fisheries Limited
McDoom Village
East Bank Demerara | (12) | The General Manager
King's Shipping & Trading Co. Ltd.
Robb & King Street
Lacytown |
| (4) | Mr. F. Ramdohll
National Hardware (Guyana) Ltd.
15A Water Street | (13) | Mr. Morris Gajadar
Comptroller
Customs & Excise Department
66, Garnett Street - Newtown Kitty |
| (5) | Cde Carl Duncan (Managing Director)
Caribbean Resources Limited
Houston Public Road
East Bank Demerara | (14) | Brigadier Norman McLean
Guyana Defence Force
Camp Ayangana
Georgetown |
| (6) | Cde J. Bissessar
140, E½ Crown Street
Queenstown
Georgetown | (15) | Cde Balram Paghubir
Commissioner of Police
Ive Leary
Georgetown |
| (7) | Cde Dennis Rambarran
Rambarran Shipping Company
24, Meadow Bank
East Bank Demerara | (16) | Cde Joseph Singh
Director General
Guyana National Service
91, Middle Street |
| (8) | Tootsie Persaud Limited
1-4 & 10-12 Lombard Street
Georgetown | (17) | The General Manager
Transport & Harbours Dept.
Battery Road
Kingston
Georgetown |
| (9) | Guyana Oil Company
Waterloo Street
Georgetown | | |

(18) Stoll Bros. Shipping Co.
Friendship Village
East Bank Demerare

(19) Mr. R. Adams
Shipping Manager
Caribanks Shipping Co.
Banks DIH
Thrist Park
Industrial Site
Ruimveldt

SELECTED CARIBBEAN MARKET SECTORS/AGENCIES
XX

JAMAICA - (5 DAYS)

1. FOUNDRIES

- Caribbean Castings & Engineering Co. Ltd (CCEC)
- Castings & Mouldings Ltd
- White Metals Ltd
- Jamaica Railway Corporation Ltd.

2. POTENTIAL MARKET SECTORS

- Sugar - National Sugar Company (5 Factories)
 - Worthy Park Sugar Co.
 - Hampden
 - Appleton
 - New Yarmouth

- Mining - Alcan Jamaica Co (2 Plants)
 - Aluport (Aluminium Partners of Jamaica)
 - Kaiser
 - Alcoa Limited
 - Bauxite and Aluminium Trading Co. of Jamaica Ltd

- Cement - Carib Cement Co.

- Metal & Machinery - Carib Steel Co. Ltd

- Construction - KIC Tank Weld
 - Carib Construction Co.
 - Kingston Industrial Construction Co.

3. STATISTICAL AGENCY

- Government Statistical Department

4. SHIP BUILDING & SHIP REPAIR

BARBADOS - (3 Days)

1. **FOUNDRIES** Nil

2. **POTENTIAL MARKET SECTORS**

Sugar - Barbados Sugar Industry

Quarry - Quarry Products Ltd

- Asphalt & Quames Ltd

Construction

Water - Sanitary Engineers Ltd

- Barbados National Water Authority

Marine - Barbados Port Authority

Telephone - Barbados Telephone Company

Hardware

3. **Statistical Agency**

- Govt. Statistical Department

4. **Ship Building/Ship Repair**

TRINIDAD 15 DAYS

1. FOUNDRIES

- Mustapha Engineering Works Ltd
- Ceroni Ltd - STE Madeleine Sugar Factory
- Trintoc Ltd
- Williams Foundry

2. POTENTIAL MARKET SECTORS

Sugar - Ceroni Ltd

- Brechin Castle
- Ste Madeleine

Steel - Iron & Steel Co. of Trinidad & Tobago

- Central Trinidad Steel

Construction - Gen Wimpey (Caribbean) Ltd

- Demus Ltd
- Ministry of Works

Water - Water & Sewerage Authority

Telephone - Trinidad & Tobago Telephone Co. Ltd

Hardware -

ST VINCENT (2 DAYS)

1. FOUNDRIES - NIL

2. POTENTIAL MARKET SECTORS

Construction - Housing & Land Development Corp.

Water - Public Works Dept

Power - St Vincent Electricity Services

3. STATISTICAL AGENCY

- Ministry of Finance/Statistics Dept.

4. SHIP BUILDING & SHIP REPAIR

-

-

ST KITTS (2 DAYS)

1. FOUNDRIES

- (Recent foundry established)

2. POTENTIAL MARKET SECTORS

Sugar - Ministry of Agricultural

- St Kitts Sugar Industry Ltd

Construction - Public Works Department

Water - Water Department

GUYANA NATIONAL ENGINEERING CORPORATION LIMITED.

19 December, 1989

QUESTIONNAIRE - FOUNDRY CUSTOMER SEGMENTS

Dear Sir,

RE: MARKET ASSESSMENT - FOUNDRY PRODUCTS

A market study is being conducted to update and reassess the current and future requirement and Market Demand for Cast Iron, Ni Hard and Non-ferrous Castings within the country. This exercise is being undertaken to help us in making a realistic future production plan and take decisions regarding a suitable product mix for our Foundry at the GNCL.

In order to facilitate and expedite the completion of this exercise, we solicit your assistance in furnishing us with the following information as per the enclosed formats.

- i) Present and future product wise requirements
- ii) Particulars of Imports of Cast products in recent years.

We would be grateful if you could have this information ready by the 8th of January, 1990, so that we could call on you and have a discussion immediately thereafter, at a mutually convenient date and time.

Thank you for your co-operation.

Yours sincerely

.....
C.A. SAUL
EXECUTIVE CHAIRMAN

GUYANA NATIONAL ENGINEERING CORPORATION LIMITED

FOUNDRY PRODUCTS CONSUMPTION TREND

PRODUCT - CAST IRON/HARD/NON-FERROUS

PRODUCTS	HISTORICAL 1987		CONSUMPTION 1988		CURRENT CONSUMPTION 1989			FUTURE CONSUMPTION 1995			
	Tonage	No./Yr.	Total Tonnage	No./Yr.	Total Tonnage	Tonnage	No./Yr.	Total Tonnage	Tonnage	No./Yr.	Total Tonnage

GUYANA NATIONAL ENGINEERING CORPORATION LIMITED

FOUNDRY PRODUCTS IMPORTS

Products	1986		1987		1988		1989		Future 1995 (Est)	
	Number	Tons Value	Number	Tons Value	Number	Tons Value	Number	Tons Value	Number	Tons Value
CAST IRON										
NIHARD										
NON-FERROUS										
Brass/Bronze										
Aluminium										

GUYANA NATIONAL ENGINEERING CORPORATION LIMITED.

21 December, 1999

QUESTIONNAIRE - FOUNDRIES (CARICOM)

Dear Sir,

SURVEY OF FOUNDRY FACILITIES/POTENTIAL MARKETS

The United Nations Industrial Development Organisation in collaboration with the Guyana National Engineering Corporation are conducting a survey in the Caribbean, to obtain an update and reassessment of the facilities available for the manufacture of cast products and their relationship to the available market demand for these products in the region.

In order to facilitate and expedite the completion of this exercise, we solicit your co-operation and assistance in furnishing us with the following information as per the enclosed formats:

- A profile of facilities existing in the foundries
- Past, present and future product wise production/sales trends (separate for cast iron, Nihard and Non-ferrous products)
- Country wise imports of cast products.
- Country market demand market segment wise.

We would be grateful if you could have this information ready by the 15th January, 1990, so that we could call on you and have a discussion immediately thereafter. We propose visiting between and ,1990 and would appreciate a mutually convenient date and time for the discussion.

Thanking you for your cooperation.

Yours faithfully

.....
C.A SAUL
EXECUTIVE CHAIRMAN

EMPLOYEES:

PRODUCTION BY PRODUCT: (Please use enclosed sheet - Attachment I)
(1987-1989)

COUNTRY MARKET DEMAND: (Please use enclosed sheet - Attachment II)
(SEGMENT WISE)

COUNTRY FOUNDRY PRODUCT - IMPORTS: (Please use enclosed sheet - Attachment III)

COMPETITION:

- INLAND

- IMPORTS

- OTHER CARIBBEAN COUNTRIES

PRODUCTION CONSTRAINTS:

MARKETING CONSTRAINTS

EXPORT CONSTRAINTS

**FUTURE MARKETING PLANS:
AND NEW PRODUCTS:**

ATTACHMENT - I

F*O*U*N*D*R*Y* P*R*O*F*I*L*E

NAME OF FOUNDRY:

DATE OF ESTABLISHMENT:

PRODUCTS MANUFACTURED:

- FERROUS

- NIHARD

- NON-FERROUS

MARKET SEGMENTS CATERED:

PRODUCTION CAPACITY:

- FERROUS

- NIHARD

- NON-FERROUS

PROCESSES:

- FERROUS

- NIHARD

- NON-FERROUS

EQUIPMENT (AUXILLIARY):

GUYANA NATIONAL ENGINEERING CORPORATION LIMITED

ATTACHMENT II

FOUNDRY PRODUCTS PRODUCTION/SALES TREND

PRODUCT - CAST IRON/NIHARD/NON-FERROUS

PRODUCTS/ MARKET SEGMENTS	HISTORICAL 1987			PRODUCTION 1988			CURRENT PRODUCTION 1989			FUTURE PRODUCTION PLAN 1985		
	Tonnage	No/yr	Total Tonnage	Tonnage	No/yr	Total Tonnage	Tonnage	No/yr	Total Tonnage	Tonnage	No/yr	Total Tonnage

NOTE: Please indicate Market Segment against each product - Sugar, Rice, Bauxite, Other Mines, Quarrying, Construction, Water, Supply, Power, Communication, Transport, Manufacturing, Hardware, others.

GUYANA NATIONAL ENGINEERING CORPORATION LIMITED

ATTACHMENT 11 I

COUNTRY MARKET DEMAND
(SEGMENT WISE IN TONS)

MARKET SEGMENT	PRODUCTS	CURRENT NUMBER	DEMAND TONNAGE	(1989) TOTAL TONNAGE	FUTURE DEMAND (1995)		
					NUMBER	TONNAGE	TOTAL TONNAGE

NOTE: Please indicate Market Segment against each product - Sugar, Rice, Bauxite, Other Mines, Quarrying, Construction, Water supply, Power, Communication, Transport, Manufacturing, Hardware, Others.

COUNTRY FOUNDRY PRODUCTS IMPORTS

Site Code	Products	1985			1986			1987			1988			1989			Future 1995(Est.)		
		Number	Tons	Value	Number	Tons	Value	Number	Tons	Value	Number	Tons	Value	Number	Tons	Value	Number	Tons	Value
	<u>CAST IRON</u>																		
	<u>NIHARD</u>																		
	<u>NON-FERROUS</u>																		
	a) <u>Brass Bronze</u>																		
	b) <u>Aluminum</u>																		

GUYANA NATIONAL ENGINEERING CORPORATION LIMITED.

28 December, 1989

QUESTIONNAIRE - SB/SR CUSTOMER SEGMENT

Dear Sirs,

RE: SHIP BUILDING/SHIP REPAIR REQUIREMENTS

A study is being conducted to reassess and update the current and future requirements of the Ship Building and Ship Repair activity in the Caribbean to facilitate in drawing up a realistic work schedule for our dock yard.

In order to facilitate and expedite the completion of this exercise, we solicit your assistance in furnishing us with the following information:

- Type and number of vessels/craft owned. (Ships, pontoons, tugs, small boats etc.)
- Extent and type of repair work that is required on each vessel/craft. (Describe nature of work and approximate repair duration).
- Schedule of periodic annual maintenance required for each vessel/craft. (Frequency, type of repair and duration).
- Ship Building Requirements. (Type of craft and description).

We would be grateful if you could have this information ready by the 15th January, 1990 so that we could call on you and have a discussion immediately thereafter, at a mutually convenient date and time.

Yours sincerely

.....
C.A. SAUL
EXECUTIVE CHAIRMAN

COUNTRY STUDY - GUYANAECONOMIC AND INDUSTRIAL BACKGROUND

Guyana's economy has been traditionally, dependent upon the export of rice, bauxite and sugar for the bulk of its export revenue. These major exports have not been performing as well as before due to climatic, industrial relations and trade problems. These exports have been supported by several non-traditional products such as citrus, shrimp, gold and diamond. The parallel economy has become quite vibrant thus consumption patterns have been steady.

Gross Domestic Product has been displaying positive growth during the years 1984 to 1987 but declined in 1988 due to strikes in the bauxite and sugar industries. The sugar contributors to GDP have been mining, construction, manufacturing and agriculture (in that order). In terms of absolute performance however, the agriculture sector has experienced negative growth from 1987. The mining sector has been experiencing mixed fortune, showing positive growth in alternate years since 1985. This industry is expected to invest heavily in order to take advantage of the current favourable world demand.

The manufacturing sector has been in a state of almost perpetual decline since 1984 due to shortages of foreign exchange, manpower and supporting infrastructure.

In the construction sector for the most part there has been neither growth nor declines except in 1987 when there was a 5% positive growth.

MARKET SURVEY

1. AGRICULTURE

The Guyanese agricultural sector produces a variety of crops like sugar, rice, wheat, bananas, fruits and vegetables. The agricultural sector accounts for a major contribution of the GDP. The performance of this sector has been declining over the years and this has been a serious problem.

The two major crops are sugar and rice. There has been a sharp fall in production of both these crops, and also exports. The sector utilises a lot of ~~farm~~ machinery but castings in any sizeable quantity are mainly used only in the sugar factories and the rice mills.

a) SUGAR INDUSTRY

Guyana's sugar industry is nationally owned and has eight factories in production currently. They are the Wales, La Bonne Intention, Enmore, Blairmont, Rosehall, Albion and Skeldon plants. In 1984, these were 10 plants, but subsequently two of the plants have been closed down ie Leonora and Diamond.

The Sugar Corporation, prior to nationalisation/owned by /was M/S Bookers McConnel of UK. With the recent shift in thinking of the Government and the process of divestment of several large public corporations, M/S Bookers has again been invited to participate in the ownership of the Sugar Corporation.

a) SUGAR INDUSTRY (CONT'D)

It is expected to give a boost to the industry and also lead to huge investments towards modernisation and rehabilitation. The industry is also obtaining IDB Assistance for obtaining rehabilitation spares.

Sugar industry has been the sector contributing to the largest demand for foundry castings and GNEC foundry's major customer. Cast iron requirements include items like mill roller shells, trash plates, scraper plates, coupling boxes, boiler doors and frames, sprockets, gears, pump housing etc, and the non-ferrous requirements include pump housings, mill bearings, bushings, impellers bodies, sprockets, hydraulic lines etc.

Mill roller shells are the single largest requirement for this sector and are replaced over a three year cycle. On an average 24-30 rollers are replaced every year i.e around 240-300 tons. Others large requirements are trash & scraper plates, coupling boxes and mill bearings.

The sugar factories also utilise several types of pumps for pumping molasses, massecuite, syrups, magma strain & clear juice, mud and water. The estates also use large number of irrigation pumps. Pumps housings, impellers and impeller bodies are replaced frequently.

Mill roller shells are all imported from UK and the other items are mostly produced by the two local foundries GNEC and BACIF. The sugar industry also has a small casting facility at Berbice.

a) SUGAR INDUSTRY (CONT'D)

The overall requirement of cast iron from this sector is around 360 tons and non-ferrous castings around 38 tons.

b) RICE INDUSTRY

Demand for castings from this sub-sector is mainly from the rice mills, where sizeable quantity of rubberised husker rolls are procured. The annual requirement of rolls is around 12000, all imported currently. The rolls are replaced as soon as the rubber layer gets worn out. The bosses of the rolls are of cast iron.

GNEC has a project initiated to rubberise these mill rollers and trials are in progress to perfect the process. Once this project takes off, GNEC could cast the roll bosses, rubberise them and supply to the rice mills.

Assuming 12000 rolls replaced every year and each roll can be recycled thrice for rubberising, there would still be a new fresh cast iron mill roll requirement of around 4000 rolls per annum.

The sub-sector also has a small requirement of foundry cast bushings and bearings. There is also a large requirement of pumps being imported, casings for which can be cast locally. This aspect will be dealt with later in the report. Most of the other farm equipment spares are procured as original equipment spares.

2. MINING & QUARRYING

a) MINING

The major mining activity in the country is the Bauxite Industry. The Guyana Mining Enterprise (GUYMINE) has large operations at Linden and Berbice. Guyana is one of the major Bauxite manufacturing countries and exports large quantities of Bauxite and other associated products. The performance of this industry has fallen considerably since 1980 due to mainly the age and condition of the plant and facilities.

The industry was, prior to nationalisation around 1970/1971 was privately owned. Negotiations are now taking place for the re-entry of ALCAN and M/S REYNOLDS as joint partners. This should lead to large investments for modernisation and rehabilitation and also improved production and performance.

Bauxite industry mainly uses proprietary equipment spares and sizeable quantity of cast steel items. The industry is equipped with well equipped machine shops and produces some replacement spares and repair jobs.

The cast iron requirement is around 10 tons and the non-ferrous requirement 18 tons per year.

Requirements of cast iron is limited mainly to water supply schemes and non-ferrous items like bearings and bushings.

b) GOLD & DIAMOND MINING

There is a large Gold and Diamond Mining activity in the country and rapidly expanding. This sub-sector employs mainly plant fabricated from steel (plates) and is based on dredger type plants. Usage of castings is negligible.

3. QUARRYING

Major Quarries in the country are the Government owned works under the Guyana National Service and the private Toolsie Persaud Quarries. Requirements of castings is low in this sector. Cast iron requirement is around 32 tons per year comprising of items like crusher jaws, sprockets, pulleys, bearing blocks, bowl liners, rollers etc. Out of this around 22 tons is in Nihard.

The non-ferrous requirement is around 5 tons per year, mostly bushings, pulleys impellers bearings etc.

4. WATER & SEWERAGE

a) THE GEORGETOWN WATER AND SEWERAGE COMMISSION

The Commission oversees the water supply and sewerage systems in Georgetown. The water supply system is very old and in need for rehabilitation.

It is understood that the leakages along the mains is considerable. Very little has been spent on replacement or rehabilitating these lines and practically no expansion to the system, mainly due to foreign exchange constraints. A major rehabilitation project is being planned over the next few years. The Sewerage system has very recently been rehabilitated.

The water commission used cast iron earlier for all pipes and bends, but have now switched over to asbestos for larger sizes and PVC for smaller sizes up to 12" diameter. Ductile iron was tried but not found satisfactory, with properties of the well water. PVC finds preference due to its being produced locally.

There is a substantial current demand for cast iron castings in this sector in the form of manhole covers and frames (120), grids (100) and valves (200) representing around 64 tons per year. This is currently not being imported due to foreign exchange constraints, but will be procured if produced locally,. Non ferrous items are saddles, valves and firehydrant accessories of around 20 tons per year.

The requirements will be much higher when the rehabilitation likely, from 1990/1991, is taken up and will be in the region of cast iron 185 tons per year and non-ferrous 50 tons.

b) GEORGETOWN CITY COUNCIL

The City Council is responsible for all connections to consumer from the main water lines. Here again foreign exchange constraints have limited imports over the past few years and a lot of planned work has not been taken up. There are requirements of manhole covers, step irons and gully grids in cast iron of around 125 tons and a non-ferrous requirement of approximately 14 tons of valves and fittings.

c) GUYANA WATER AUTHORITY

The Water Authority coordinates all the work of the regions, undertakes execution of large and special projects and also provides workshop facilities to the Georgetown Water Commission City Council and the regions.

Projects are continuously taken up with outside foreign aid/assistance. An EEC funded project has been going on for the past few years. Most equipment and spares are imported through this assistance package and generally come from the countries/agencies providing assistance.

The Workshop has also small cast iron and non-ferrous castings requirements.

5. MANUFACTURING

The manufacturing base in Guyana is very small, embracing light industries producing; foodstuffs, beverages, pharmaceuticals, paints, textiles, electrical equipments, pvc pipes, nuts & bolts etc. There has not been much growth in this sector over the years.

a) INDUSTRIAL EQUIPMENT & APPLIANCES LTD (IDEAL)

IDEAL manufacturers electrical equipment like; fridges, freezers, gas cookers (domestic and commercial), plastic injection moulded components and concrete blocks. Requirement is negligible for cast iron and around 5 tons for non-ferrous.

MANUFACTURING (CONT'D)

b) SANATA TEXTILES

The plant was set up by the Chinese and utilises mostly Chinese machinery. Spare parts are mostly proprietary and very little demand for cast iron - around 4 tons per year of shafts, brackets and other spares. Non ferrous requirement is mainly bushings.

c) INDUSTRIAL ENGINEERING LIMITED (IEL)

IEL is involved in mainly design of plant and equipment, and its production and fabrication. Very negligible demand.

d) OTHER INDUSTRIES

Other Industries like PVC, pharmaceuticals, food, beverages, paints, nuts & bolts, furniture etc have practically no requirements of cast items.

6. POWER

The Guyana Electricity Corporation has very little requirement of castings as almost all electricity lines are overhead. Negligible requirements of cast iron for spares like pump housings, baffle plates etc of around 2.5 tons per year and a non-ferrous requirement of around 4 tons mainly bushings.

7. TELECOMMUNICATIONS

The Guyana Telecommunication Corporation is in charge of erecting and maintaining all Telecommunication systems in Guyana. The Corporation has telephone systems covering the whole country, mostly concentrated in the urban area. The telephone system is in need of rehabilitation, and improvement/expansion of facilities required. Small projects, localised to certain areas have been carried out with foreign assistance, but a total rehabilitation programme has not been possible due to constraints of foreign exchange.

Currently a rehabilitation project is under execution (10.5 million US Dollars) under contract with Northern Telecoms of USA; to rehabilitate and enhance business sector facilities in certain parts of Georgetown. This project had requirements for manhole covers and joint boxes in cast iron. It is understood however that all requirements have already been ordered under contract with Northern Telecoms. No other projects are envisaged at present.

Almost 80% of all telephone cables have already been laid underground in Georgetown city and most parts of BV, Linden, New Amsterdam areas. The current requirements therefore for cast iron manhole covers are only as maintenance replacements and not very sizeable.

Negotiations are underway with the company "Atlantic Tele Network", for ATN to acquire 80% of Guyana Telecommunication Corporation. ATN also guarantees over US\$50 million during the next three years for rehabilitating, expanding and improving the telephone system in the country. Future plans of the Corporation, therefore very vague at this juncture and will await ATN's participation and priorities.

8. FORESTRY

The Timber industrial sector is quite large in Guyana and a potential export earner. There are large timber and saw milling operations like Toolsie Persaud Limited, Willems Timber Limited, Caribbean Resources Limited, Mazarally, Demerara Woods Ltd, Nagarsa Saw Mills etc.

Cast iron requirements are small around 16 tons per year for items like mill rollers, slides and guides, crankarms, trolley wheels, sprockets, gears, bearing blocks, mill frames etc. The non-ferrous requirement is around 3 tons mainly for bearings, bushings, impellers, gland boxes etc.

9. PUBLIC WORKS

The Ministry of Works oversees all construction of roads, bridges and Government buildings. Demand generally from this sector is for manhole covers, gully grids, grills etc. In Guyana however cast iron is generally not used and the demand is negligible.

10. TRANSPORT

This sector requires mainly spare parts for the various types of vehicles such as Omnibus and minibuses, cars trucks etc. Demand for castings is very low and mostly proprietary requirements from the original equipment manufacturers.

11. CONSTRUCTION

There is not very appreciable construction activity in the country. Private contractors import their requirements. The recent imports by this sector however is not available with the Statistical Department since 1984.

12. O T H E R S

Guyana import a sizeable volume of different types of pumps for water supply and irrigation. The pumps are imported by the water supply authorities, The Guyana Stores (Agro Division); The Guyana National Trading Corporation (GNTC) and also directly by the farmers. Imports by Guyana Stores and GNTC are for Agricultural projects and also for retail sale to customers.

These imports have been over the years reducing drastically, not because of diminishing demand, but due to foreign exchange constraints. Analysis of these requirements indicate the following:

- Small semi rotary water pumps are used for both domestic and irrigation purposes. The popular sizes are 2" and 3" pumps. As per GNTC officials, subject to foreign exchange availability and imports, there is a ready demand for around 1000 pumps per annum of 3" and around 2000 per 2" pumps.

- Guyana Stores has encouraged a private entrepreneur Mr Bynoe of Linden to produce and market a range of water pumps as they are confident of selling sizeable volumes of these indigenously produced pumps. However, very few pumps have so far been produced with mainly elaborate fabrication and machining. Discussions with Mr Bynoe reveals that he would be very interested in the use of castings in these pumps as it would expedite and make production simpler and less expensive. GNEC could collaborate in the production of these pumps by meeting the casting requirements.

O T H E R S (CONT'D)

- Several pumps and pump spares like impellers housings are being imported by the Guyana Water Authority, Sugar Industry, Mining Industry etc which again could be an opportunity for local manufacture by GNEC.

Production of pumps could be a very good opportunity that GNEC could consider as a regular production line, the foundry benefitting from this by way of a sizeable regular steady cast iron requirements for the foundry.

A tie up with a reputed pump manufacturer abroad, for technical know how, would however be required to standardise and produce a range of the popular sizes of pumps locally. The foreign collaborator could also facilitate entry into foreign markets and also collaboration in marketing the same pumps manufactured in Guyana, in other countries in Europe, USA and Caribbean countries. This aspect will be discussed further later in the report.

13. S U M M A R Y O F D E M A N D

a) CURRENT DEMAND

The details of demand and sectorwise are indicated in Tables 5 to 8 for cast iron and non-ferrous castings in Guyana. Cast iron demand is around 644 tons per annum and the non-ferrous demand around 109 tons. Major contribution to the demand is from the Sugar and Water supply and Sewerage sectors with the quarries and forestry sectors having small requirements.

CURRENT DEMAND (CONT'D)

There have been sizeable imports of castings for the Water & Sewerage sector and the construction sectors in earlier years up to 1984-1985. Subsequently in view of the severe foreign exchange requirements in the country, imports have dropped substantially, only restricted to priority and urgent requirements. There has therefore been hardly any imports over the past three years in the major sectors of sugar, rice, mining, water and sewerage and also manufacturing. This does not indicate that there were no requirements, but severe austerity measures have led to very selective imports of only essential and urgent requirements.

In addition to demand projected for the country, there are also several imports of items like pumps in large volumes, which could be a very good opportunity for local manufacture at GNEC with technical and marketing tie up with a reputed pump manufacturer overseas. This aspect is dealt with in detailed, later in the report.

The Sugar sector still is and will continue to be the largest market for cast products in the country. Mill roller shells contribute to around 240 tons of the total demand of cast iron requirements of 360 tons in this sector.

M/S ATN is expected to enter the Telecoms sector as it is expected there will be rehabilitation of existing network and laying of more underground cables. This should generate a sizeable demand for cast iron or ductile iron joint boxes. However, the future plans of the Telecoms sector will only be cleared after the merger plans are finalised.

The re-entry of Bookers in the Sugar Sector and Alcan/Reynolds in the Bauxite Sector should also generate considerable current demand.

b) FUTURE DEMAND

The recent re-thinking by the Government for divestment of most of the large Public Corporations and inviting private foreign investment into these Corporations, should lead to huge foreign investments into the various manufacturing sectors towards rehabilitation, leading to improved performance and increased production in these sectors. Huge investments towards rehabilitation/modernisation in the major sectors like sugar, mining, rice milling, telecoms, etc should generate a larger requirement for essential spares, also consequently castings demands which always existed, but for reasons of foreign exchange constraints were never procured over the years.

The demand in the Sugar industry is likely to be more or less steady. However the entry of M/S Bookers in the Sugar industry is likely to generate larger investments for rehabilitation/modernisation/expansion of the sugar factories and could generate a larger demand for foundry castings from this sector.

Demand in the rice sector is likely to increase with the plans for divestment in this sector and possible future increases in milling activity.

The demand from the mining sector is also likely to have sizeable future requirements in view of the proposed participation of M/S Reynolds and M/S Alcan in this sector. It is expected that there will be investments made in the next few years towards rehabilitation and modernisation in this sector, thereby more replacement of plant & machinery and consequently a larger demand for foundry castings.

FUTURE DEMAND (CONT'D)

Major rehabilitation is planned for the Water supply network over the next three to five years. This should generate a much larger demand than projected for foundry castings.

Proposed participation of M/S ATN in the Telecoms sector could again, as understood, lead to more detailed plans for improving the Telecoms network, rehabilitation and expansion of existing systems, conversion of more areas from overhead cables to underground cable and improving Telecoms service in the country. This could generate sizeable requirements of cast iron manhole covers and joint boxes over the next three to five years.

G U Y A N A

ORGANISATIONS/RESPONDENTS CONTACTED

1. **GUYANA SUGAR CORPORATION LTD**
 - Mr Tyrell - Technical Director
 - Mr London - Maintenance Manager
 - Mr Willabus - Maintenance Manager

2. **GUYANA RICE MILLING & MARKETING AGENCY**
 - Mr G. Kennard - General Manager
 - Mr Compton Jones - Plant Manager

3. **KAYMANSANKAR LTD**

4. **MAHAICA, MAHAICONY ABARY AGRICULTURAL DEVL.P. CORP.**
 - Mr T.A. Earl - General Manager
 - Mr Ramchall - Purchase Manager

5. **GUYANA MINING ENTERPRISE LTD (LINDEN)**
 - Mr B.O.F Holder - Finance/Planning Coordinator
 - Mr George Paris - Maintenance Manager
 - **Mr Kisson - Purchase Manager**
 - Mr Jackman - Stores

6. **GUYANA MINING ENTERPRISE LTD (BERBICE)**
 - Mr John Lewis - General Manager

7. **TOOLSIE PERSAUD LTD (QUARRY DIVISION)**

8. **GUYANA NATIONAL SERVICE**
 - Mr Joe Singh - Director General
 - Major Archer - Director Admin.
 - Major Booker - Director Quarry
 - Capt. Handerson - Quarry Coordinator

9. **GUYANA WATER AUTHORITY**
 - Mr R. Rajnarine - General Manager
 - Mr Yearwood - Chief Engineer
 - Mr Karan Singh - Deputy Chief Engineer

10. **GEORGETOWN SEWERAGE & WATER COMMISSION**
 - Ms R. Alikhan - Chairman
 - Mr Dewar - Chief Engineer
11. **GEORGETOWN CITY COUNCIL**
 - Mr Ayub Khan - Water Engineer
 - Mr Sowdagar - Town Planning
12. **INDUSTRIAL ENGINEERING LTD (IEL)**
 - Mr George Jordan - Chairman
13. **SANATA TEXTILES**
 - Mr Lewis - Works Manager
14. **INDUSTRIAL EQUIPMENT & APPLIANCES LTD (IDEAL)**
 - Mr Bert Carter - General Manager
 - Mr Lewis - Works Manager
 - Mr Davson - Works Engineer
15. **GUYANA ELECTRICITY CORPORATION**
 - Mr McDonald/ Mr Grandon
16. **GUYANA TELECOMMUNICATION CORPORATION**
 - Mr E. Harry/Mr McDavison
17. **TOOLSIE PERSAUD LTD (TIMBER DIVISION)**
 - Mr Persaud - Director
 - Mr Gulzar - Works Manager
18. **WILLEMS TIMBER LTD**
 - Mr Willems - Director
19. **CARIBBEAN RESOURCES LTD**
 - Mr Paul Bonar - Manager
20. **NAGARSA SAW MILLS**
 - Mr Chris Sawh - Director

21. **DEMERARA WOODS LTD**
 - Mr Perry - General Manager
 - Mr Cornette
22. **GUYANA STORES (AGRICULTURAL DIVISION)**
 - Mr Hope - General Manager
23. **GUYANA NATIONAL TRADING CORPORATION (HARDWARE DIVISION)**
 - Mr Russel - General Manager
24. **GUYANA NATIONAL TRADING CORPORATION (AGRICULTURAL DIVISION)**
 - Mr Spense - General Manager
25. **GUYANA GOLD & DIAMOND MINING ASSOCIATION**
 - Mr Harding - President
26. **BRASS, ALUMINIUM & CAST IRON FOUNDRY LTD (BACIF)**
 - Mr C. Geddes - Director
 - Mr Hammer - Works Manager
27. **GOVERNMENT STATISTICAL AGENCY**
 - Mr Bowman - Chief Statistician
28. **CARICOM SECRETARIAT**
 - Mr Changlee

COUNTRY STUDY - JAMAICAECONOMIC AND INDUSTRIAL BACKGROUND

Jamaica has a comparatively diverse economic base, with each sector having strong potential for growth.

Gross Domestic Product growth has been averaging at 3% per annum over the years 1986 to 1988. This performance would have been significantly better had it not been for the devastation which was caused by Hurricane Gilbert in August of 1988. All the major sectors suffered tremendously in this year except for the construction industry which showed a growth pattern of 2.6% in 1986, 14.0% in 1987 and 15% in 1988.

In terms of contribution as it relates to the major sectors, the mining sector has been displaying the best performance, followed by construction, then manufacturing and finally agriculture. The tourism sector, which was moderately damaged by the hurricane, was quick to recover and was fully functioning by the winter season.

MARKET SURVEY1. AGRICULTURE

Jamaica produces a diverse range of agricultural products mainly; bananas, coconuts, coffee and citrus fruits in addition to sugar which is a major export earner. The major user of castings however, is the sugar industry with the other industries using mainly hand-tools and other equipment.

1. AGRICULTURE (CONT'D)

a) SUGAR INDUSTRY

Jamaica has Sugar factories, two of them under the Jamaica Sugar Holdings and the other private plants coordinated by the Sugar Industry Authority. The two estates Moneymusk and Frome which are under the Jamaica Sugar Holdings produce around 160,000 tons of sugar ie about 50% of the total sugar production in the country. Longpond, a public company produces around 18,000 tons and the balance is produced by the other five factories Hampden, Appleton, New Yarmouth, Worthy Park and Tropicana.

The Industry operates at only around 70% of its total capacity and there is a steady demand for cast iron components like mill roller shells, trash and scraper plates, coupling boxes etc and sizeable non-ferrous requirements like bearings and bushings. Pump Casings are in Nihard but are replaced by the entire pumps imported.

The current demand for Cast Iron is in the region of 530 tons per year and the non-ferrous requirement is around 44 tons

2. MINING & QUARRYING

There is a large bauxite industry in Jamaica with a number of large Corporations in the country like ALCOA, ALCAN, ALPART, Kaiser, Bauxite and Alumina Trading Co. and the Jamaica Bauxite Mining Co.

2. MINING & QUARRYING (CONT'D)

The bauxite industry mainly uses proprietary equipment spares and a sizeable quantity of cast steel items. The requirement of cast iron is therefore very limited mainly in the water supply systems. (Approximately.....tons of cast iron are procured every year.)

Non-ferrous requirements are mainly in the form of replacement bearings and bushings which are mostly manufactured in their machine shops from barstock or procured off the shelf from the manufacturers.

3. WATER & SEWERAGE

The National Water Commission is responsible for the development and maintenance of the Water supply and Sewerage system in Jamaica. A number of large projects have been undertaken by the Commission with sizeable requirements of ductile iron, asbestos and PVC pipes and pipe fittings in the past.

All current and future requirements of pipes and bends will be in ductile iron in the water sector and asbestos in the sewerage sector. Saddles will be in asbestos and gully traps and gatings will be fabricated mild steel.

The current recurring demand per year of manhole covers is around 630, firehydrants - 320; and a sizeable requirements of pipes, pipe fittings, valves etc in ductile iron. The total CI requirement will be in the region of 164 tons, ductile iron 2162 tons and non-ferrous castings 433 tons.

3. W A T E R & S E W E R A G E (CONT'D)

Major rehabilitation scheme is planned for the water supply system and an expenditure of around 256 million Jam. dollars has been budgeted during the next 5 years and a total of 1 billion Jam. dollars before the turn of the century. The project is yet to go on stream and awaits funding assistance. The rehabilitation programme will generate huge market demand for ductile iron and non-ferrous castings. An estimate of the demand has however not been possible at this juncture as the detailed requirements have not been finalised by the commissions.

4. P O W E R

Jamaica Public supply company operates two power stations at Hunts Bay and Old Harbour respectively and a diesel plant facility. Most of the Boiler and Generator spare parts required are proprietary with a small requirement of ducting and pipes and bends.

5. T E L E C O M M U N I C A T I O N S

The Telephone Company of Jamaica has recently gone into partnership with the Cable & Wireless Co. UK, and decisions have been taken to extensively replace the currently overhead lines with underground lines over the next five years.

Around 1000 jointed points are being planned each year for which two-thirds will utilise fabricated manhole covers. The balance would require heavy duty manhole covers and frames (around 400 per year) of modular ductile construction in three different sizes, as also cast iron step irons and gratings.

5. TELECOMMUNICATIONS (CONT'D)

This requirement is likely to be steady in the next three years after which it is likely to go up further.

Cable and Wireless has very rigid specifications for its heavy duty manhole covers and frames and currently import all their requirements in the Caribbean from the UK. It is however understood that they are interested in obtaining them locally if quality and price are satisfactory, and have been holding discussions with the Foundry - Caribbean Castings of Jamaica.

The demand per year is likely to be in the region of around 155 tons, out of which 145 tons will be ductile iron requirement.

6. MANUFACTURING

Jamaica has a fairly organised manufacturing sector covering the production of steel products, cement, chemicals, petroleum, plastics, glass, building materials, Textiles, electrical/electronic equipment assemblies, Leather goods, Furniture, food stuffs, flour and several fabricating units.

a) CARIB CEMENT COMPANY

The Cement Co. imports most of its spare parts, the major proportion of which are proprietary purchases from the process equipment manufacturers. There is however a small cast iron requirement of around 20 tons comprising of; liners, grates, hammers, impellers etc which can be produced locally.

There is hardly any significant requirement of non-ferrous items.

6. MANUFACTURING (CONT'D)

b) CARIBBEAN STEEL COMPANY

Caribbean Steel Company is currently involved only in rolling and rerolling steel products like rods, wires, angles channels etc. The melting facility where steel ingots were being cast has not been in use since 1986. Consequently the requirement of cast iron moulding boxes for ingot castings has ceased to exist, unless melting is resumed.

There is a recurring demand for special ductile iron rolls (20 per year) of around 22 tons per year. No other significant requirement.

c) JAMAICA FLOUR MILLS

The Flour Mill is mainly involved in milling flour and has no significant foundry casting requirements. Most of the spares are original equipment supplies. There is a small requirement of around 5.00 tons (10 rollers) of cast iron rollers per year.

d) WEST INDIES GLASS CO. LTD

The only requirement from the Glass Co. are the dies which are being imported from Belgium. It is understood that all these dies are now made of steel.

e) TEXTILES

There are a number of small textile and hosiery works producing a variety of textiles. The casting requirement in this sector is negligible except for small machined and die cast components.

6. MANUFACTURING (CONT'D)

f) CHEMICALS & PLASTICS

Most of the spare parts requirements are proprietary items obtained from the machinery manufacturers and very insignificant casting requirement.

g) PETROLEUM REFINERY

There is very little recurring demand for castings except for a few, one off requirements to cover emergency breakdowns. Most of the spares are proprietary.

h) OTHER INDUSTRIES

The other industries like the Food Sector, Electric/electronic assemblies, leather, building materials, furniture and the fabrication units and machine shops have a very negligible requirement of foundry castings.

7. PUBLIC WORKS

The Ministry of Construction (Works) oversees the construction of Roads, Bridges, Government Buildings, Drains and Gullys etc. The manhole covers used are all of concrete and the gratings/grids are of fabricated mild steel.

There is therefore no significant requirement of cast products.

8. T R A N S P O R T

a) JAMAICA RAILWAY

The Jamaican Railway has a large requirement of cast iron brake-shoes (around 100 tons). This is however, produced at their captive in-house foundry.

b) ROAD TRANSPORT

Road transportation is the major means of distributions of goods and transporting of people. This sector has a very variable and small volume requirement of spare parts, which are mostly procured from the manufacturers of the different types of vehicles. No significant casting requirement.

9. C O N S T R U C T I O N

Most of the construction activity is in the hands of the Private Contractors. There has been considerable building activity in Jamaica over the past five years; as could be seen from the statistics collected from the Ministry of Construction (housing).

	<u>Houses Started</u>	<u>Houses completed</u>
1986	1901	2180
1987	1974	2108
1988	4816	2518
1989	same trend	

The Government has announced plans to build 20,000 houses over the next five years, 15,000 of which will be built in the Greater Portmore and St. Catherine areas and the rest along the north coast.

The private contractors independently import their requirements of cast iron, ductile iron and non-ferrous castings. Import statistics from the Government Statistical Department show considerable imports of tubes, pipes and bends, pipe fittings and other domestic filments of iron and steel.

Imports are mainly by the Water and Sewerage Sector, Construction and Hardware Sectors. The present statistical classification however does not facilitate segregating tubes and pipes fittings sector-wise and between cast iron and steel. Relevant imports have been covered separately later in paragraph 2.27.

10. S U M M A R Y O F D E M A N D

a) CURRENT DEMAND

The total demand in Jamaica for cast iron, ductile iron and non-ferrous castings is around 850 tons, 2307 tons and 477 tons per annum respectively. Major sectors contributing to demand are Sugar Industry; Water & Sewerage, telecommunications, manufacturing and the railways.

Railway requirement is met by the captive foundry of the Jamaican Railways. Requirements of the Water Sector and the Telecoms Sector have shifted more to ductile iron in the case of pipes bends and pipe fittings.

b) FUTURE DEMAND & TRENDS

Sugar industry and manufacturing have more or less steady demand. The recent entry of M/S Cable and Wireless along with the Telephone Company of Jamaica; promises larger investments for more extensive rehabilitation of the telephone systems and more of underground cables. There could be greater requirements for the next five years, mostly ductile iron, plans for which are currently being drawn up.

Major rehabilitation is also being planned in the Water & Sewerage Sectors to be executed in the next 3 to 5 years and this should generate very sizeable requirements. Estimates of Demand has not be possible as details are currently being finalised by the National Water Authority.

Detailed estimates of demand sectorwise are highlighted in Tables ..9... to¹²

J A M A I C A

ORGANISATIONS/RESPONDENTS CONTACTED

1. SUGAR INDUSTRY AUTHORITY
2. JAMAICA SUGAR HOLDINGS
 - Mr R. Campbell - Managing Director
3. WRAY & NEPHEW SUGAR CO.
 - Mr R. Henriques
4. ALCAN JAMAICA COMPANY
 - Materials Manager
5. ALCOA LIMITED
 - Mr Clark Duncan - Materials Manager
6. ALUMINIUM PARTNERS OF JAMAICA (ALPART)
 - Mr Reinford Doughlas - Purchase Manager
7. BAUXITE & ALUMINA TRADING CO OF JAMAICA
8. KAISER BAUXITE COMPANY
 - Mr Carver Chen
9. JAMAICA BAUXITE MINING LTD
10. NATIONAL WATER COMMISSION
 - Mr Vivian Matthews - Director
 - Mr Hunter - Director Engineering
 - Mr Penant - Director Planning
 - Mr Munroe - Sewerage Engineer
11. JAMAICA PUBLIC SUPPLY COMPANY
 - Mr Bonnick - Procurement Manager

12. **TELEPHONE COMPANY OF JAMAICA**
 - Mr Clarence Tate - General Manager
13. **CARIB CEMENT CO.**
 - Mr Mark Boyles - Procurement Manager
 - Mr Jonny Brooks - Maintenance Manager
14. **JAMAICA INTERNATIONAL TELEPHONES**
 - Mr Jim Carter - Vice President
15. **CARIBBEAN STEEL**
 - Mr Neville Scarlet - Managing Director
16. **JAMAICA FLOUR MILLS**
 - Mr Neville Chambers - Maintenance Manager
17. **WEST INDUSTRY GLASS CO. LTD**
18. **JAMAICA PUMP & VALVE CO,**
19. **KIC TANK WELD**
20. **CARIB CONSTRUCTION CO.**
21. **MINISTRY OF CONSTRUCTION (WORKS)**
 - Mr Chung - Engineer
22. **MINISTRY OF CONSTRUCTION (HOUSING)**
23. **JAMAICA RAILWAY**
 - Mr W. Halsall - Project Engineer
24. **CARIBBEAN CASTINGS & ENGINEERING CO. LTD**
 - Mr T. Edwards - Director
 - Mr Roy - Plant Manager

COUNTRY STUDY - TRINIDAD AND TOBAGOECONOMIC AND INDUSTRIAL BACKGROUND

The Trinidad and Tobago economy is heavily dependent upon the Oil Industry, a major revenue earning support. This industry performance however is subject to the fluctuations in the international price of oil. This circumstance was responsible in large part for the poor performance of the economy over the years 1984 to 1988.

The Sector which has shown continuous positive growth is the agricultural sector for the years 1984 to 1988. The average growth per annum in this sector (over this period) was 5.18%. This was primarily a function of good production of sugar, cocoa and citrus crops due to favourable weather conditions.

The mining sector, although the largest contributor to Gross Domestic Product in absolute terms, has been declining over the last three years (1986 - 1988) with a negative growth of approximately 4.6% per annum.

A continuous decline in real income was responsible for the almost interrupted negative growth pattern of the manufacturing sector which showed positive growth only once (1985) in the last five years.

The construction sector has also been performing poorly in terms of growth in spite of the fact that it is the second largest contributor to G.D.P.

Total Gross Domestic Product has been negative for the past five years averaging approximately - 5% per annum.

MARKET SURVEY

1. AGRICULTURE

The Agricultural base in Trinidad is diverse covering banana, coconuts and citrus and sugar industries. The Agricultural sector has however been at a serious disadvantage in terms of the high labour costs and has not developed as much as in the other Caribbean countries. The major user of castings in this sector is the Sugar Industry.

a) SUGAR INDUSTRY

The Caroni Sugar Industries in Trinidad operates two factories i.e the Brenchin Castle Plant and the Ste Madeleine. There was also earlier, another facility called the Orange Grove Factory, which has since been closed. The two existing plants together contribute to a sizeable requirement of cast iron and non-ferrous castings.

Cast iron products include sugar mill rollers, trash plates, scraper plates, and coupling boxes. The non-ferrous requirement is for mainly mill bearings and bushings of various sizes.

Mill rollers are mainly imported from UK and from Caribbean Castings of Jamaica. Some of the other requirements are locally obtained from Willems Foundry in Trinidad. Caroni Sugar Industries has also a small captive foundry facility at their Ste Madeleine Sugar Factory which takes care of some small requirements.

Ste Madeleine factory is also served by an extensive light railway system. The railway requirement of cast iron wagon bearings and replacement wheels are taken care of at the captive foundry.

The total demand for cast iron in this sector is around 430 tons and around 15 tons of non-ferrous castings.

2. MINING & QUARRYING

Trinidad has no alumina and bauxite deposits unlike Guyana and Jamaica.

There are however several quarries and crushing industries mainly catering to the construction industry. There is however very negligible demand for castings in this sector.

3. WATER & SEWERAGE

The Trinidad Water and Sewerage Authority (WASA) is in charge of all planning, execution and maintenance of the water supply and sewerage schemes in Trinidad. Extensive rehabilitation has been undertaken over the years on the water supply system. There are however several plans under execution calling for a sizeable requirements of pipes, pipe fittings, manhole covers etc.

WASA, as a policy uses mostly PVC pipes up to 12" in diameter and above 12" diameter entirely made of ductile iron. PVC has been preferred in place of the originally cast iron usage due to the fact that there are local manufacturers of PVC in Trinidad. Ductile iron pipes and bends are mostly imported from the USA. There is a recurring demand for cast iron manhole covers and frames every year, but no procurement, in view of the huge stocks of the item, taking care of the requirement for the next few years.

The current demand for cast iron is in the region of 9 tons per year, ductile iron 41 tons and non-ferrous items 13 tons.

4. POWER

The Trinidad & Tobago Electricity Commission operates a number of power stations, mostly steam and gas turbines. Most spares are obtained as proprietary supplies or fabricated locally.

The distribution system is mostly overhead and the transmission and distribution hardware consists of mainly angle iron fittings, strips, insulator pins, clamps and other galvanised iron items.

The requirement for castings in this sector is therefore very negligible.

5. TELECOMMUNICATIONS

The Trinidad & Tobago Telephone Company (TELCO) looks after the internal telephone system and TEXTEL the international communication system. A massive rehabilitation program has been in operation for the past eight to nine years and the major portion of the work has already been carried out and most of the cables in the urban areas have been laid underground. Plans have not been drawn up to cover rural areas.

In view of most of the work having been completed, there is practically no demand for manhole covers and frames and other castings at the present moment. Moreover there are huge stocks of manhole covers as a spill over from the recent rehabilitation programme.

5. TELECOMMUNICATIONS (CONT'D)

The merger of the Trinidad & Tobago Telephone Company with M/S Cable & Wireless of UK is in the final stages and all future plans of TELECO are dependent on this merger and at the present stage unclear. It is however expected that these could be major requirements for castings in future when further expansion plans and the rural rehabilitation programmes are taken up.

6. MANUFACTURE

There is a fairly large manufacturing sector and infrastructure built up in Trinidad over the years with plants producing Iron and Steel, Cement, Chemicals, Petroleum and Gas, Glass, Food products, Flour mills, Furniture, Automobile assembly, Steel rolling mills producing bar stock, wire-rods, flats, angles & channels, and several fabrication units, machine shops etc.

a) FOOD INDUSTRY

This sector is involved in the processing of meats, dairy products, fruits and vegetables, bakeries etc. The sector being very light industry, the castings demand is negligible.

b) FLOUR & RICE MILLING

The national Flour Mills has very negligible requirements for cast items. The crusher rolls and mill rolls originally of cast iron, have now been replaced entirely by steel rolls.

The rubberised crusher rolls at the Rice mill originally of cast iron have also entirely been replaced by steel rolls.

6. MANUFACTURE (CONT'D)

c) CEMENT

The Trinidad Cement Company has been performing very well, producing around half of a million tons of cement, and exporting to most Caribbean countries. The requirement of castings is not very appreciable, as most spares are obtained from the original equipment manufacturers. There is however a small cast iron requirement of around 33 tons comprising of kiln rollers, gears, cooler parts, spirals (large & small), cooler wall liners etc and a small requirement of around 4 tons of non-ferrous bronze bearings.

d) GLASS

Carib glass works uses all dies made of steel, imported from Belgium or UK and consequently has practically no other requirement for castings.

e) PETROLEUM AND GAS

This is the major activity in the Trinidad industrial field with both onshore and off-shore operations. The major companies operating are AMOCO, TRINTOC and Trinidad Tesoro.

Trintoc has its own captive foundry which caters for some of its cast iron and non-ferrous casting requirements. Cast iron products include cast iron pipes and fittings, base plates, grills, trays, bubble caps for distillate columns and the non-ferrous items are fans, impellers bushings, bearings and pump housings. Approximately 25 tons of cast iron and 15 tons of non-ferrous castings are produced annually by the foundry.

e) PETROLEUM GAS (CONT'D)

The refinery industry has practically no other general purpose foundry castings requirements. Most of the tubes/pipes and fittings used are stainless steel pipes so as to withstand high pressures as high as 10000 psi. Valves are also high pressure values mostly made of stainless steel or high chrome forgings. CI pipes and valves find application in the water supply systems.

f) IRON & STEEL

ISPAT, formerly the Iron and Steel Company of Trinidad (ISCOTT) is the only Iron and Steel producing facility in Trinidad. The new management (partly owned by overseas investors) has tremendously improved the performance of the plant and also has plans for large investments to modernise and rehabilitate the facility.

ISPAT produces mild steel using a continuous casting process in standard billet form, for use in steel rolling and wire rod mills. ISPAT also has a wire rod rolling mill around 25 tons of surface hardened cast iron.

The cast iron demand is small around 10 tons per year comprising of CI doors, rolls, gears and gear boxes, and the non-ferrous requirement around 5 tons, mainly bushings and bearings.

6. MANUFACTURE (CONT'D)

g) STEEL ROLLING

There are several steel rolling mills producing steel bars, wire-rods, flats, angles and channels. The largest of the operations are Central Trinidad Steel (CENTRIM) and Caribbean Steel Mills.

CENTRIM replaces about 300 rolls of cast iron annually i.e around 100 tons per annum.

h) AUTOMOBILE ASSEMBLY

Different models of automobiles are assembled in Trinidad like Mazda, Datsun, Susuki, Ford and Toyota. There are three companies assembling these models of autos ie M/S Neal & Massey, Amalgamated Industries & Amars.

Engines are all imported and the plants do only the assembly. Consequently there is no requirements for castings until engines are cast in Trinidad.

i) FURNITURE

There is a large furniture manufacturing base in Trinidad producing all types of furniture. The fittings used in this sector are all mainly Die cast. No foundry casting requirement.

6. MANUFACTURE (CONT'D)

j) FABRICATION

There are a number of large fabrication shops like Mustapha Engineerings, Damus, Geo Wimpey. Requirements for castings is negligible.

7. PUBLIC WORKS

The Ministry of Works caters for the construction, and maintenance of roads, Government buildings, bridges etc. The major requirements associated with this sector are manhole covers and frames, grills and grates. However in Trinidad, none of these items are currently procured in cast iron. There is therefore no foundry castings requirement.

8. TRANSPORT

The Transport sector utilises considerable quantities of automobile spares, mostly proprietary and consequently very little demand for foundry castings.

9. CONSTRUCTION

There is considerable construction activity in Trinidad and Tobago, mostly carried out by private contractors. Statistics obtained from the Statistical Department and enclosed shows the number of houses, flats and commercial and industrial buildings approved and taken up for construction since 1985. In 1987 and 1988 the number of constructions were as follows:

9. C O N S T R U C T I O N (C O N T ' D)

	1987		1988	
	Number	Floor Area Sq mtrs	Number	Floor Area Sq mtrs
Dwelling Houses	2117	216100	1853	351100
Blocks of Flats	2	700	3	6500
Commercial & Industrial buildings	25	18100	31	25500
Other buildings	22	9600	15	9700

A major portion of the imports highlighted above are for the Construction and hardware sectors. Since it has not been possible to isolate castings from the overall imports, this demand, though fairly substantial has not been taken into account while computing estimated market demand.

10. S U M M A R Y O F D E M A N D

a) CURRENT DEMAND

The total demand for castings in the country is 638 tons of cast iron 41 tons of ductile iron and 52 tons of non-ferrous metals. The major sectors contributing to this demand are the Sugar Industry, Water and Sewerage, Manufacturing and the Construction sectors. Sector-wise details of demand and the summary of demand are indicated in Table 13 to 16.

10. S U M M A R Y O F D E M A N D (CONT'D)

b) FUTURE DEMAND & TRENDS

The Sugar Industry and the manufacturing sector demands are likely to be steady. The demand from WASA is likely to increase to around 100 tons or higher, as per indications, in view of the water supply and sewerage schemes being planned.

The Telecommunication sector is currently very vague about future plans and awaits the merger of the Trinidad and Tobago Telephone Company Ltd with M/S Cable and Wireless of UK, which is likely very shortly. Indications are that there is likely to be a good future demand after the merger, when sizeable investments are expected for expansion and improvement of the existing telephone systems.

Trends in the construction sector also indicate steady or increased building construction activity and a good demand for cast iron manhole covers, pipes and bends and pipe fittings.

TRINIDAD & TOBAGO

ORGANISATIONS/RESPONDENTS CONTACTED

1. **CARONI SUGAR INDUSTRIES LTD**
 - Mr Husang - Procurement Manager
 - Mr Noel Watts - Procurement Manager
2. **WATER & SEWERAGE AUTHORITY (WASA)**
 - Mr Mottey - Procurement Manager
3. **TRINIDAD & TOBAGO ELECTRICITY COMMISSION**
 - Mr Guppy - Procurement Manager
4. **TRINIDAD & TOBAGO TELEPHONE CO. LTD**
 - Mr Lerry France - Procurement Manager
5. **NATIONAL FLOUR MILLS**
 - Mr Vernon Henry - Procurement Manager
6. **TRINIDAD CEMENT CO. LTD**
 - Mr Arun Goyal - Plant Manager
7. **CARIB GLASSWORKS LTD**
 - Plant Manager
8. **CENTRAL TRINIDAD STEEL CO. LTD**
 - Mr Randall Mohammed - Group Marketing Manager
9. **NASIL & CO LTD**
 - Mr R. Mohammed - Group Marketing Manager
10. **GEO WIMPEY (CARIBBEAN) LTD**
 - Mrs S. Bachoo - Purchasing Manager
 - Mr S. Goolcharan - Marketing Manager
11. **DAMUS LTD**
 - Mr K. Oliver - Marketing Manager

12. **TRINIDAD & TOBAGO OIL COMPANY (TRINTOC)**
 - Mr Peter Thomas - Procurement Manager
13. **TRINTOC FOUNDRY**
 - Foundry Manager
14. **IRON & STEEL CO. OF TRINIDAD (ISPAT)**
 - Mr U.R. Rao - General Manager
 - Mr Bhargava - Project Manager
 - Mr Anthony Thorne - Project Engineer
15. **CARIBBEAN STEEL MILLS LTD**
 - Mr Zeaotti - Procurement Manager
16. **INDUSTRIAL DEVELOPMENT COUNCIL**
 - Mr Raphel Jones
17. **MUSTAPHA ENGINEERING (FOUNDRY)**
 - Mr Zaid Mustapha - Managing Director
 - khayam - Director
18. **MINISTRY OF WORKS**
 - Mr Ali
19. **TRINIDAD & TOBAGO STATISTICAL DEPARTMENT**
 - Mrs. M. Ramprasad - Chief Statistician

COUNTRY STUDY - BARBADOSECONOMIC AND INDUSTRIAL BACKGROUND

Barbados has a multi-sector economy which is dominated by the Tourism sector. Total GDP has been experiencing an average growth of 3.18% per annum between 1984 and 1985. The agricultural sector has been experiencing negative growth trends since 1986 primarily due to adverse weather conditions. The manufacturing sector, which is dominated by cement and other construction materials declined significantly in 1987, but grew at a rate of 6.8% in 1988. This growth was fueled by the boom in the construction industry, which saw its third year of positive growth from 1986 to 1988. In the mining sector oil production fell as a consequence of cheaper imported oil.

MARKET SURVEY1. AGRICULTURE

The major agricultural crop in Barbados is sugar, along with by-products such as molasses, syrup and rum. Recently, however this industry has been severely financially crippled, causing management to use all but four of the original twenty-four plants and to maintain these four with spares from the closed plants.

The major cast iron requirement is in mill roller shells of which twenty are changed per year. This is approximately 100 tons per annum. Scraper tips and Trash plates are all currently of cast steel. With regard to pumps. The industry is not willing to have housings made or impellers replaced. The strategy employed is to replace a damaged pump with a new unit in view of the lower import tariffs for complete equipment as compared to spare parts.

2. MINING & QUARRYING

The quarrying sector, while relatively vibrant, has little requirements for castings or iron, brass or aluminium since the majority of parts are made of cast steel due to the abrasive nature of the quarry material.

The Barbados Mining and Quarrying sector has shown a significant decline in absolute terms and from 1984, when it contributed 1.4% of GDP, in 1988 the contribution had slipped to 0.50% of GDP.

3. WATER & SEWERAGE

The Barbados National Water Authority is the agency charged with the supply of water in Barbados. The authority is currently expending its efforts to efficiently maintain the existing system and also undertakes one or two large projects every year.

The materials which the Authority uses for its maintenance works include ductile iron which has been replacing cast iron in pipes and for the smaller sizes, galvanised pipes are used. Supplies are currently procured from Canada and the United Kingdom. With respect to saddles and manhole covers, there are adequate stocks of these items on hand. In 1989, 1090 tons of cast iron pipe and pipe fittings have been utilised out of which 1079 tons are in ductile iron. Around 20 tons of non-ferrous castings have also been utilised.

4. SANITATION

There is a very negligible requirement of castings in this sector.

5. MANUFACTURING

The manufacturing sector has been slowly declining, both in absolute terms and with respect to its contribution to the total GDP, fell from 11.5% to 8.2%. The major contributors to this sector are the Barbados National Oil Co. Ltd.

All of these, except for the furniture sector, are processing industries which show a low demand for castings of iron. Some non-ferrous castings are utilized in the furniture industry - these are primarily die castings for items such as door handles etc.

The cement factory use some castings which are made of cast steel. All other spares are proprietary requirements. Total requirements in this sector is thus negligible.

6. POWER & TELECOMMUNICATIONS

The Barbados Light and Power Co Ltd is responsible for the generation and distribution of electricity in Barbados. Power generation is around 130 MW.

This well-kept plant has very little cast iron requirements, lapping tools comprise a total of 100 lbs of cast iron requirements in one year. In the non-ferrous line bushes and screw worms are the only significant brass castings and thus a negligible 100 lbs/annum.

The Telecommunications sector is primarily in the hands of cable & wireless, a multi-national Telecoms firm. Under their management this sector has been growing significantly. While there are no major projects planned for the immediate future, there is a general intention to gradually transform the system (which is 95% overhead) to a totally underground one.

POWER & TELECOMMUNICATIONS (CONT'D)

The major castings demand in this sector is in manhole covers which are currently being imported from the United Kingdom. There could be large requirements of ductile iron manhole covers & frames in future, when large projects for laying of underground cables are taken up.

7. PUBLIC WORKS

The Public Works dept. in the Ministry of Works mainly looks after and oversees the construction and maintenance of bridges, roads and Government buildings. The major requirements from this sector are cast iron, grids and gratings for the roads being constructed. Manhole covers and frames are mostly fabricated from mild steel. The current and future requirements of this sector are around 58.50 tons and 53.50 tons of cast iron castings per year respectively.

8. TRANSPORT

The requirements of the Transport sector are mainly proprietary and mostly procured from manufacturers of vehicles.

9. S U M M A R Y O F D E M A N D

a) CURRENT DEMAND

The current demand in the country is in the region of around 1254 tons of cast iron, out of which 1079 tons are ductile iron and around 26 tons of non-ferrous castings. The major sector is the water & sewerage sector with a demand of around 1093 tons, mostly in ductule iron for pipes and pipefittings. Other major sectors are Public Works with around 59 tons and 100 tons in the Sugar Sector of cast iron requirements.

Non-ferrous castings, again, the major sector is water & sewerage with around 21 tons. The detailed demand estimates are enclosed in Tables 2.23-1 to 2.23-4.

b) FUTURE DEMAND & TRENDS

Future demand is around 991 tons of cast iron and 31 tons of non-ferrous castings. There is likely to be a huge future requirement from the Telecoms sector if the plans for laying underground lines is taken up in the next few years. Sugar sector has steady demand.

The Water & Sewerage sector has been undertaking continuously projects on expansion and rehabilitation of their water system on a yearly basis with outside financial assistance. The same trend is likely to continue for the next few years.

The demand estimates, current & future are highlighted in Tables 17 to 20 enclosed.

B A R B A D O S

ORGANISATIONS/RESPONDENTS CONTACTED

1. **BARBADOS SUGAR INDUSTRY LTD**
 - Mr Fontaine - Maintenance Manager
2. **BARBADOS AGRICULTURAL DEVELOPMENT CORPORATION**
 - Mr G. Marshall - Project Manager
3. **BARBADOS NATIONAL WATER AUTHORITY**
 - Mr Hubert Sealey - General Manager
 - Mr Yearwood - Chief Engineer
4. **BARBADOS SANITATION AUTHORITY**
 - Mr Griffith - General Manager
 - Mr Gordon Haynes - Superintendent
 - Mr Alleyne - Superintendent
5. **BARBADOS LIGHT & POWER CO.**
 - Mr Edwards - Plant Engineer
 - Mr Yearwood - Plant Engineer
6. **BARBADOS TELEPHONE CO.**
 - Mr Jordon - General Manager
7. **BARBADOS FLOUR MILLS**
 - Mr Belgrave - General Manager
8. **ARRAWAK CEMENT CO.**
9. **ACONS MANUFACTURING CO. LTD**
 - Mr Frank Butcher - Managing Director
10. **COLES ENGINEERING CO. LTD**
 - Mr Grahan - General Manager

11. **QUARRY PRODUCTS LTD**
 - Mr Raysida - General Manager
12. **CO. WILLIAMS ASPHALTS & QUARRIES**
 - Mr Williams - General Manager
13. **CO QUARRIES**
14. **RM CONSTRUCTION AND QUARRIES LTD**
15. **WORKS & TRANSPORT DEPARTMENT**
 - Mr C. Archer - General Manager
 - Mr Corbin - Maintenance Manager
16. **TOWN PLANNING DEPARTMENT**
 - Mr Nurse - Chief Town Planner
17. **GOVERNMENT STATISTICAL DEPARTMENT**
 - Ms Angela Hunte - Chief Statistician

COUNTRY STUDY - ANTIGUAECONOMIC AND INDUSTRIAL BACKGROUND

Antigua is essentially a tourism driven economy. This fact is evident from the tremendous effort which has gone into creating a tourist attractive environment. Not least among such efforts has been the Heritage Quay Complex and extensive construction activity in the Hotel Industry.

The Island was damaged by Hurricane Gilbert in 1988 and this has been responsible for the falling off of tourism in the last year. Reconstruction has however been going on in an effort to recapture the lost tourist trade.

The manufacturing sector is very small, mainly comprising of small electrical/electronic industries; assembling TV parts, Refrigerators, Stoves etc. There are also a number of small furniture manufacturers and a few quarries. This sector has contributed approximately 4.0% per annum to GDP over the years 1985 - 1987.

The construction sector, fueled by tourism in large parts has been growing at a rate of 9.8% per annum. This sector is a good signal of the confidence in the economy.

Mining and quarrying is a very small part of this economy inspite of the fact that there are several privately owned and one major government owned quarry. This sector's contribution averages about 1.8% per annum.

The agriculture sector is quite broad, comprising crops, livestock, forestry and fishing. This sector however is declining in its contribution to GDP and currently averages about 4% of GDP.

MARKET SURVEY

1. AGRICULTURE

Antigua has a broad agricultural sector, which includes root crops, vegetables, fruits, livestock, forestry and fishing. There was a fairly large Sugar Industry earlier, which has since 1952 been closed, as it was found to be economically not viable.

The major requirement of cast products in this sector was from the Sugar factory and this requirement does not exist anymore unless the Sugar industry is again revitalised. The requirement from the rest of the agricultural sector is negligible.

2. MINING & QUARRYING

Although there are several small quarries in Antigua, the trend indicates extensive use of mainly cast steel for crusher jaws and other parts. Most other spare parts are obtained from the manufacturers of the equipment as proprietary items. The casting requirement in this sector is practically nil.

3. WATER & SEWERAGE

The Water Supply system is one of the sectors which uses castings to some extent. All pipes are currently being replaced by PVC pipes and all future requirements will also be in cast iron. There is however a cast iron requirement of manhole service boxes (300/year) and Firehydrants (300 per yr) and a ductile iron requirements of couplings (340 per yr) and valves (300 per year). Also a non-ferrous Brass saddle requirement of around 1000 per year.

3. WATER & SEWERAGE (CONT'D)

The Ferrous casting requirement therefore would be around...⁶⁷...tons per year and the non-ferrous around...⁸...tons.

There is no existing sewerage system in Antigua but plans are a-foot to install a major system initially covering St Johns and could generate a good casting demand in the future.

4. P O W E R

Power supply in Antigua is the responsibility of the Electrical Department of the Antigua Public Utilities Authority. Power is generated by both Diesel and Steam Turbines. Spares for the equipment are supplied by the original equipment manufacturers and are mainly proprietary items. There is therefore negligible demand for cast products.

In terms of the distribution system. Antigua's power supply lines are mostly overhead, which again does not generate any requirement for castings.

5. T E L E C O M M U N I C A T I O N S

Telecommunication Services are provided jointly by the Telephones Department of the Public Utilities Authority and the M/S Cable & Wireless, who are mainly concerned with international telecommunications.

5. TELECOMMUNICATIONS (CONT'D)

There is demand for circular manhole covers (5 to 6 per annum) and two sizes of rectangular joint boxes. (100 per annum of sizes 4ft x 2ft 3 inches and 6ft x 2ft 3ins by 3ft deep). These requirements are all in ductile iron and are currently imported from UK.

There are plans to fully convert all telephone lines to underground lines in the near future, in which case there will be huge demand generated for ductile iron castings.

The local telephone system also uses manhole covers (BELL manhole covers) for which there was sizeable requirement. The expansion plans which were started last year are in progress and expected to be completed in the next 18 months. The entire requirement of manhole covers for this expansion, however, have already been procured and in stock.

6. MANUFACTURING

The manufacturing sector consists primarily of light industry such as food processing, furniture manufacture and small industries assembling electric/electronic items such as TV parts, Refrigerators, Stoves etc.

The food processing industries mainly comprise of Copra and cotton seed, meal plant (which has now ceased production), edible oils and pickled meats and the demand for castings in this area is practically nil.

The furniture industries use a sizeable quantity of die or pressure cast items. The demand therefore in the manufacturing sector is consequently negligible.

7. PUBLIC WORKS

The Public Works Department mainly looks after the building and maintenance of Government Buildings, Roads, Bridges etc and use a sizeable quantity of manhole covers, grills and piping. The manhole covers and grills are however now being made of concrete and the piping is all of PVC.

In view of concrete and PVC replacing cast iron for these items, the demand for castings in this sector is negligible.

8. TRANSPORT

The Transport Sector uses mostly equipment spares supplied by the manufacturers of the different types of vehicles. The degree of precision involved in these spares and the wide variety of very small volume requirements precludes this sector for foundry castings.

9. CONSTRUCTION

The Construction industry, although quite vibrant is primarily in the private sector. The buildings are mainly concrete structures with very little need for cast fittings except for door handles, locks and other household fittings, mostly die cast. Most of the pipes and bends used are of PVC.

There is however some quantity of manhole covers, firehydrants etc being imported by the private contractors.

10. OTHERS

The Forestry, wood working and fabrication sectors have insignificant and irregular requirements for cast iron or castings of Aluminium or brass.

11. SUMMARY OF DEMAND

a) CURRENT DEMAND

Current demand for foundry castings is around 65 tons of cast iron, 49 tons of ductile iron and 8 tons of non-ferrous products. Major sectors are Water supply and sewerage and Telecommunications.

There is no Sugar Industry currently in Antigua, the existing one having being closed since 1982 as it was found to be financially non viable.

b) FUTURE DEMAND

Future demand exists only in the Telecoms sector for joint boxes. The Water sector has no major plans for the future. There is however no sewerage systems currently and plans are being drawn up for a complete system. This could generate demand for castings.

The future demand will be in the region of 52 tons of ductile iron and 8 tons of non-ferrous castings.

The demand estimates current and future are enclosed in Tables 21 to 22.

ANTIGUA
ORGANISATIONS/RESPONDENTS

1. MINISTRY OF PUBLIC UTILITIES
 - Water - Peter Braithwaite
 - Telephones - Malcolm Edwards, Mr Malton Pringle
 - Electricity - Mr Peter Benjamin
 - Permanent Secretary - Mr Will Christian

2. PUBLIC WORKS (MINISTRY)
 - Mr Hanley
 - Mr Francis - Director

3. MINISTRY OF FINANCE - DEPT OF STATISTICS
 - Mr Frank Jacobs
 - Mr O'Keeffe
 - Mrs Smith

4. MINISTRY OF AGRICULTURE
 - Mr Benjamin - Permanent Secretary

5. ANTIGUA PORT AUTHORITY
 - Miss Brown
 - Mr Allen Green

6. CABLE & WIRELESS
 - Mr Malcolm Green

7. CUSTOMS DEPARTMENT
 - Mr Henry Simon

8. CENTRAL PLANNING & HOUSING AUTHORITY
 - Mr Issaac - Manager

9. ANTIGUA MASONARY PRODUCT
 - Government Quarries at Burma, Coolidge bendon

COUNTRY STUDY - ST KITTSECONOMIC AND INDUSTRIAL BACKGROUND

St Kitts' average rate of growth during the four year period 1984 - 1987 was 5.7%. Significant performance came from the manufacturing sector (which contributed 14.3%), the agricultural sector (9.5%) and the construction sector (8.5%)

This island is currently increasing investment in the construction sector through development projects in tourist - intensive areas such as Frigate Bay. The construction sector will therefore tend to fuel the growth of other sectors such as manufacturing, tourism and agriculture. Foreign investment is openly courted for almost all of the major projects with the intention of such investors utilizing their own capital for the strengthening of the economy.

MARKET SURVEY1. AGRICULTURE

The major revenue-earner in this sector is sugar, which is produced by the St. Kitts Sugar Manufacturing Corporation. This Corporation uses (like other Caribbean Sugar producers) mill rollers shells, Scraper plates, Trash plates, coupling boxes, bearings and pumps. It also operates a small railway facility.

Unlike other Caribbean producers, however, cast steel is used for mill roller shells, scraper plates and trash plates. The respondent informed the team that this was found to be better for the abrasive soil of St Kitts.

1 AGRICULTURE (CONT'D)

Other potential products, such as impellers are fabricated in the Corporation's foundry. Coupling boxes have not been replaced since 1954 and are still going strong while brass and babbit bearings are supplied by Fletcher and Smith of the United Kingdom.

The only cast iron demand appears to be for axle boxes on the rail-cars. The requirements quoted were fifty (50) boxes per annum with each box weighing approximately fifteen (15) lbs. This market may bear an exploration.

2. WATER & SEWERAGE

The water supply system in St Kitts is the responsibility of the Water Dept. All pipe work and saddles ^{are} of P.V.C or ductile iron,

These fittings, which include elbows, bends and valves of various sizes all make a total cast iron demand of approx. nine (9) tons per annum. There is a demand for 30 fire hydrants and five hydrants box covers per annum. There is, currently no central sewerage system in St Kitts.

There is an increasing (by 10% per annum) demand for non-ferrous castings such as stop, cocks and plugs.

3. MINING & QUARRYING

The St Kitts Masonary Products Ltd is the only quarry of appreciable proportions and, like quarries in the other islands, there are no requirements for cast iron or castings of brass or aluminium.

4 MANUFACTURING

This sector is engaged in small scale light industrial work such as electronic assembling, food processing and wood-work. Consequently cast products requirements are nil.

5. POWER & TELECOMMUNICATIONS

Power generation and distribution is controlled by the Need Must Power Authority which operates a diesel fueled power station. Power is distributed primarily by overhead lines.

There is very little requirement for cast iron products. Non-ferrous castings such as bearings are all prefit type bearings.

Telecommunications is operated by joint venture between the St Kitts government and Cable & Wirelss (SCANTEL). Joint boxes and manhole covers are all of cast iron which is imported from UK. Strict standards are observed in the supply of these items which must confirm to UK Standard Practices. Types of manhole covers imported are JR 12's and JR 14's. There is a current demand for 45 - 50 per annum, while there is a demand for 20-100 joint boxes if funds become available and depending on new housing and hotel developments.

6 PUBLIC WORKS

The Public Works Dept., which does principally maintenance work, normally contract large projects to private contractors. There are no significant requirements in this sector.

7. TRANSPORT

The requirements of this sector are mainly proprietary and consequently castings requirement is negligible.

8. CONSTRUCTION

The construction sector is expected to grow by about 10 percent per annum. The major areas of construction being in residential and hotel type buildings.

As was revealed in the other islands the overwhelming proportion of this work will be in concrete and structural.

9. SUMMARY OF DEMAND

a) CURRENT DEMAND

Tables 23 to 24 highlight the demand estimates, current and future for St Kitts for ferrous and non-ferrous castings. Current demands is 418 tons of ferrous castings out of which 400 tons are in ductile iron. Negligible requirement of non-ferrous castings.

The major sector with potential demand is the Water & Sewerage Sector contributing around 387 tons of ferrous castings, out of which 377 tons in ductile iron; and the Telecoms sector with 24 tons of ductile iron and 7 tons of cast iron. Requirements in the Water Sector are substantial due to massive expansion/rehabilitation currently planned.

b) FUTURE DEMAND & TRENDS

The future demand will be only around 62 tons in the ferrous sector out of which 24 tons are in ductile iron. No major demand trends indicated for the future in the country.

S T. K I T T S

ORGANISATIONS/RESPONDENTS

1. WATER DEPARTMENT
 - Messrs Best & Rawlins

2. PUBLIC WORKS DEPARTMENT
 - Messrs Boncompere & Ullah

3. ST. KITTS SUGAR MANUFACTURING CORPORATION
 - Messrs Conrad Kelly & George Thomas

4. SCANTEL
 - Messrs M. Ross, George Howell & Nick Richards

5. CUSTOMS DEPARTMENT
 - Messrs Warner & Joseph

6. DEPARTMENT OF STATISTICS
 - Messrs Oliver Knight & Melroy Henry

7. PHYSICAL PLANNING DEPARTMENT
 - Mrs Patsy Matthews

8. NEED MUST POWER STATION
 - Mr Errol Laws

9. CENTRAL ELECTRICAL DEPARTMENT

COUNTRY STUDY - ST VINCENT

ECONOMIC AND INDUSTRIAL BACKGROUND

St Vincent is an economy with a very narrow and fragile revenue-earning base. Between 1985 and 1987 agriculture proved to have the largest value added as a percentage of Gross Domestic Product, that of 18.8% followed by manufacturing with 10.3% and construction with 9.3%

Gross Domestic Product growth averaged about 6.0% from 1984 - 1987. There are intensified efforts to widen the range of products produced since the major export (bananas) is subject to various climatic and trade handicaps.

The fact that the economy is still a producer of primary goods indicates that the requirements for castings is very minimal.

MARKET SURVEY

1. AGRICULTURE

The agriculture sector in St Vincent is dominated by bananas production which is the primary export crop. No processing of crops is done. This sector as a consequence, has no requirements for cost products.

2. MINING AND QUARRYING

There is no significant mining and quarrying activities in St Vincent except for a number of small producers of sand and stone. Cast products requirements is thus, quite low.

3. WATER & SEWERAGE

The St Vincent Water Authority is the agency charged with the supply of water in St Vincent. This agency utilizes cast steel

for all manholes covers and water mains respectively, while items such as grills and ladders are fabricated locally and this supply source has been adequate to date. While there is expected to be construction works done in new areas which would require a water supply, there would be no requirements for castings of iron, brass or aluminium.

The sewerage system is also one requiring no cast products since the pipes are all PVC and no pumps are required since this system is a gravity-fed one.

4. MANUFACTURING

This sector displayed an added value of 10.3% of GDP between 1985 and 1987. The major industries include a beer brewery, a flour mill and several furniture makers. These manufacturers utilize processes which require little or no castings except for small die castings such as door handles, knobs etc.

5. POWER & TELECOMMUNICATIONS

The power supply in St Vincent is under the charge of VINLEC. This Corporation operates a diesel generating plant which utilize spares exclusively from the plant manufacturers.

5. POWER & TELECOMMUNICATIONS (CONT'D)

The distribution system is an overhead one but the general intent is to eventually go underground but use is made of concrete slabs instead of metal manhole covers/inspection boxes.

This sector therefore provides little in the way of casting requirements.

The research team experienced some difficulty in interviewing Telecommunications personnel and attempts to follow-up by telephone proved fruitless. Cable & Wireless is the organisation responsible for local and international telephones, and requirements from this sector are mainly manhole covers & frames. Most of the work relating to the laying of underground cables has been completed and current requirements are not very sizeable.

6. PUBLIC WORKS

The Public Works department is in charge of overseeing the construction of roads, bridges and Government buildings. Very negligible requirement of foundry castings.

7. TRANSPORT

Transport spares are mostly proprietary items from automobile manufacturers and scope for foundry castings is negligible.

8. CONSTRUCTION

Construction work is primarily a private sector activity in St Vincent. Large contractors generally import their requirements which are, in the main, concrete and structural steel. Castings are used in a very minimal way.

This sector is expected to continue to grow in the future but this does not signal a demand for castings of iron, brass or steel.

9. OTHERS

Sectors such as transport require no castings which are not proprietary in nature.

10. SUMMARY OF DEMAND

a) CURRENT DEMAND

Tables 25 to 26 indicate current and future demand estimates for the country for ferrous and non-ferrous castings.

75 tons of cast iron out of which 31 tons of ductile iron constitutes the current ferrous castings demand in St Vincent. Sectors contributing to this demand are Water supply & Sewerage and Telecommunications.

b) FUTURE DEMAND & TRENDS

The future demand is in the region of 95 tons of ferrous castings, out of which 25 tons in ductile iron. There are no significant future potential trends which could contribute to greater demand.

S T. V I N C E N T

ORGANISATIONS/RESPONDENTS

1. PUBLIC WORKS DEPARTMENT
 - Mr Jeffrey Cato

2. ST. VINCENT WATER AND SEWERAGE AUTHORITY
 - Mr Saunders/D. Cummings

3. MINISTRY OF HOUSING & LAND DEVELOPMENT
 - C. Grant

4. MINISTRY OF FINANCE/STATISTICS DEPARTMENT
 - Mrs Francis

5. EAST CARIBBEAN FLOUR MILLS
 - Mr Beyea
 - D.A Dickson

6. GESCO
 - Mr Davy
 - Mr Alexander

7. MINISTRY OF PUBLIC WORKS
 - Mr Bradley

8. CUSTOMS DEPARTMENT
 - Mr James
 - Mr Bailey

9. CABLE & WIRELESS
 - Mr Nevison
 - Mr Charles

S T. V I N C E N T (CONT'D)

ORGANISATIONS/RESPONDENTS

10. VINLEC
- Mr Dennick
11. POLICE DEPARTMENT
- A.S.P Oliviere
12. JOACHIM ENGINEERING LIMITED
13. GIBSON CONSTRUCTION LIMITED
14. CAPTAIN FRANK OLIVIERE - BOAT OWNER
15. MR FRANCIS BYNOE - BOAT OWNER
16. ADAMS BROTHERS LIMITED - BOAT OWNERS

RELEVANT IMPORTS

Tables 27 to 33 highlight the relevant imports of ferrous and non-ferrous products to each of the countries under study. Details of imports have been obtained from the respective Government Statistical Departments. The years for which statistics have been obtained are the latest available information in the respective countries.

The tables show that considerable quantities of tubes, pipes and pipe fittings of iron and steel and non-ferrous metals have been imported. Also large quantities of pumps, pump and machinery spares and domestic fittings.

Table 27 indicates the summary of countrywise imports of tubes, pipe and pipe fittings made of cast iron and steel; metal other than cast iron and steel, (ductile iron, malleable irons etc) but of iron and steel, and Aluminium and copper based non-ferrous materials. A total of 10,096 tons, 17,721 tons and 466 tons have been imported in the respective classifications.

Above SITC classifications however do not permit a further breakup and means of seggregating iron products from steel and also tubes from pipes and pipe fittings for all for both ferrous and non-ferrous products imported. It is therefore difficult to assess accurately how much of these imports pertain to ferrous and non-ferrous foundry castings. Also there is no indication as to the sector for which these imports were made.

It is to be noted however that independent demand estimates have been made for each country, sectorwise and indicated in the country studies. These estimates also form a part of the imports made in each country.

RELEVANT IMPORTS (CONT'D)

Import statistics from Guyana do not state composition or material specifications (in most cases) and poses more of a problem to segregate the products imported material wise. Most of imports however are of pumps and pump parts and machinery spares.

Pipes and pipe fittings imported are mostly asbestos and PVC. Most of these imports have been through aid packages from the donor countries.

FOUNDRY PROFILE - 1

NAME OF FOUNDRY: Brass Aluminium & Cast Iron Foundry Ltd
Guyana

DATE OF ESTABLISHMENT: 1959

PRODUCTS MANUFACTURED:

Ferrous: Cast iron solids, pump housings, saddles,
Reducers, gears, pulleys, slides etc.

Non-Ferrous: Impellers, bearings, bushings, solids etc.

MARKET SEGMENTS CATERED: Government Corporations like; Guysuco,
Guymine, Water Authority and large, medium
and small manufacturing companies

PRODUCTION CAPACITY:

Ferrous: 110/120 tons per year

Non-Ferrous: Nil

Non-Ferrous: 50/60 tons per year

PROCESSES:

Ferrous: 2 Cold Blast Cupolas of 5 ton and 1 ton

Non-Ferrous: 2 oil fired crucible furnaces of capacity
1000 lbs each

Centrifugal casting: 1 centrifugal casting machine

EQUIPMENT (AUXILLIARY): 3 ton overhead gantry crane, green-sand
moulding, pattern shop, machine shop
& special analytical equipment.

EMPLOYEES: 40 workers

PRODUCTION:

Ferrous: Around 63 tonnes

Non-Ferrous: Around 53 tonnes

COMPETITION:

Inland: only one other foundry (GNEC)

Imports: Imports from UK, USA

Other Caribbean Countries: Nil

FOUNDRY PROFILE - 1 (CONT'D)

PRODUCTION CONSTRAINTS:	Lack of infrastructural space (Moulding and casting area)
MARKETING CONSTRAINTS:	Nil
EXPORT CONSTRAINTS:	Market has a bias toward US and European castings producers.
FUTURE MARKETING PLANS:	Overseas markets particularly the Caricom Region
NEW PRODUCTS:	Water cooled bearings for (sugar factories) domestic water pumps and Impellers for Hardware Stores.

FOUNDRY PROFILE - 2

NAME OF FOUNDRY: Caribbean Casting & Engineering Limited

DATE OF ESTABLISHMENT: April, 1971

PRODUCTS MANUFACTURED:

Ferrous: Sugar Mill Rollers, Scraper Tips, Trash plates
Coupling Pipe Fittings, Sanitary Casting &
General Engineering

Nihard None

Non-Ferrous: Bearings, Spills, General Engineering Casting

MARKET SEGMENTS CATERED: Sugar/Bauxite/Waier Works/Telephone/Power
Generation/Engineering Industry/Construction

PRODUCTION CAPACITY:

Ferrous: Melting Capacity - 10MT Induction Furnace;
with the existing moulding facility;
production capacity is about 2000 MT. per annum

Nihard Nil

Non-Ferrous: 75 MT per annum

PROCESSES:

Ferrous Melting: Induction Melting;
Moulding: Hand Moulding/Machine Moulding using
Green sand/Resin sand

Nihard None

Non-Ferrous Melting: - Oil-fired furnace
Moulding:- Hand moulding/machine moulding using
Green sand/Resin sand

EQUIPMENT (AUXILLIARY): Semi-Mechanised sand plant with machine moulding
facility/over-head crane (2- twenty MT crane)
pattern shop & fettling carbon/carbon equivalent
determinator/immersion pyrometer/leco equipment
for carbon & sulphur determination.

FOUNDRY PROFILE - 2 (CONT'D)

EMPLOYEES:	98
PRODUCTION BY PRODUCT: (1987 - 1989)	(Attachment I & II)
COMPETITION:	
Inland	None
Imports	From MEXICO/BRAZIL/UNITED KINGDOM
Other Caribbean Countries:	DOMINICA REPUBLIC
PRODUCTION CONSTRAINTS:	Lack of Volume of Workload and Cast Iron Scrap
MARKETING CONSTRAINTS)	Shortage of Hard Currency in some countries
EXPORT CONSTRAINTS)	
FUTURE MARKETING PLANS.)	Diversification in the areas of Ductile Iron/ Alloyed Iron/Steel Casting.
AND NEW PRODUCTS)	

GUYANA NATIONAL ENGINEERING CORPORATION LIMITED

FOUNDRY PRODUCTS PRODUCTION/SALES TREND

PRODUCT - CAST IRON/NIHARD/NOH-FERROUS

PRODUCTS/ MARKET SEGMENTS	HISTORICAL 1987			PRODUCTION 1988			CURRENT PRODUCTION 1989			FUTURE PRODUCTION PLAN 1985		
	Tonnage	No/yr	Total Tonnage	Tonnage	No/yr	Total Tonnage	Tonnage	No/yr	Total Tonnage	Tonnage	No/yr	Total Tonnage
SUGAR		85	1341855		94	1859090		117	1791576			2,000,000
CONSTRUCTION			125000			270014			800 tons			400,000
MANUFACTURING			40000			112506			137 tons			215,000
MISCELLANEOUS			15000			45002			82.80 tons			150,000
						2290012			2409713			2769000
						1020 tons			1075 tons			1234 tons
*INCLUDES:- MANHOLE FRAMES + COVERS/HYDRANTS PIPE FITTINGS												

NOTE: Please indicate Market Segment against each product - Sugar, Rice, Bauxite, Other Mines, Quarrying, Construction, Water, Supply, Power, Communication, Transport, Manufacturing, Hardware, others.

GUYANA NATIONAL ENGINEERING CORPORATION LIMITED

FOUNDRY PRODUCTS PRODUCTION/SALES TREND

Product - Non-Ferrous

PRODUCTS/ MARKET SEGMENTS	HISTORICAL 1987			PRODUCTION 1988			CURRENT PRODUCTION 1989			FUTURE PRODUCTION PLAN 1995		
	Tonnage	No/yr	Total Tonnage	Tonnage	No/yr	Total Tonnage	Tonnage	No/yr	Total Tonnage	Tonnage	No/yr	Total Tonnage
SUGAR			17445			11745			10764			20,000
MISCELLANEOUS			4362			3915			4613			10,000
									15,277			30,000
						TOTAL			6.86 tons			13.39 tons

NOTE: Please indicate Market Segment against each product - Sugar, Rice, Bauxite, Other Mines, Quarrying, Construction, Water, Supply, Power, Communication, Transport, Manufacturing, Hardware, Etc.

FOUNDRY PROFILE - 3

NAME OF FOUNDRY: Castings & Mouldings Ltd - Jamaica

PRODUCTS MANUFACTURED:

 Ferrous: Nil

 Non-Ferrous: Cast outdoor Aluminium furniture, Brass/Bronze Bushes

MARKET SEGMENTS CATERED: Mainly furniture manufacture

PRODUCTION CAPACITY:

 Ferrous: Nil

 Non-Ferrous: 100 tons per annum

PROCESSES:

 Ferrous: Nil

 Non-Ferrous: 400 lbs butts out furnace, diesel oil fired

EMPLOYEES:

PRODUCTION 20 to 30 tons

COMPETITION: From wrought iron furniture manufacturers

FOUNDRY PROFILE - 4

NAME OF FOUNDRY: White Metals Ltd - Jamaica

PRODUCTS MANUFACTURED:
Ferrous: Nil
Non-Ferrous: Casket and furniture handles in Aluminium and other Die cast products.

MARKET SEGMENTS CATERED: Furniture and Hardware Sectors

PRODUCTION CAPACITY:
Ferrous: Nil
Non-Ferrous: 75 tons per annum

PROCESSES:
Ferrous: Nil
Non-Ferrous: Automatic Pressure die casting

EMPLOYEES: 6 - 8 workers

PRODUCTION: 15 to 20 tons per annum

COMPETITION: Mainly from imports

F O U N D R Y P R O F I L E - 5

NAME OF FOUNDRY:	Jamaica Railway Corporation (Foundry)
DATE OF ESTABLISHMENT:	1845
PRODUCTS MANUFACTURED:	
Ferrous:	Brake shoes for Rail road rolling stock
Non-Ferrous	Nil
MARKET SEGMENTS CATERED:	Rail road
PRODUCTION CAPACITY:	
Ferrous:	100 tons per annum
PROCESSES:	
Ferrous	Cupola 8 to 9 tons/hour
EQUIPMENT (AUXILLIARY):	Furnace - Cupola 3 Ton Jib Crane Grinder (stone) Blower-motor set 3 Ton pneumatic Crane Electric Lift Small Lathe
EMPLOYEES:	10 workers
PRODUCTION:	Around 40-50 tons per year
COMPETITION:	Nil
PRODUCTION CONSTRAINTS:	Old inefficient equipment
FUTURE MARKETING PLANS: AND NEW PRODUCTS:	Modernization existing facilities

FOUNDRY PROFILE - 6

NAME OF FOUNDRY: Williams Foundry - Trinidad

PRODUCTS MANUFACTURED:
 Ferrous: Manhole covers, grids, frames, water outlets etc
 Non-Ferrous: Impellers, bushings, Aluminium furniture etc.

MARKET SEGMENTS CATERED:

PRODUCTION CAPACITY:
 Ferrous: 60 tonnes of cast iron
 Ni-hard: Nil
 Non-Ferrous: 15 tonnes

PROCESSES:
 Ferrous: 2 Cupolas 22" diameter with capacity 1 ton per hour each manual moulding using local quarry sand.
 Non-ferrous: 2 x 500 lbs tilting crucible furnaces fired by natural gas

EMPLOYEES: 20 workers

PRODUCTION:
(1987 - 1989)
 Ferrous: Around 60 tons
 Non-ferrous: Around 15 tons

COMPETITION: Mainly from imports

FOUNDRY PROFILE - 7

NAME OF FOUNDRY: Mustapha's Engineering Works Ltd - Trinidad

PRODUCTS MANUFACTURED:

Ferrous: One off components for plant & equipment

Non-Ferrous: Bearings and Bushings

PRODUCTION CAPACITY:

Ferrous: Around 500 tons

Non-Ferrous: Around 100 tons

 This is the integrated capacity after take over of Barbados Foundry and Swan Hunter Foundry - Trinidad.

PROCESSES: A number of Cupolas & Tilting furnaces (details not available)

PRODUCTION: Negligible

FUTURE PLANS: Utilising existing facility as well as diversification plans to produce sponge iron and copper alloys for export markets with continuous casting facility.

FOUNDRY PROFILE - 8

NAME OF FOUNDRY: Caroni Ltd, STE Madelein Sugar Factory
Foundry - Trinidad

PRODUCTS MANUFACTURED: Wheels for sugar-cane rail cars, scraper plates,
Brake shoes, bearings, bushings, impellers,
ingots for machine shop etc.

PRODUCTION CAPACITY:

Ferrous: 100 tons per year

Non-Ferrous: 20 tons per year

PROCESSES:

Ferrous: 1 Cupola 1 ton capacity

Non-Ferrous: 800 lb oil fired crucible

PRODUCTION:

Ferrous: Around 30 tons

Non-Ferrous: Around 10 tons

MARKET SEGMENT CATERED: All production for captive use in the
Sugar Factories

FOUNDRY PROFILE - 9

NAME OF FOUNDRY: Trintoc Ltd (Foundry Division) Trinidad

PRODUCTS MANUFACTURED: Anchors, Trays, Columns, Bed plates,
Pipe fittings, Bubble caps, Pumphousings,
Bearings, Bushing, fans, impellers etc.

PRODUCTION CAPACITY:

Ferrous: 180 tons
 Non-Ferrous: 30 tons

PROCESSES:

Ferrous: 2 Cupolas 32" and 22" diameter
 Non-Ferrous: 500 lbs gas fired crucible

PRODUCTION:

Ferrous: 2 Cupolas 32" and 22" diameter
 Non-Ferrous: 500 lbs gas fired crucible

PRODUCTION:

Ferrous: Around 30 tons
 Non-Ferrous: Around 15 tons

MARKET SEGMENT CATERED: Captive production for TRINTOC

FOUND RY DIVISION

TABLES 1 - 50

TABLE - 1

FOUNDRY PRODUCTION(1985/1989)

PRODUCTS	1985		1986		1987		1988		JAN/OCT 1989	
	QTY	WEIGHT	QTY	WEIGHT	QTY	WEIGHT	QTY	WEIGHT	QTY	WEIGHT
<u>FERROUS</u>										
Coupling Box	61	84.92	36	51.91	19	24.25	26	35.84	15	20.89
Trash Plates	46	26.15	39	23.27	26	24.00	30	22.23	17	8.84
Scraper Plate	111	28.39	56	12.90	59	15.21	91	21.23	8	1.75
Manhole Covers & Frames	-	-	-	-	9	1.15	11	0.64	-	-
Miscellaneous	-	17.57	-	43.23	-	11.92	-	6.97	-	3.18
TOTAL	-	157.03	-	131.31	-	76.53	-	86.91	-	34.66
<u>NON-FERROUS</u>										
Top gear bearing	38	10.11	22	6.98	16	6.22	14	5.05	11	2.95
Bottom/Side bearing	89	13.31	35	6.69	45	10.93	40	9.64	30	8.05
Miscellaneous	-	<u>9.07</u>	-	<u>6.88</u>	-	<u>4.76</u>	-	<u>13.13</u>	-	<u>1.25</u>
		<u>32.49</u>		<u>20.55</u>		<u>21.91</u>		<u>27.82</u>		<u>12.25</u>
TOTAL		137.82		151.86		98.44		114.73		46.91

TABLE - 2

FOUNDY PROFIT AND LOSS STATEMENT - (1985-1989)

	1985	1986	1987	1988	1989 (10 mths)
Revenue	2,843	2,586	3,468	4,696	5,039
Cost of Sales	<u>534</u>	<u>1,628</u>	<u>4,121</u>	<u>3,278</u>	<u>2,763</u>
Gross Margin	<u>2,259</u>	<u>958</u>	<u>(653)</u>	<u>1,418</u>	<u>2,276</u>
Divisional Expenses	<u>1,883</u> 376	<u>4,287</u> (3,329)	<u>3,591</u> (4,244)	<u>3,852</u> (2,434)	<u>2,314</u> (88)
Management Expenses	<u>353</u> 23	<u>1,616</u> (4945)	<u>1,601</u> (5,845)	<u>1,232</u> (3,366)	<u>2,301</u> (2,339)
Other Income	--	-	101	87	32
Loss on Exchange	-	-	(4,925)	-	-
Profit (loss) before tax	23	(4,945)	(10,669)	(3,579)	(2,307)

TABLE - 3

FOUNDRY DIVISION - BALANCE SHEET ('000)

	1985	1986	1987	1988	1989 (10 months)
Fixed Assets	987	20737	20737	21223	21287
Less: Depreciation	489	1375	3168	4964	6494
Net Book Value	503	19362	17569	16259	14793
Construction W.I.P	19891	736	2593	1798	1869
	20,394	20,068	20,162	18,057	16,662
<u>CURRENT ASSETS</u>					
Inventory - Finished Stocks	-	15	15	9	2
Raw Material	799	1230	1746	2060	2149
In Progress	244	306	431	734	510
	1043	1551	2192	2803	2661
Accounts Receivables	1218	890	1659	835	1819
Less: Prov. for bad debts	264	264	352	454	99
	954	626	1307	381	1720

TABLE - 3 (CONT'D)

FOUNDRY DIVISION- BALANCE SHEET ('000)

	1985	1986	1987	1988	1989 (10 months)
Prepayments	(2)	20	22	22	(16)
Cash	-	111	221	-	-
External Payments Deposit	4292	5411	5410	12310	20,627
Deposits	-	-	240	240	240
Total Current Assets	6287	7719	9392	15756	25232
Total Assets	26,681	27,787	29,554	33,813	41,894
<u>CURRENT LIABILITY</u>					
Accounts Payable Accruals	5650	6299	11677	14339	14318
Current Portion of long term loan	5324	7527	13852	13852	13852
Accrued Taxes	50	50	(1747)	(3301)	(4339)
Other Taxes	95	253	427	574	524
Loans & Travel	4	1	-	-	-
Deposit W.I.P	34	28	1597	6	185
Total Current Liability	11157	14158	25806	25470	24540
Working Capital	(4870)	(6439)	(16414)	(9714)	692
Capital Employed	15,524	13,629	3,748	8,343	17,354

TABLE - 4

FOUNDRY PRODUCT PRICES

<u>PRODUCT</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1989 Jan/Mar</u>	<u>1989 Apr/Oct</u>
<u>FERROUS</u>						
Coupling Box	7,500	10,200	28,800	28,800	28,800	95,000
Trash Plate	6,500	8,700	19,600	19,600	19,600	64,000
Scraper Plate	5,000	7,000	18,000	18,000	18,000	59,000
Manhole Covers/Frames	-	-	5,000	5,000	5,000	-
Miscellaneous	6,700	6,700	10,900	43,000	66,000	73,000
<u>NON-FERROUS</u>						
Top Gear Bearing	16,200	21,400	38,300	38,300	38,800	126,000
Bottom/Side Bearing	8,000	11,300	20,300	20,300	20,300	67,000
Miscellaneous	18,000	37,000	37,000	73,000	80,000	88,000

TABLE - 5

G U Y A N A

SUMMARY OF DOMESTIC CAST IRON MARKET DEMAND

MARKET SEGMENTS	CURRENT DEMAND (Tons/annum)	FUTURE DEMAND (Tons/annum)	REMARKS
1. Sugar Industry	359.00	359.00	Steady demand
2. Rice Industry	0.50	40.50	Likely to increase with greater milling activity good potential after GNEC rubberisation project takes off.
3. Mining Industry	10.00	10.00	
4. Quarrying	31.50	44.00	19.5 tons and 31.50 tons respectively of Nihard.
5. Water & Sewerage	189.00	311.50*	*Major rehabilitation of water supply network planned. Could generate much larger demand. At present not importing for want of foreign exchange. Will procure if made locally.
6. Manufacturing	4.20	4.20	Other requirements mostly proprietary.
7. Power	2.50	3.60	
8. Telecommunications	31.10	Negligible*	* Negligible requirement. Could have sizeable future requirements after M/S ATN's involvement shortly.
9. Forestry	16.00	16.00	7.00 tons Nihard.
10. Public Work		Negligible Requirement	
11. Transport		" "	Mostly proprietary requirements
12. Others		" "	
TOTAL	643.80	788.80	19.5 tons & 31.50 tons Nihard

TABLE - 6

G U Y A N A

DOMESTIC CAST IRON MARKET DEMAND

MARKET SEGMENTS/AGENCIES	PRODUCTS	CURRENT DEMAND		FUTURE DEMAND		REMARKS
		Number	Tons	Number	Tons	
1. SUGAR INDUSTRY						
Guyana Sugar Corporation (Guysuco)	Mill Roller Shells	24	240.00	24	240.00	Steady demand
	Scraper Plates	36	12.00	36	12.00	
	Trash Plates	32	32.00	32	32.00	
	Coupling Boxes	44	66.00	44	66.00	
	Boiler Doors & Frames	10	2.20	10	2.20	
	Irrigation pump Housing	2	0.50	2	0.50	
	Sprockets	10	0.30	10	0.30	
	SIF Rods (Nihard)		2.00		3.00	
	Rome Harrows Titting Bracket	100	3.70	100	3.70	
	Rome Harrows G. Clamps	10	<u>0.30</u>	10	<u>0.30</u>	
			359.00		359.00	
	2. RICE INDUSTRY					
a) Guyana Rice Milling & Marketing Agency Kaymansankar Private Milling Agencies	Husker Roll Bosses	-		4000	40.00	Currently imported. New CI rollers can be cast at GNEC and rubberised there once the GNEC rubber isolation project takes off.
b) Mahaica Mahaicony Abari Agricultural Devlp. Agency.	Impellers, pump body brake drums, pins etc.		<u>0.50</u> 0.50		<u>0.50</u> 40.50	

G U Y A N A
DOMESTIC CAST IRON MARKET DEMAND

MARKET SEGMENTS/AGENCIES	PRODUCTS	CURRENT DEMAND		FUTURE DEMAND		REMARKS
		Number	Tons	Number	Tons	
3. MINING						
a) Guyana Mining Enterprise Ltd						
Linden Operations	Rough castings,					
Berbice Operations	Bearings		10.00		10.00	
	Shafts, Casings, housings					
4. QUARRYING						
a) Guyana National Service						
	Bowl Liners, Drawback		11.50		24.50	Out of this 9.50 tons & 19.50 tons Nihard requirements
	Rod Housing, Sprockets, Pulleys					
	Crusher Jaws, Mantle, Sockets					
	Toggle Plates & Grooves, Socket Sealing rings etc (NIHARD)					
b) Toolais Perseud	Sprockets, Pulleys, bearing blocks, coupling, wheels rollers etc.		20.00		20.00	Out of this 12.00 tons is Nihard requirement
			31.50		44.00	

G U Y A N A
DOMESTIC CAST IRON MARKET DEMAND

MARKET SEGMENTS/AGENCIES	PRODUCTS	CURRENT DEMAND		FUTURE DEMAND		REMARKS
		Number	Tons	Number	Tons	
5. <u>WATER SUPPLY & SEWERAGE</u>						
a) Georgetown Sewerage & Water Commission	Circular Manhole covers & frames	120	16.00	120	16.00	Major rehabilitation of water system planned over the next few years. At present not importing for want of foreign exchange, but will procure if produced locally.
	Fire Hydrants	100	25.00	300	75.00	
	Repair Couplings	500	5.00	2500	25.00	
	Dockfort Bends	100	8.00	500	40.00	
	Grids	100	3.00	300	10.00	
	Valves (4"Ø)	200	5.00	600	15.00	
	Distance pieces) spiggots, couplings) etc.)			<u>1.50</u>		
			63.50		186.00	
b) Georgetown City Council	Rectangular Manhole Covers & Frames					At present not importing for want of foreign exchange Will procure if made locally
	Heavy duty	500	44.90	500	44.90	
	Light duty	1000	53.60	1000	53.60	
	Step Irons	2000	9.00	2000	9.00	
		2000	<u>18.00</u>	2000	<u>18.00</u>	
			125.50		125.90	

G U Y A N A
DOMESTIC CAST IRON MARKET DEMAND

MARKET SEGMENTS/AGENCIES	PRODUCTS	CURRENT DEMAND		FUTURE DEMAND		REMARKS
		Number	Tons	Number	Tons	
c. Guyana Water Authority		Negligible				Large Project requirements supplied by foreign Organisations/countries. Some replacement castings requirements from Workshop
6. MANUFACTURING						
a) Indl Equipment & Appliances Ltd	Press tool pressure pads		0.20		0.20	Mostly fabrication work.
b) Senata Textiles	Shafts, brackets & Machinery spares	4.0			4.0	Other requirements proprietary
c) Industrial Eng. Ltd		No requirement				
			4.20		4.20	
7. POWER						
Guyana Electricity Corporation	Pump housings baffle plates etc.		2.50		3.60	
8. TELECOMMUNICATIONS						
Guyana Telecommunications Corp.	Carriage way boxes + covers	6	2.60			* Could have sizeable requirements in future if after M/S ATN acq. major shares in the Corp.
	Footpath boxes + covers	24	4.50			
	Control boxes & covers	12	31.10			
			24.00		31.10	

G U Y A N A
DOMESTIC CAST IRON MARKET DEMAND

MARKET SEGMENTS/AGENCIES	PRODUCTS	CURRENT DEMAND		FUTURE DEMAND		REMARKS
		Number	Tons	Number	Tons	
9. FORESTRY						
Toolais Persaud Ltd Willems Timber Ltd Caribbean Resources Ltd Nagarse Saw Mills Demerara Woods Ltd Mazarally	Mill Rollers, mill slide, Trolleys wheels, shoes, crank arms, sprackets, gears, bearing block, mill frames, brake drums, winch drums grides etc.		16.00		16.00	Out of this 7.00 tons is Nihard requirement.
10. PUBLIC WORKS						
Ministry of Works			Negligible Requirement			
11. TRANSPORT						
			Negligible Requirement			Mostly proprietary OE supplies
TOTAL			643.80		788.80	19.5 tons and 31.5 tons in Nihard

TABLE - 7

G U Y A N A

SUMMARY OF DOMESTIC NON-FERROUS MARKET DEMAND

MARKET SEGMENTS	CURRENT DEMAND (Tons/Annum)	FUTURE DEMAND (Tons/Annum)	REMARKS
1. Sugar Industry	37.50	37.50	Steady demand
2. Rice Industry	3.00	3.00	
3. Mining Industry	16.00	18.00	
4. Quarrying	4.50	8.50	
5. Water and Sewerage	33.00	64.00	Major rehabilitation of water supply system planned.
6. Manufacturing	6.00	11.00	
7. Power	4.00	4.50	
8. Telecommunications	Negligible Requirement		
9. Forestry	3.00	3.00	
10 Public Works	No Requirements		
11 Transport	Negligible Requirement		
12 Others			
Total	109.00	149.50	

TABLE - 8

G U Y A N A

DOMESTIC NON-FERROUS CASTINGS MARKET DEMAND

MARKET/SEGMENT/AGENCIES	PRODUCT	CURRENT DEMAND		FUTURE DEMAND		REMARKS
		Number	Tons	Number	Tons	
1. <u>SUGAR INDUSTRY</u>						
Guyana Sugar Corp. (GUYSUCO)	Sprockets	24	0.50	24	0.50	Steady Demand
	Pump Housing	2	0.50	2	0.50	
	Bearings	60	24.00	60	24.00	
	Bushings		6.50		6.50	
	Bronze Rods		2.00		2.00	
	Impellers		3.40		3.40	
	Impellers Bodies	2	0.10	2	0.10	
	Hydraulic Liners	16	0.50	16	0.50	
			<u>37.50</u>		<u>37.50</u>	
2. <u>RICE INDUSTRY</u>						
Guyana Rice Milling & Marketing Agency: Keymansankar Private Milling Agencies Mahaica, Mahaicony Abary Agric. Development Agency.	Mill Bearings, Bushings etc.		3.00		3.00	

TABLE - 0

G U Y A N A (CONT'D)

DOMESTIC . NON-FERROUS CASTINGS MARKET DEMAND

MARKET SEGMENT/AGENCIES	PRODUCT	CURRENT DEMAND		FUTURE DEMAND		REMARKS
		Number	Tons	Number	Tons	
3. <u>MINING INDUSTRY</u>						
a) Guyana Mining Enterprise Ltd Linden & Berbice Operations	Quills, Bearings Solid & cured bushings Cylinders, Flanges Liners etc		18.00		18.00	
b) Guyana Gold & Diamond Mining Association		Negligible Requirements				
4. <u>QUARRYING</u>						
a) Guyana National Service	Pulleys, Bushings Liners etc.		1.50		3.50	
b) Toolais Persaud	Bushings, impellers		<u>3.00</u>		<u>5.00</u>	
			4.50		8.53	

TABLE - 8

G U Y A N A (CONT'D)

DOMESTIC NON-FERROUS CASTINGS MARKET DEMAND

MARKET SEGMENT/AGENCIES	PRODUCT	CURRENT DEMAND		FUTURE DEMAND		REMARKS
		Number	Tons	Number	Tons	
5. <u>WATER SUPPLY & SEWERAGE</u>						
a) Georgetown Sewerage & Water Commission	Brass Saddles Valves (1/4"-2") Fire Hydrant Brass accessories	800	6.00 12.00 <u>1.00</u> 19.00	5000	37.50 12.00 <u>1.00</u> 50.00	
b) Georgetown City Council	Taps, Domestic Valves, Pipe Fittings	1000	14.00	10000	14.00	
c) Guyana Water Authority		Negligible				
5. <u>MANUFACTURING</u>						
a) INDL Equipment & Appliances Ltd	Bronze Burner Caps Welding Tips		5.50		10.50	
b) Sanata Textiles	Bushings		0.50		0.50	Most requirements proprietary
c) Industrial Eng. Ltd			No requirement <u>6.00</u>		<u>11.00</u>	

TABLE - 0

G U Y A N A (CONT'D)

DOMESTIC NON-FERROUS CASTINGS MARKET DEMAND

MARKET SEGMENT/AGENCIES	PRODUCT	CURRENT DEMAND		FUTURE DEMAND		REMARKS
		Number	Tons	Number	Tons	
7. POWER						
Guyana Electricity Corp.	Solid & cored phosphor bronze bushings		4.00		4.50	
8. TELECOMMUNICATIONS						
Guyana Telecommunication Corporation		Negligible requirement				
9. FORESTRY						
Toolsie Persaud Ltd Willems Timber Ltd Caribbean Resources Ltd Nagaree Saw Mills Demerara Woods Ltd Mazerally	Bushing, Impeller Housing, Bearings Gland boxes etc.		3.00		3.00	
10. PUBLIC WORKS						
Ministry of Works		Negligible requirements				
11. TRANSPORT						
		Negligible requirements				
12. OTHERS						
TOTAL			109.00		149.50	

TABLE - 2

J A M A I C A

SUMMARY OF CAST IRON MARKET DEMAND

MARKET SEGMENT	CURRENT DEMAND (Tons/Annum)	FUTURE DEMAND (Tons/Annum)	REMARKS
1. Sugar Industry	529.20	529.20	Steady demand Mostly proprietary requirements. * 2162 tons in Ductile Iron. Figures indicate current recurring requirements. Major rehabilitation planned in next 5 years and the demand will be substantially higher. Detailed future requirements currently being worked out by the Water Commission.
2. Mining and Quarrying	Small Requirements	-	
3. Water and Sewerage	2326.00	2326.00*	
4. Power	-	-	This trend of requirements will continue for the next 3 to 5 yrs and increase further subsequently. Around 145 tons in Ductile iron.
5. Telecommunications	154.80	154.80	
6. Manufacturing	47.00	47.00	Met by captive Foundry facility. Mostly proprietary requirements
7. Public Works	Negligible		
8. Railways	100.00	100.00	
9. Transport	-	-	
TOTAL	3157.00	3157.00	2307 tons in Ductile Iron.

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TABLE - 10

J A M A I C ACAST IRON MARKET DEMAND

MARKET SEGMENTS/AGENCIES	PRODUCTS	CURRENT DEMAND		FUTURE DEMAND(1985)		REMARKS
		Number	Tons	Number	Tons	
1. <u>SUGAR INDUSTRY</u>						
a) <u>SUGAR INDUSTRY AUTHORITY</u>						
Appleton Estates Ltd	Mill Roller Shells	51	419.00	51	419.00	Steady demand parts of trash plates and coupling boxes have been now changed to steel.
Long Pond Sugar Factory	Coupling Boxes	66	66.00	66	66.00	
Hampden Estates Ltd	Trash Plates	72	28.80	72	28.80	
Petronol(JA) Ltd (Bernard Lodge)	Scraper Plates	77	15.40	77	15.40	
New Yarmouth Estates Tropicana Estates Worthy Park Estates						
b) <u>JAMAICA SUGAR HOLDINGS</u>						
Clarendon Sugar Company Ltd (Monymusk) West Indies Sugar Co. Ltd (Frome)						
2. <u>MINING AND QUARRYING</u>						
Alcan Jamaica Company Alcoa Limited Alpert Limited Bauxite & Alumina Trading Co. Kaiser Bauxite Company Jamaica Bauxite Mining Ltd			Small Requirements			Mostly proprietary items procured from equipment manufacture

J A M A I C A
CAST IRON MARKET DEMAND

MARKET SEGMENTS/AGENCIES	PRODUCTS	CURRENT DEMAND		FUTURE DEMAND		REMARKS
		Number	Tons	Number	Tons	
3. <u>WATER & SEWERAGE</u>						
National Water Commission Sewerage Authority	Manhole covers & frames	630	84.00		84.00	2162 tons in ductil iron
	Firehydrants	320	80.00		80.00	
	Ductile Pipes & fittings	122248 ft.	1251.00		1251.00	Figures indicate only recutring current requiremets Major rehabilitatio planned in the next 5 yrs and the futur requirements will b. considerably higher Estimates of future demand were not possible as the Water Commission is currently finalising detailed requirements.
	D.I Bends	6548	283.75		283.75	
	D.I. TEE's	7261	397.25		397.25	
	Couplings		<u>230.00</u>		<u>230.00</u>	
			2326.00		2326.00	
4. <u>POWER</u>						
Jamaica Public Supply Company		Negligible requirement				

J A M A I C A
CAST IRON MARKET DEMAND

MARKET SEGMENTS/AGENCIES	PRODUCTS	CURRENT DEMAND		FUTURE DEMAND		REMARKS
		Number	Tons	Number	Tons	
5. TELECOMMUNICATION						
Telephone Co. of Jamaica Jamaica International Telephones	MANHOLE COVERS & FRAMES					This trend of requirement will continue for the next 3 yrs and likely to increase further subsequently.
	Single cover type	280	60.80	280	60.80	
	double " "	40	21.40	40	21.40	
	triple " "	80	63.10	80	63.10	
	CI step Irons	900	5.00	900	5.00	
	CI Stump Hole Grates	1000	<u>4.50</u> 154.80	1000	<u>4.50</u> 154.80	
6. MANUFACTURING						
Carib Cement Co.	Liners, Grates, Hammers Impellers etc.		20.00		20.00	
Caribbean Steel	Ductile iron rolls	20	22.00	20	22.00	
Jamaica Flour Mills	Rollers	10	<u>5.00</u> 47.00	10	<u>5.00</u> 47.00	
West Indies Glass Co. Ltd		No significant requirement				
KIC Tank Weld		Negligible				Mostly machined & die cast components.
Textiles		"				
Furniture		Negligible				
Chemicals & Plastics		"				Mostly proprietary.
Petroleum Refinery		"				Mostly proprietary

J A M A I C A
CAST IRON MARKET DEMAND

MARKET SEGMENTS/AGENCIES	PRODUCTS	CURRENT DEMAND		FUTURE DEMAND		REMARKS
		Number	Tons	Number	Tons	
7. <u>PUBLIC WORKS</u>						
Ministry of Works		Negligible				
8. <u>RAILWAYS</u>						
Jamaican Railway Corp.	Brake Shoes		100.00		100.00	Presently met by captive foundry. Modernisation planned for increased future requirement.
9. <u>TRANSPORT</u>						
		Negligible				Requirement mostly proprietary.
TOTAL			3157.00		3157.00	2307 tons in Ductile Iron.

TABLE - 11

J A M A I C ASUMMARY OF NON-FERROUS CASTINGS MARKET DEMAND

MARKET SEGMENTS	CURRENT DEMAND (Tons/Annum)	FUTURE DEMAND (Tons/Annum)	REMARKS
1. Sugar Industry	44.20	44.20	Steady Demand
2. Mining and Quarrying	-	-	
3. Water and Sewerage	433.00	433.00*	*Future requirements will be considerably higher in view of the major rehabilitation project planned for the next 5 yrs. Detailed estimates not available.
4. Power	Negligible requirements		
5. Telecommunications	Negligible requirements		
6. Manufacturing	Small requirements		Procured off the shelf, mainly bushings & bearings.
7. Public Works	Negligible requirements		
8. Railways	Negligible requirements		
9. Transport	Mostly proprietary requirements		
10 Others	-	-	
TOTAL	477.20	477.20	

TABLE - 12

J A M A I C A

NON-FERROUS CASTINGS MARKET DEMAND

MARKET SEGMENTS/AGENCIES	PRODUCTS	CURRENT DEMAND		FUTURE DEMAND		REMARKS
		Number	Tons	Number	Tons	
1. <u>SUGAR INDUSTRY</u>						
a) <u>SUGAR INDUSTRY AUTHORITY</u>						
Appleton Estates Ltd	Mill Bearings	98	39.20	98	39.20	Steady demand
Longpond Sugar Factory	Bushings		<u>5.00</u>		<u>5.00</u>	
Hampden estates Ltd			44.20		44.20	
Petronol (JA) Ltd (Bernard Lodge)						
New Yarmouth Estates						
Tropicana Estates						
Worthy Park Estates						
b) <u>JAMAICA SUGAR HOLDINGS</u>						
Clarendon Sugar Company Ltd						
West Indies Sugar Co Ltd (Frome)						
2. <u>MINING AND QUARRYING</u>						
Alcoa Jamaica Company	Small Requirements					Mostly proprietary
Alcoa Limited						
Alpart Limited						
Bauxite & Alumina Trading Co.						
Kaiser Bauxite Company						
Jamaica Bauxite Mining Ltd						

J A M A I C A

NON-FERROUS CASTINGS MARKET DEMAND

MARKET SEGMENTS/AGENCIES	PRODUCTS	CURRENT DEMAND		FUTURE DEMAND		REMARKS	
		Number	Tons	Number	Tons		
3. <u>WATER AND SEWERAGE</u>							
National Water Commission Sewerage Authority	Valves, Fire-hydrant accessories		433.00		433.00	Figures indicate only current recurring requirements. Future requirements will be considerably higher in view of the major rehabilitation planned for the next 5 years. Detailed estimates not available.	
4. <u>POWER</u>							
Jamaica Public Supply Company		Negligible Requirement					
5. <u>TELECOMMUNICATIONS</u>							
Telephone Company of Jamaica Jamaica International Telephones		Negligible Requirements					
6. <u>MANUFACTURING</u>							
Carib Cement Co. Caribbean Steel Jamaica Flour Mills West Indies Glass Co. Ltd K/C Tank Weld Textiles Furniture Chemicals Petroleum Refinery	Solid & cored Bushings/Bearings		Small requirements			Mostly procured off the shelf (centrifugally cast bars). Small requirement of furniture parts & fittings mostly die cast items.	

J A M A I C A

NON-FERROUS CASTINGS MARKET DEMAND

MARKET SEGMENTS/AGENCIES	PRODUCTS	CURRENT DEMAND		FUTURE DEMAND		REMARKS
		Number	Tons	Number	Tons	
7. <u>PUBLIC WORKS</u>						
Ministry of Works			No Requirement			
8. <u>RAILWAYS</u>						
Jamaican Railway Company			No Requirement			
9. <u>TRANSPORT</u>						
			Mostly proprietary requirements			
10. <u>OTHERS</u>						
TOTAL			477.20		477.20	

TABLE - 13

TRINIDAD AND TOBAGO
SUMMARY OF CAST IRON MARKET DEMAND

<u>MARKET SEGMENT</u>	<u>CURRENT DEMAND (Tons/Annum)</u>	<u>FUTURE DEMAND (Tons/Annum)</u>	<u>REMARKS</u>
1. Sugar Industry	431.50	431.50	Steady demand other requirements cast in captive Caroni Foundry.
2. Mining & Quarrying	Negligible	Negligible	
3. Water & Sewerage	50.35*	100.00	41* tons are in Ducttile Iron. Heavy stocks of manhole covers. future requirements are likely to be much larger
4. Power	No requirements	No requirements	-
5. Telecommunications	No requirements	Could have major requirements	Huges stocks of manhole covers. Future requirements could be high after merger with M/s cable & wireless, UK
6. Manufacturing	172.50	172.50	Small requirements cast in trintoc foundry.
7. Public Works	Negligible	Negligible	
8. Construction			
9. Transport	Negligible	Negligible	Mostly proprietary
10. Others			
TOTAL	679,35	729.00	41 tons and 100 tons in Ductile iron

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TABLE - 14

TRINIDAD AND TOBAGO

CAST IRON MARKET DEMAND

<u>MARKET SEGMENT</u>	<u>PRODUCT</u>	<u>CURRENT Number</u>	<u>DEMAND Tons</u>	<u>FUTURE Number</u>	<u>DEMAND Tons</u>	<u>REMARKS</u>
1. Sugar Industry	Mill Roller Shells	34	340.00	34	340.00	Steady demand. Other small requirements produced by small captive Caroni Foundry.
Caroni Ltd - Brechin castle	Trash Plates	32	32.00	32	32.00	
Caroni Ltd -	Coupling Boxes	34	51.00	34	51.00	
STE Madeleine	Scraper Plates	26	8.50	26	8.50	
			<u>431.50</u>		<u>431.50</u>	
2. Mining & Quarrying			Negligible requirements			
3. Water & Sewerage						
Water & Sewerage Authority(WASA)	Ductile pipes		41.00			- 41 tons in ductile iron
	CI saddles	2509	6.50			- Heavy stocks of manhole covers & frames
	Gate Valves & Parts		2.25			-*Future requirements are likely to be much larger
	Fire hydrants	5	0.60			
			<u>50.35</u>		100.00*	
4. Power			No Requirements			
Trinidad & Tobago Electricity Commission						

T R I N I D A D A N D T O B A G O (CONT'D)

CAST IRON MARKET DEMAND

MARKET SEGMENT	PRODUCT	CURRENT Number	DEMAND Tons	FUTURE Number	DEMAND Tons	REMARKS
5. Trinidad & Tobago Telephone Co. Ltd TEXTEL		No requirements			*	Huge stocks of manhole covers & frames * There could be major require.. in future when merger with M/S cable & Wireless UK is finalised.
6. Manufacturing						
1. National Flour Mills		No requirement				Cast iron replaced by steel
2. Trinidad Cement Co. Ltd	Kiln Rollers/Gears	1	8.00	1	8.00	Other items proprietary
	Cooler Plates	140	12.50	140	12.50	
	CI Spirals - Large	100	5.50	100	5.50	
	small	200	4.50	200	4.50	
	Cooler wall liners	40	2.00	40	2.00	
			<u>32.00</u>		<u>32.50</u>	
3. Carib Glassworks Ltd		No requirement				CI moulds replaced by steel
4. Central Trinidad Steel Co. Ltd	Cast Iron rolls		100.00		100.00	
5. NASIL & co Ltd		No requirement				
6. Caribbean Steel Mills Ltd		Negligible requirement				
7. Iron Steel Co of Trinidad (ISPAT)	CT Doors, Rolls, Gears & Gear Boxes		35.00		30.00	

TRINIDAD AND TOBAGO (CONT'D)

CAST IRON MARKET DEMAND

MARKET SEGMENT	PRODUCT	CURRENT DEMAND		FUTURE DEMAND		REMARKS
		Number	Tons	Number	Tons	
6. 8. Trintoc Ltd	Trays, columns, Bed plates, pipe fittings bubble caps		30.00		30.00	Produced by captive foundry facility.
9. Damus Ltd		No requirements				
10. GEO Wimpey (Caribbean) Ltd		Negligible requirements				
11. Automobile Assemblies		Negligible requirements				
7. Public Works Ministry of Works		Negligible requirements				
8. Transport		Mostly proprietary requirements				
TOTAL			679.35		729.00	41 tons & 100 tons in Ductile Iron.

TABLE - 15

T R I N I D A D A N D T O B A G O
S U M M A R Y O F N O N - F E R R O U S C A S T I N G S M A R K E T D E M A N D

MARKET SEGMENTS	CURRENT DEMAND (Tons/Annum)	FUTURE DEMAND (Tons/Annum)	REMARKS
1. Sugar Industry	15.50	15.50	Steady demand, other requirements casting captive Cazoni Foundry.
2. Mining and Quarrying			
3. Water and Sewerage	13.00	13.00	Future requirement could be higher.
4. Power	-	-	Good requirement of Aluminium Die cast items.
5. Telecommunications	-	-	
6. Manufacturing	23.50	23.50	15 tons requirements met by captive Trintoc Foundry.
7. Public Works	Negligible Requirements		
8. Transport	-	-	Mostly proprietary items
9. Others	-	-	
TOTAL	52.00	52.00	

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T R I N I D A D A N D T O B A G O
NON-FERROUS CASTINGS MARKET DEMAND

MARKET SEGMENT	PRODUCT	CURRENT DEMAND		FUTURE DEMAND		REMARKS
		Number	Tons	Number	Tons	
1. <u>SUGAR INDUSTRY</u>						
Caroni Ltd-Brechin Castle	Top, Bottom & side bearings	23	9.50	23	9.50	Steady demand. Other requirements casting captive Caroni Foundry.
Caroni Ltd-STE Madeleine	Solid/Cored Bushings		<u>6.00</u> 15.50		<u>6.00</u> 15.50	
2. <u>MINING & QUARRYING</u>		Negligible requirements				
3. <u>WATER & SEWERAGE</u>						
Water & Sewerage Authority (WASA)	Brass saddles Gate valves, ferrules etc.		13.00		13.00	Future requirement could be higher.
4. <u>POWER</u>						
Trinidad & Tobago Electricity Commission.		Fairly good requirement of small Aluminium die Cast items.				
5. <u>TELECOMMUNICATIONS</u>						
Trinidad & Tobago Telephone Co. Ltd TEXTEL		No Requirements				

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T R I N I D A D A N D T O B A G O
NON-FERROUS CASTINGS MARKET DEMAND

MARKET SEGMENT	PRODUCT	CURRENT DEMAND		FUTURE DEMAND		REMARKS
		Number	Tons	Number	Tons	
6. MANUFACTURING						
a) National Flour Mills		Negligible Requirement				
b) Trinidad Cement Co. Ltd	Bronze Bearings	60	3.50		3.50	
c) Carib Glassworks		Negligible Requirement				
d) Central Trinidad Steel Co. Ltd	Bronze Bearings	Negligible Requirement				
e) GEO Wimpey (Caribbean) Ltd		Negligible Requirement				
f) NASIL & Co Ltd		Negligible Requirement				
g) Caribbean Steel Mills Ltd		Negligible Requirement				
h) Iron & Steel Co. of Trinidad (ISPAT)	Bushings/Bearings	5.00			5.00	
i) Trintoc Ltd	Pump housings, bearings bushings, fans, impellers	15.00			15.00	Met by Trintoc Captive Foundry
j) DAMUS Ltd		Negligible Requirement				

TRINIDAD AND TOBAGO

NON-FERROUS CASTINGS MARKET DEMAND

MARKET SEGMENT	PRODUCT	CURRENT DEMAND Number Tons	FUTURE DEMAND Number Tons	REMARKS	
7. <u>PUBLIC WORKS</u>	Ministry of Works	Negligible Requirements			
8. <u>TRANSPORT</u>		Mostly proprietary requirements			
9. <u>OTHERS</u>					
	TOTAL		52.00	52.00	

TABLE - 17

B A R B A D O S

SUMMARY OF CAST IRON MARKET DEMAND

<u>MARKET SEGMENT</u>	<u>CURRENT DEMAND</u> (Tons/Annum)	<u>FUTURE DEMAND</u> (Tons/Annum)	<u>REMARKS</u>
1. Sugar Industry	100.00	100.00	Requirements low in sugar industry because of financial constraints. Except for mill rollers all other items are now in steel.
2. Rice Industry		Negligible Requirements	
3. Quarries		Negligible Requirement	
4. Water & Sewerage	1090.00*	832.50*	Out of this 1079 tons and 812 tons are in Ductile Iron.
5. Sanitation	3.00	3.00	Easily castable truck spares other items proprietary
6. Manufacturing	1.50	1.50	Mostly proprietary spares
7. Power		Negligible Requirement	
8. Telecommunications	0.50		*Likely to be a huge future requirement if proposed extensive plans for laying underground lines is taken up.
9. Public Works	58.50	53.50	Mostly grills for roads
10. Transport		Negligible Requirement	Mostly proprietary spares
11. Construction			
12. Others			
TOTAL	1093.50	990.50	1079 tons & 812 tons in Ductile Iron

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TABLE - 18

B A R B A D O S

CAST IRON MARKET DEMAND

MARKET SEGMENT/AGENCIES	PRODUCT	CURRENT Number	DEMAND Tons	FUTURE PROJECTED Number	DEMAND Tons	REMARKS
<u>1. Sugar Industry</u>						
Barbados Sugar Industry Ltd	Mill Roller Shells	20	100.00	20	100.00	<p>Current procurement low due to financial constraints.</p> <p>Trash & Scraper Plates and coupling boxes changed to steel.</p> <p>Mill roller shells currently imported mainly from UK. Jamaica source tried but not found of good quality.</p> <p>Pump housing and Impellers replaced as OE complete eqpt is full pumps replaced.</p>
<u>2. Rice Industry</u>						
Barbados Agricultural Devlp. Corp.			Negligible requirement			<p>Large volume of impellers replaced. Having stocks however for next five years.</p>

B A R B A D O S (CONT'D)

CAST IRON MARKET DEMAND

<u>MARKET SEGMENT/AGENCIES</u>	<u>PRODUCT</u>	<u>CURRENT DEMAND</u>		<u>FUTURE PROJECTED DEMAND</u>		<u>REMARKS</u>
		<u>Number</u>	<u>Tons</u>	<u>Number</u>	<u>Tons</u>	
3. Quarries						
A. Quarry Products Ltd						Most spares are of proprietary nature
B. CO Williams Asphalt & Quarries Ltd						
C. CQ Quarries						
D. RM Construction & Quarries Ltd						
4. Water and Sewerage						
Barbados National Water Authority	Pipes & bends Firehydrants, Valves etc. Details indicated in Attachment		1090.00 (Av of 1987 & 1983 1989 was very slack year 1990 will follow same trend as 1988)		832.50	- Major portion of this demand is ductile iron pipes & bends(1079 tons & 812 tons respectively - No Manhole cover requirements in view of very heavy stocks,

B A R B A D O S (CONT'D)
CAST IRON MARKET DEMAND

<u>MARKET SEGMENT/AGENCIES</u>	<u>PRODUCT</u>	<u>CURRENT DEMAND</u>		<u>FUTURE PROJECTED DEMAND</u>		<u>REMARKS</u>
		<u>Number</u>	<u>Tons</u>	<u>Number</u>	<u>Tons</u>	
5. Sanitation						
Barbados Sanitation Authority.	Rear spring brackets	50	0.50	50	0.50	
	Compactor units arms & cranks	3	1.30	3	1.30	
	Wheels hubs	25	1.20	25	1.20	
			<u>3.00</u>		<u>3.00</u>	
6. Manufacturing						
A. Barbados Flour Mills	Roll cores & Shafts	12	0.50	12	0.50	Most of the other spares ordered from Manufacture as OE proprietary items
	Bars for Conveyor chain	75	1.00	75	1.00	
			<u>1.50</u>		<u>1.50</u>	
B. Arawak Cement Factory			Negligible requirements			Mostly proprietary items
C. ACME Manufacturing Co. Ltd			Nil			
D. Coles Engineering Co. Ltd			Negligible requirement			
7. Power						
Barbados Light & Power Co.			Very negligible demand			

BARBADOS (CONT'D)

CAST IRON MARKET DEMAND

MARKET SEGMENT/AGENCIES	PRODUCT	CURRENT DEMAND Number	DEMAND Tons	FUTURE PROJECTED DEMAND Number	DEMAND Tons	REMARKS
<u>8. Telecommunications</u>						
Barbados Telephone Company	Manhole covers & Frames	6	0.50	-	-	*Likely to be a huge requirement if proposed plans for laying of underground lines is taken up.
<u>9. Public Works</u>						
Works Department	CI Grills for roads	53.50		1200	53.50	
	1200 ornament/CI gates & railings	<u>5.00</u>				
		58.50				
<u>10. Transport</u>						
			Negligible requirement			Proprietary spares
TOTAL		1253.50			990.50	1079 tons & 812 tons in Ductile iron.

TABLE - 19

B A R B A D O S

SUMMARY OF NON-FERROUS CASTING MARKET DEMAND

<u>MARKET SEGMENT</u>	<u>CURRENT DEMAND</u> (TONS/ANNUM)	<u>FUTURE DEMAND</u> (TONS/ANNUM)	<u>REMARKS</u>
1. Sugar Industry	2.00	5.75	Requirements low because of financial constraints in Sugar Industry
2. Rice Industry	-	-	
3. Quarries	Negligible Requirements		
4. Water & Sewerage	20.50	22.50	
5. Sanitation	No Requirements		
6. Manufacturing	3.00	3.00	Cement Factory
7. Power	Negligible Requirements		
8. Telecommunications	No Requirements		
9. Public Works	No Requirements		
10. Transport	Negligible		Mostly Proprietary spares
TOTAL	25.50	31.25	

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TABLE - 20

B A R B A D O SNON-FERROUS CASTINGS MARKET DEMAND

<u>MARKET SEGMENT/AGENCIES</u>	<u>PRODUCT</u>	<u>CURRENT DEMAND</u>		<u>FUTURE DEMAND</u>		<u>REMARKS</u>
		<u>Number</u>	<u>Tons</u>	<u>Number</u>	<u>Tons</u>	
1. <u>Sugar Industry</u>						
Barbados Sugar Industry Ltd	Bronze Bearings	4	1.50	10	3.25	Requirements low due to financial constraints
	Phosphor Bronze cored & solid bars		0.50		2.50	
			2.00		5.75	
2. <u>Rice Industry</u>						
Barbados Agricultural Devlp. Corp.						Negligible requirements
3. <u>Quarries</u>						
A. Quarry Products Ltd						
B. Co. Williams Asphalt & Quarries Ltd						Negligible
C. C Q Quarries						
D. RM Construction & Quarries Ltd						
4. <u>Water & Sewerage</u>						
Barbados National Water Authority	Valves, cocks ferrules etc details enclosed		20.50		22.50	

BARBADOS (CONT'D)
NON-FERROUS CASTINGS MARKET DEMAND

<u>MARKET SEGMENT/AGENCIES</u>	<u>PRODUCT</u>	<u>CURRENT DEMAND</u>		<u>FUTURE DEMAND</u>		<u>REMARKS</u>
		<u>Number</u>	<u>Tons</u>	<u>Number</u>	<u>Tons</u>	
5. <u>Sanitation</u>						
Barbados Sanitation Authority			Negligible	Requirements		
6. <u>Manufacturing</u>						
A. Barbados Flour Mills			Negligible	Requirements		Mostly proprietary spares
B. Arrawaks Cement Factory	Bushings/ Bearings		3.00		3.00	Other requirements proprietary
C. ACME Manufacturing Co. Ltd			No requirements			
D. Coles ENG. Co. Ltd			Negligible	Requirements		
7. <u>Power</u>						
Barbados Light & Power Co.			Negligible	Requirements		
8. <u>Telecommunications</u>						
Barbados Telephone Co.			No Requirements			

BARDADOS (CONT'D)
NON-FERROUS CASTINGS MARKET DEMAND

<u>MARKET SEGMENT/AGENCIES</u>	<u>PRODUCT</u>	<u>CURRENT DEMAND</u>		<u>FUTURE DEMAND</u>		<u>REMARKS</u>
		<u>Number</u>	<u>Tons</u>	<u>Number</u>	<u>Tons</u>	
9. <u>Public Works</u>						
Works Department						No Requirements
10. <u>Transport</u>						
Transport Department						Negligible Requirements
TOTAL			25.50		31.25	

TABLE - 21

A N T I G U A

CAST IRON MARKET DEMAND

MARKET SEGMENT/AGENCIES	PRODUCT	CURRENT DEMAND		FUTURE DEMAND		REMARKS
		Number	Tons	Number	Tons	
1. <u>Agriculture</u>						
Antigua Sugar Industry	-	-	-	-	-	Sugar factory not operating since 1982
Rice	-	-	-	-	-	No Rice Sector
2. <u>Water and Sewerage</u>						
Ministry of Public Utilities						
Water	Pipes	-	-	-	-	All pipes are PVC
	Couplings	70	0.60	70	0.60	Ductile 2 tons, balance cast iron
	Valves	100	1.40	300	1.40	
	Fire Hydrants	250/ Yr.	62.50	-	-	
	Service Boxes	300	2.70	-	2.70	Used in place of manhole covers - approx. 20 lbs. each.
				<u>67.20</u>		<u>4.70</u>
Sewerage	-	-	-	-	-	No central system

TABLE - 21
ANTIGUA CON'T.
CAST IRON MARKET DEMAND

MARKET SEGMENT/AGENCIES	PRODUCT	CURRENT DEMAND		FUTURE DEMAND		REMARKS
		Number	Tons	Number	Tons	
3. <u>Mining and Quarrying</u>						
Antique Masonry Products) Government Quarries)	-	-	-	-	-	Components casted primarily with steel.
4. <u>Manufacturing</u>						
Furniture) Food)	-	-	-	-	-	Light Industry - primarily processing - no requirements.
5. <u>Power</u> - Ministry of Public Utilities	-	-	-	-	-	Overhead system - no requirements.
6. <u>Construction</u>						
Construction) Public Works Dept.)	Bridges) Roads) Building)	No Cast Iron Requirements				Use of concrete & structural steel Reinforced concrete - P.V.C.
7. <u>Transport</u>	-					Mostly proprietary items
8. <u>Telecommunication</u>						
(Cable & Wireless)	Manhole Covers Joint Boxes	5-6/Yr. 100/Yr.	0.60 <u>46.00</u> 46.60	5-6/Yr 100/Yr	0.60 <u>46.00</u> 46.60	All of Ductile iron All of ductile iron.
TOTAL			113.80		51.30	48.60 Tons in Ductile Iron

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A N T I G U A

NON-FERROUS CASTINGS MARKET DEMAND

MARKET SEGMENT/ AGENCIES	PRODUCT	CURRENT DEMAND		FUTURE DEMAND		REMARKS
		Number	Tons	Number	Tons	
Sugar						No Sugar Industry
Rice						
Water & Sewerage	Saddles	1000	7.5	17.5	7.5	Brass Saddles
Mining			-			
Quarrying			-			
Manufacturing			-			
Power			-			
Telecommunication			-			
Forestry			-			
TOTAL			7.5		7.5	

TABLE - 23

ST. KITTS

CAST IRON MARKET DEMAND

MARKET SEGMENT/AGENCIES	PRODUCT	CURRENT DEMAND		FUTURE DEMAND		REMARKS
		Number	Tons	Number	Tons	
1. <u>Agriculture</u>						
St. Kitts Sugar Industry Limited	Axle Boxes	50	0.30	50/Yr.	0.3	Other traditional cast iron products now all in steel
2. <u>Water & Sewerage</u>						
Water Dept.	Valves - 4 Inch	30				(Pipes traditionally of ductile iron, but trend is toward P.V.C.
	3 "	15				
	12 "	<u>12</u>	8.0		8.0	
	Bends - 6 Inch	10				
	10 "	22				
	4 "	40	2.9		<u>2.9</u>	
	Valve Covers	<u>59</u>				
	Fire Hydrant Box Covers (CI)	30	0.70		0.7	
	Fire Hydrant (CI)	35	8.80		8.80	
	Pipes	7800/ft. - 4"	69.60			
	7 Km 10"	307.60		20.4		
	6000/ft. - 6"			<u>40.80</u>		
			386.70			
3. <u>Mining & Quarrying</u>						
St. Kitts Masonry Products	-					Largest quarry - no requirements

TABLE - 23
ST. KITTS CON'T.
CAST IRON MARKET DEMAND

MARKET SEGMENT/AGENCIES	PRODUCT	CURRENT DEMAND		FUTURE DEMAND		REMARKS
		Number	Tons	Number	Tons	
4. <u>Manufacturing</u>						
Food)	-	-	-	-	-	Die castings and proprietary items
Electronic Assembly)	-	-	-	-	-	
Furniture)	-	-	-	-	-	
5. <u>Power</u>						
Need most Power Station	-	-	-	-	-	Negligible cast iron requirement
6. <u>Telecommunications</u>						
Scantel	Junction Boxes	45/per	23.70	-	-	In ductile iron As new projects come on stream
	Manhole Covers	50/y o	<u>7.20</u>			
			30.90		20.70 (cast iron)	
TOTAL			417.90		61.50	401 tons and 24 tons in ductile iron

TABLE - 24

ST. KITTS

NON-FERROUS CASTINGS MARKET DEMAND

MARKET SEGMENT/ AGENCIES	PRODUCT	CURRENT DEMAND		FUTURE DEMAND		REMARKS
		Number	Tons	Number	Tons	
1.	Sugar					Uses own Foundry to work brass and babbit bearings
2.	Rice					
3.	Water & Sewerage	Saddles	250	2.00	250	2.00
4.	Mining		-			-
5.	Quarrying		-			-
6.	Manufacturing		-			-
7.	Power		-			-
8.	Telecommunication		-			-
9.	Forestry		-			-
10.	Transport		-			-
TOTAL			2.00		2.00	

TABLE - 25
S T. V I N C E N T
CAST IRON MARKET DEMAND

MARKET SEGMENT	PRODUCT	CURRENT DEMAND		FUTURE DEMAND		REMARKS
		Number	Tons	Number	Tons	
1. SUGAR	-	-	-	-	-	No Sugar Industry-Major Crop Bananas
2. RICE	-	-	-	-	-	No Rice Sector
3. WATER & SEWERAGE	Pipes/Manholes covers	-	64.60	-	87.00	20 tons in ductile iron heavily use of PVC & Mild steel Fabrication
4. MINING	-	-	-	-	-	No Mining Industry
5. QUARRIES	-	-	-	-	-	No Quarry Requirements
6. MANUFACTURING	-	-	-	-	-	No requirements in Manufacturing Industry which is primarily into PR.
7. POWER	-	-	-	-	-	Primarily overhead system. No requirements
8. TELECOMMUNICATION	Manhole covers	20	10.60	10	5.30	All in Ductile iron
9. FORESTRY	-	-	-	-	-	Minute Forestry Activity
10. TRANSPORT	-	-	-	-	-	Vehicle spares - No effective demand
11. PUBLIC WORKS	Railing Gates	-	-	-	2.50	Primarily concrete & structural steel cast iron for rails.
TOTAL			75.20		94.80	30.60 tons and 25.00 tons ductile iron

TABLE - 26

ST. VINCENT

NON-FERROUS CASTINGS MARKET DEMAND

MARKET SECTOR	CURRENT DEMAND	FUTURE DEMAND	REMARKS
1. Sugar	-	-	No Sugar Industry - no requirements.
2. Rice	-	-	No Rice Sector - Banana Sector - no requirements.
3. Water	-	-	No requirements.
4. Mining	-	-	No Mining Industry
5. Quarries	-	-	No Quarry requirements.
6. Manufacturing	-	-	Predominantly light processing. Negligible castings requirement.
7. Power	-	-	Nil
8. Telecommunications	-	-	
9. Forestry	-	-	Negligible requirements in this sector.
10. Transport	-	-	Only Die Cast Spares requirements.
11. Construction	-	-	
TOTAL	Nil	Nil	Negligible castings requirement.

TABLE - 27

SUMMARY OF IMPORTS OF PIPE AND PIPE FITTINGS

COUNTRY & YEAR		CAST IRON AND STEEL (Tons/Annum)	OTHER THAN CAST IRON (DUCTILE IRON) (Tons/Annum)	NON FERROUS (CU AND AL) (Tons/Annum)
Jamaica	1988	1445	5285	172
Trinidad	1987	219	6351	152
	1988	<u>624</u>	<u>4180</u>	<u>128</u>
	Average	422	5265	140
Barbados	1987	-	849	63
	1988	<u>42</u>	<u>1526</u>	<u>120</u>
		21	1188	92
Antigua	1987	7919	4556	47
St. Kitts	1988	521	1427	15
Guyana		Current Statistics not available		
TOTAL		10328	17721	466

TABLE - 28

RELEVANT IMPORTS - JAMAICA (1988 & 1989)

S.I.T.C Code	Product Description	1988		1989 (9 months)	
		Q.T.Y Tonne	Value	Q.T.Y Tonne	Value
6712900	Pig Iron, Cast Iron	1	22458	5	27651
6781000	Tubes & Pipes of Cast Iron	1211	11308600.	327	1420532.
6782100	Blanks or Iron or Steel	12	140353	43	263095
6783000	Tubes & Pipes (other than those of Cast Iron)	1913	11628992.	41451	9411993.
6785100	Tubes & Pipes fittings of Cast Iron	231	3733711.	271	1174152.
6785900	Tubes & pipes fittings of Iron or steel including Cast Iron	3141	30928771.	6208	11847695.
6794100	Castings in Rough State	2.673	158952.	12.891	214920.
6822500	Tubes & Pipes & Blanks of copper	69.866	1923059.	104.577	2296530.
6822600	Tubes & Pipes fittings (copper)	16.458	902398.	44.200	1908412.
6832300	Tubes & Pipes & Blanks (Nickel)	0.005	1460.	0.006	380
6842500	Tubes & Pipes & Blanks of Aluminium	78.705	1424892.	102.499	1740384.
6842600	Tubes & Pipes fittings (Aluminium)	7.472	32664.9	27.022	483532
6852400	Tubes & Pipes & Blanks of lead	33.453	179864.	0.015	2760
6863400	Tubes & Pipes & Blank, pipe fittings (zinc)	34.887	562457.	0.461	18719
6872400	Tubes & Pipes & Blanks of tin	0.833	10856.	0.019	2081
6911100	Prefabricated buildings & their assembled panels & parts of Iron of Steel	1483	30448811.	19343	7259031
6911900	Structure & Parts of Structure of Iron	3221	13215658.	117302	13512123
6912100	Prefabricated buildings & their assembled panels & parts of Alumina.	18.413	239593.	3.006	267490.

RELEVANT IMPORTS (CONT'D) - JAMAICA (1988 & 1989)

S.I.T.C Code	Product Description	1988		1989	
		Q.T.Y Tonne	Value	Q.T.Y Tonne	Value
6912900	Structures & Parts of structures of Aluminium	282.362	5599418.	495.884	8524927
6974111	Pots & Saucepans of Iron or steel	17.074	362803.	15.272	508408
6974119	Other domestic Articles and parts	91.318	1487518.	132.975	1595861
6974390	Other articles of a kind used for domestic purposes	20.859	729755	19.100	666017
6975200	Sanitary ware for indoor use & parts thereof of copper	2.076	59641	0.985	62188
6975300	Sanitary ware for indoor use & parts thereof of Aluminium	3.427	119138	31.860	258236
6991100	Locks & Padlocks (key combination or electrically operated & parts)	801.599	7443777	207.295	6736698
6998395	Castings & Forging of Aluminium	1.098	36898.		
6974200	Domestic Articles & Parts	0.417	17870	0.263	7612
6975100	Wash Basins, Baths & Sinks	279.467	3489376	147.014	3092161
6975190	Other Sanitary ware for indoor of iron or steel	53469	1833994	83.275	2110921
6996510	Arc Welding Electrodes	283.097	1285023	148.904	1017541
6997100	Archors & Graphels (Iron or steel	28.450	436323	15.542	251539
6991300	Base Metal fittings & mountings	354.270	1167832.1	422.993	12419449.

TABLE - 29

RELEVANT IMPORT - TRINIDAD (1987, 1988 & 1989)

S.I.T.C Code	Production Description	1987		1988		1989	
		Q.T.Y Tonne	Value	Q.T.Y Tonne	Value	Q.T.Y Tonne	Value
67-22.000	Cast Iron					460	226.755
674-91000	Galvanised iron less than 3mm	3,963	10540.875			5.398	25418.244
678-11000	Cast Iron pipes 150mm in in diameter & under	26	101.396	1	38.161	5	111.001
678-12000	Pipes of cast iron over 150mm in diameter	1	17.900	2	32.669		
678-21000	Blanks for tubes, pipes under 150 mm	190	909.148	3743	1725.333	92	1275.466
678-38000	Other tubes, pipes under 150mm)	213	813.285	825	3038.700	217	62.739
)	326	146.791				
678-39000	Other tubes, pipes over 150mm	983	4285.789				
678-51000	Pipe fittings cast iron under 150mm	162	1021.668				
678-52000	Pipe fittings cast iron over 150mm	30	352.711				
678-59000	Other pipe & tube fittings	5.042	16075.725				
679-41000	Iron castings	.003	652				
682-25000	Hollow bars of copper tubes pipes etc	18.699	1319.343				
682-26000	Tube and pipe fittings of copper	19.619	1033.063				
683-23000	Tubes, pipes of nickel	.001	24	.003	94		
684-25000	Tubes, pipes etc of Aluminium	38.354	581.914	6.352	158.549	8.758	38.856

RELEVANT IMPORT - TRINIDAD (CONT'D) (1987, 1988 & 1989)

S.I.T.C Code	Production Description	1987		1988		1989	
		Q.T.Y Tonne	Value	Q.T.Y Tonne	Value	Q.T.Y Tonne	Value
584-26000	Tube & pipe fittings of Aluminium	12,428	379,302	4,698	229,079	15,070	44,353
585-24000	Tubes & pipes etc of lead	.013	705	.001	34		
572-41000	Ingots of cast iron	-	-	-	-	1.234	.375
578-34000	Blanks for tubes, pipes over 150mm	-	-	.013	873,908	357	1234,375
586-34000	Tubes, pipes etc of zinc	-	-	.011	352		

TABLE - 30

RELEVANT IMPORT - BARBADOS (1985, 1986, 1987 & 1988)

S.I.T.C Code	Product Description	1985		1986		1987		1988	
		Q.T.Y Tonne	Value	Q.T.Y Tonne	Value	Q.T.Y Tonne	Value	Q.T.Y Tonne	Value
678.1000	Tubes & Pipes of Cast Iron	475	549763	1.653	893543	.08	58823	42	113711
678.3000	Tubes & pipes of iron or steel	27493	3871258	17.232	1886229	1.044	1939218	15.24	1719815
678.5000	Tubes & pipes fittings of iron or steel	5885	1162681	5441	1398777	.001	29		
679.4100	Iron castings in rough state	.972	11440	.092	10881				
682.2500	Tubes & pipes of copper etc	22.755	200831	32.028	266799	29.028	230223	56.375	579754
682.2600	Tubes & pipe fittings of copper	25.385	282165	22.345	264747	25.764	337482	27.204	348729
683.2300	Tubes & pipes fittings of nickel	.79	3419	1.128	10469	600	19259	1.140	8113
684.2500	Tubes, pipes, hollow bars etc of aluminium	10.58	142614	.293	5140	4.861	56550	30.272	362040
684.2600	Tubes & pipes fittings of aluminium	19.898	162391	7.739	56307	3.633	82529	6.182	
685.2400	Tubes & pipes fittings of lead etc	14.901	55637	20.040	63939	47.401	193105	12.511	61657
686.3400	Tubes & pipes fittings of zinc etc.	.004	127	.070	120			.007	70
687.2400	Tubes & pipes fittings of tin etc	18.038	32805						
691.1000	Structures & parts eg doors, window frames roofs etc of cast iron or steel	11069	1936814	2.955 238.239	745730 1780404	176	848321	842	2317502
691.200	Structures & parts eg roofs door/window frames of Aluminium	359387	2905345			247.335	1718054	380.458	3321377

TABLE - 31

RELEVANT IMPORTS - ANTIGUA AND BARBUDA

1987

S.I.T.C Code	Product Description	Q.T.Y Tonne	Value
678.1	Tubes & pipes of Cast Iron	7919	852919
678.3	Other tubes & pipes	396	344545
678.5	Tubes & Pipes fittings	3660	551562
679.3	Casting of rough iron	0.377	3000
682.25	Tubes & Pipes & Blanks (copper)	18.820	293957
682.26	Tubes & Pipes fittings	25.144	132075
684.25	Tubes & Pipes of Aluminium	1.670	78391
684.26	Tubes & pipes fittings	1.713	30231
686.34	Tubes & pipes & blanks	0.003	45
691.1	Non-ferrous metals	41583	27141470
691.2	Structures & parts of structure	380.317	5829911
697.42	Domestic articles	0.231	2741
697.51	Sanitary ware for indoor use	38.864	434032
697.43	Domestic articles	22.017	317594
697.53	Sanitary ware for indoor use	2.441	27205
699.11	Locks & Padlocks	24.760	532608
699.13	Base metal fittings & mountings for furniture	162.303	3019813
678.21	Blanks for tubes & pipes	7	15475
697.411	Domestic articles & parts of cast Iron	277.869	10773568

RELEVANT IMPORTS - ANTIGUA & BARBUDA (CONT'D)

S.I.T.C Code	Product Description	Q.T.Y Tonne	Value
697.52	Sanitary Ware for indoor	0.542	6676
699.71	Anchors & Grapnels & parts	3.459	44873
699.839	Other articles of Aluminium	23.897	698436
6749.1	Galvanised sheets & plates	49	633533

TABLE - 32

RELEVANT IMPORTS - ST KITTS (1988)

1988

S.I.T.C Code	Product Description	Q.T.Y Tonnes	Value
671	Pig Iron, Spiegeleisn, Sponge	-	1475
678.1	Tubes & Pipes of Cast Iron	521	1527446
678.3	Other tubes & Pipes of Iron	38	116242
678.5	Tubes & Pipes fittings	1389	1699812
679.3	Steel & Iron Forgings (rough)	705	580345
679.41	Castings of Iron in rough state	0.473	8337
682.25	Tubes & Pipes, blanks (copper)	2.527	36093
682.26	Tubes & Pipes fittings	1.306	95381
683.23	Tubes & pipes & blanks (nickel)	0.002	32
684.25	Tubes & Pipes & blanks (Aluminium)	10.634	21860
684.26	Tubes & pipes fittings	0.291	4947
685.24	Tubes & Pipes & blanks (lead)	0.065	474
678.21	Blanks for tubes & pipes	0.546	15672

TABLE - 33

RELEVANT IMPORTS - ST. VINCENT (1988)

S.I.T.C No	PRODUCT DESCRIPTION	Q.T.Y Tonne	Value
6781	Tubes & Pipes of Cast Iron	5	3685
6783	Tubes & Pipes other than cast iron	59	181940
6785	Tubes & Pipes fittings of iron or steel	496	277888
6911	Prefabricated Buildings	1434	1782312
69751	Wash basins, baths & sinks (sanitary wares)	7.968	143170
69741	Pots, & Saucepans of iron or steel		7
697411	Domestic Articles	16.953	285745
67821	Blanks of iron or steel	11	10653

TABLE - 34

SUMMARY OF COUNTRYWISE TOTAL DEMAND - FERROUS

COUNTRY	CURRENT DEMAND (Tons/annum)	FUTURE DEMAND (Tons/annum)	REMARKS
1. GUYANA	642.80	738.80	Sugar and Water Sectors
2. JAMAICA	3157.00	3157.00	Water, Sugar, Telecommunications, manufacturing and Transport Sectors
3. TRINIDAD & TOBAGO	679.35	729.00	Sugar, manufacturing & Water Sectors
4. BARBADOS	1253.50	990.50	Water, Public works & Sugar Sectors
5. ANTIGUA	113.80	51.30	Water & Telecommunication Sectors
6. ST KITTS	417.90	61.50	- do -
7. ST VINCENT	75.20	94.80	- do -
TOTAL	6340.55	5877.90	3908 tons and 3324 tons in ductile iron and 9.5 tons & 31.50 tons in Nihard.

TABLE - 35

SUMMARY OF COUNTRYWISE TOTAL DEMAND - NON-FERROUS

COUNTRY	CURRENT DEMAND (tons/annum)	FUTURE DEMAND (tons/annum)	REMARKS
1. GUYANA	109.00	149.50	Major requirements are in Water & Sugar Sectors
2. JAMAICA	477.20	477.20	Water, Sewerage & Sugar Sectors
3. TRINIDAD	52.00	52.00	Manufacturing, Sugar & Water Sectors
4. BARBADOS	25.50	31.25	Water & Sewerage Sectors
5. ANTIGUA	7.50	7.50	Water & Sewerage
6. ST KITTS	2.00	2.00	-
7. ST VINCENT	-	-	-
TOTAL	673.20	719.45	Major requirements in Sugar & Water Sectors

TABLE - 36

SUMMARY OF TOTAL SECTORWISE DEMAND - FERROUS

MARKET SECTOR	CURRENT DEMAND (Tons/annum)	FUTURE DEMAND (Tons/annum)	REMARKS
1. Sugar Industry	1420.00	1420.00	Steady demand
2. Rice Industry	0.50	40.50	Demand only in Guyana. Likely to increase with increase in milling activity.
3. Mining	10.00	10.00	Bauxite industry in Guyana & Jamaica. Demand not very large, Mostly replacement parts.
4. Quarrying	31.50	44.00	Demand only in Guyana. 19.5 tons and 31.50 ton respectively in Nihard. Very little use of ferrous castings in other countries. Spares mostly of steel.
5. Water & Sewerage	4176.85	3705.50	Major rehabilitation of water supply system planned in Guyana. Currently not importing sizeable quantities due to Foreign exchange constraints. Will procure if made locally. Barbados & Jamaica executing large rehab. and expansion projects consistently every year. 3682 tons & 3127 tons in ductile iron respectively.
6. Manufacturing	250.20	250.20	Mostly replacement & equipment spares.
7. Power	2.50	2.50	-

TABLE - 36 (CONT'D)

SUMMARY OF TOTAL SECTORWISE DEMAND - FERROUS

MARKET SECTOR	CURRENT DEMAND (Tons/annum)	FUTURE DEMAND (Tons/annum)	REMARKS
9. Telecommunications	274.50	227.40	Entry of M/S cable & wireless in most Caribbean countries has generated large demand for ductile iron. Joint boxes and manhole covers. Entry of ATN in Guyana could generate large demand. 226 tons and 197 tons of total requirement in ductile iron. Future demand estimate estimate is very conservative and will be much higher.
9. Forestry	16.00	16.00	Forestry sector only in Guyana
10. Public Works	58.50	56.00	Mainly grills/grids for roads.
11. Transport	100.00	100.00	Demand from Jamaican Railways. Met by captive foundry.
12. Others	-	-	-
Total demand	6340.55	5872.90	3908 tons and 3324 tons in ductile iron and 19.5 tons and 31.50 tons in Nihard

TABLE - 37

SUMMARY OF TOTAL SECTORWISE DEMAND - NON-FERROUS

MARKET SECTOR	Current Demand Tons/Annum	Future Demand Tons/Annum	REMARKS
Sugar Industry	99.20	102.95	Almost steady demand
Rice Industry	3.00	3.00	Very small demand in Guyana
Mining	18.00	18.00	-
Quarrying	4.50	8.50	Small demand in Guyana
Water and Sewerage	509.00	542.00	Major demands from Guyana and Jamaica
Manufacturing	32.50	37.50	Demand from Trinidad and Guyana
Power	4.00	3.00	Mostly all overhead lines. No requirement for non-ferrous castings.
Telecommunications	-	-	-
Forestry	3.00	3.00	-
Public Works	-	-	-
Transport	-	-	-
Others	-	-	-
TOTAL DEMAND	673.20	719.45	Major requirements in Sugar and Water Sectors

TABLE - 38

SECTORWISE FERROUS DEMAND (TONS) - ALL COUNTRIES

SECTOR	GUYANA		TRINIDAD		BARBADOS		ANTIGUA		ST. VINCENT		ST. KITTS		JAMAICA		TOTAL DEMAND	
	Current	Future	Current	Future	Current	Future	Current	Future	Current	Future	Current	Future	Current	Future	Current	Future
Sugar Industry	359.00	359.00	431.00	431.00	100.00	100.00	-	-	-	-	0.30	0.30	529.20	529.00	1420.00	1420.00
Rice Industry	0.50	40.50	-	-	-	-	-	-	-	-	-	-	-	-	0.50	40.50
Mining	10.00	10.00	-	-	-	-	-	-	-	-	-	-	-	-	10.00	10.00
Quarrying	31.50	44.00	-	-	-	-	-	-	-	-	-	-	-	-	31.50	44.00
Water & Sewerage	189.00	311.50	50.35	100.00	1093.00	835.50	67.20	4.70	64.6	87.00	38.70	40.80	2326.00	2326.00	4176.85	3705.50
Manufacturing	4.20	4.20	197.50	197.50	1.50	1.50	-	-	-	-	-	-	47.00	47.00	250.20	250.20
Power	2.50	2.50	-	-	-	-	-	-	-	-	-	-	-	-	2.50	2.50
Telecommunication	31.10	-6	-	-	0.50	-	46.60	46.60	10.60	5.30	30.90	20.70	154.80	154.80	274.50	227.40
Forestry	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Public Works	-	-	-	-	58.50	53.50	-	-	-	2.50	-	-	-	-	58.50	56.00
Transport	-	-	-	-	-	-	-	-	-	-	-	-	100.00	100.00	100.00	100.00
Other	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL	643.80	788.80	679.35	729.00	1253.50	990.50	113.80	51.30	75.20	94.80	417.90	61.50	3157.00	3157.00	6340.55	5872.90

TABLE - 32
SECTORWISE NON-FERROUS DEMAND - ALL COUNTRIES

SECTOR	GUYANA		TRINIDAD		BARBADOS		ANTIGUA		ST. VINCENT		ST. KITTS		JAMAICA		TOTAL DEMAND	
	Current	Future	Current	Future	Current	Future	Current	Future	Current	Future	Current	Future	Current	Future	Current	Future
Sugar Industry	37.50	37.50	15.50	15.50	2.00	5.75	-	-	-	-	-	-	44.20	44.20	99.20	102.95
Rice Industry	3.00	3.00	-	-	-	-	-	-	-	-	-	-	-	-	3.00	3.00
Mining	18.00	18.00	-	-	-	-	-	-	-	-	-	-	-	-	18.00	18.00
Quarrying	4.50	8.50	-	-	-	-	-	-	-	-	-	-	-	-	4.50	8.50
Water & Sewerage	33.00	64.00	13.00	13.00	20.50	22.50	7.50	7.50	-	-	2.00	2.00	433.20	433.20	509.00	512.00
Manufacturing	6.00	11.00	23.50	23.50	3.00	3.00	-	-	-	-	-	-	-	-	32.50	37.50
Power	4.00	4.50	-	-	-	-	-	-	-	-	-	-	-	-	4.00	4.50
Telecommunications	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Forestry	3.00	3.00	-	-	-	-	-	-	-	-	-	-	-	-	3.00	3.00
Public Works	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Transport	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Others	-	-	-	-	-	-	-	-	-	-	2.00	2.00	477.20	477.20	673.20	719.45
TOTAL	108.00	119.50	52.00	52.00	25.50	31.25	7.50	7.50	-	-	2.00	2.00	477.20	477.20	673.20	719.45

TABLE - 40

CAST IRON SUPPLY POTENTIALS - CARICOM

FOUNDRIES	CAPACITY (Tons/annum)	CURRENT PRODUCT (Tons/annum)	UNUTILISED Capacity tons	REMARKS
<u>GUYANA</u>				
GNEC Foundry	1445	35	1110	Very low utilisation
BACIF	120	65	55	54% capacity utilisation
<u>JAMAICA</u>				
Caribbean Castings	2000	1075	925	54% capacity utilisation
Castings & Moulding Ltd	-	-	-	
White Metals Ltd	-	-	-	
Jamaica Railway	100	45	55	Captive consumption
<u>TRINIDAD</u>				
Williams Foundry	250	60	190	Low capacity utilisation
Mustapha Eng. Works	500	15	485	Negligible capacity utilisation
Ceroni Ltd	100	30	70	Captive production
Trintoc Ltd	180	30	150	Captive production
TOTAL	4695	1355	3340	29% capacity utilisation

TABLE - 1A

NON-FERROUS SUPPLY POTENTIALS - CARICOM

FOUNDRIES	CAPACITY (Tons)	CURRENT PRODUCT (Tons)	UNUTILISED CAPACITY (Tons)	REMARKS
1. GUYANA				
GNEC Foundry	120	12	108	Poor utilisation
BACIF	60	55	5	Very good capacity utilisation
2. JAMAICA				
Caribbean Castings	75	7	68	Poor utilisation
Castings & Mouldings	100	20	80	Poor utilisation mainly involved in Furniture casting No consequence to study.
White Metals Ltd	75	15	60	Only die cast capacity poor utilisation, but no consequence to this study.
Jamaica Railways	-	-	-	
3. TRINIDAD				
Williams Foundry	100	15	85	Poor capacity utilisation
Mustapha Eng. Works	100	10	85	" " "
Caroni Ltd	20	10	10	
Trintoc Ltd	50	15	35	
TOTAL	710	154	551	Only 22% capacity utilisation

TABLE - 42

OVERALL CAST IRON SUPPLY, DEMAND & OPPORTUNITY - CARICOM REGION

COUNTRY	PRODUCT CAPACITY (Tons/annum)	ACTUAL PRODUCT (Tons/annum)	MARKET DEMAND (Tons/annum)	OPPORTUNITY Tons	REMARKS
1. GUYANA	1565	100	643	543	Sugar sector 359 out of which mill roll shells constitute 240 tons.
2. JAMAICA	2100	1120	3157	2037	2307 tons out of total demand in ductile iron export of castings from Jamaica --- tons
3. TRINIDAD	1030	135	679	544	Sugar, Manufacturing & Water sectors
4. BARBADOS	-	-	1254	1254	Water, Public works & Sugar sectors 1079 tons of demand in ductile iron.
5. ANTIGUA	-	-	114	114	Water & telecommunication sectors 49 tons in ductile iron
6. ST KITTS	-	-	418	418	Water & Telecoms. sectors 400 tons in ductile iron.
7. ST VINCENT	-	-	75	75	31 tons in ductile iron
TOTAL	4695	1355	6340	4305	3908 tons in ductile iron only 21.5% of market demand met by foundries

TABLE - 43

OVERALL NON-FERROUS SUPPLY DEMAND & OPPORTUNITY - CARICOM REGION

COUNTRY	PRODUCT CAPACITY (Tons/annum)	ACTUAL PRODUCT (Tons/annum)	MARKET DEMAND (Tons/annum)	OPPORTUNITY Tons	REMARKS
. GUYANA	190	67	100	47	Sugar & Water sectors
. JAMAICA	250	-	477	435	Mainly water & sewerage sector.
. TRINIDAD	270	50	52	2	Local demand almost met
. BARBADOS	-	-	26	26	Water & Sewerage
. ANTIGUA	-	-	7	7	- do -
. ST KITTS	-	-	2	2	-
. ST VINCENT	-	-	-	-	-
TOTAL	710	159	673	514	only 23.6% of market met by foundries

TABLE - 44
MARKETING PLAN - INDUCTION FURNACE OPERATION

PRODUCT	<u>150 TONS</u>		<u>500 TONS</u>		<u>850 TONS</u>		<u>1200 TONS</u>	
	DOMESTIC	EXPORT	DOMESTIC	EXPORT	DOMESTIC	EXPORT	DOMESTIC	EXPORT
Trash Plates	32	-	32	25	32	25	32	25
Scraper Plates	12	-	12	21	12	21	12	21
Coupling Boxes	66	-	66	30	66	30	66	30
Manhole covers & frames	40	-	115	24	115	24	115	24
Other Municipal Castings (Fire hydrants, grills, grids and stepirons)	-	-	25	-	25	-	25	-
Sugar Mill Roller Shells	-	-	150	-	240	180	240	260
Pipes & Bends (Ductile Iron)	-	-	-	-	-	80	-	300
Telecom Junction Boxes/manhole covers (Ductile Iron)	-	-	-	-	-	-	-	50
	<u>150</u>	<u>-</u>	<u>400</u>	<u>100</u>	<u>490</u>	<u>360</u>	<u>490</u>	<u>710</u>

TABLE 45

GUYANA NATIONAL ENGINEERING CORPORATION LIMITED

COMPUTATION OF UNIT SELLING PRICE - FERROUS

PRODUCTS	P R O D U C T I O N R A N G E S											
	0 - 50		0 - 100		0 - 150		0 - 200		0 - 250		0 - 300	
	Cost Price	Selling Price	Cost Price	Selling Price	Cost Price	Selling Price	Cost Price	Selling Price	Cost Price	Selling Price	Cost Price	Selling Price
Coupling Boxes	247.800	309.750	166.040	207.550	138.790	173.490	122.790	153.490	115.210	144.010	110.130	137.660
Scraper Plates	35.500	44.380	23.190	28.990	19.550	24.440	17.430	21.860	16.250	20.310	15.570	19.460
Trash Plates	97.900	122.380	64.220	80.280	54.070	67.590	48.960	61.200	45.460	56.830	43.460	54.330
Manhole Covers and Frames	21.800	27.250	14.450	18.060	12.140	15.180	10.900	13.630	10.220	12.780	9.720	12.150
	N O N F E R R O U S											
	P R O D U C T I O N R A N G E											
	0 - 50		0 - 100		0 - 150							
	Cost Price	Selling Price	Cost Price	Selling Price	Cost Price	Selling Price	Cost Price	Selling Price	Cost Price	Selling Price	Cost Price	Selling Price
Top Bearings	60.220	75.280	52.930	66.160	51.360	64.200						
Bottom Bearings	30.170	37.710	26.830	33.540	26.060	32.580						
Side Bearings	31.990	39.990	28.470	35.590	27.750	34.690						

A 25% MARK-UP WAS APPLIED TO THE TOTAL COST

ASSUMPTIONS USED TO ARRIVE AT PRODUCTION AND PRODUCT COST
USING THE FOUNDRY INDUCTION FURNACE

- Wages and Salaries figures are based on new organisational structure provided by the Group I Director.
- Electricity cost is based on a melting rate of two tons per hour and the furnace will use 1100 kwh per hour.
- Product quantities were provided by the Group I Director; however, these figures were increased proportionately to cater for products at the various production range.

TABLE 46

GUYANA NATIONAL ENGINEERING CORPORATION LIMITED

COMPUTATION OF UNIT SELLING PRICE IN INDUCTION FURNACE

PRODUCTS	PRODUCTION RANGES																			
	0 - 300		0 - 400		0 - 500		0 - 600		0 - 700		0 - 800		0 - 900		0 - 1000		0 - 1100		0 - 1200	
	COST PRICE	SELLING PRICE	COST PRICE	SELLING PRICE	COST PRICE	SELLING PRICE	COST PRICE	SELLING PRICE	COST PRICE	SELLING PRICE	COST PRICE	SELLING PRICE	COST PRICE	SELLING PRICE	COST PRICE	SELLING PRICE	COST PRICE	SELLING PRICE	COST PRICE	SELLING PRICE
Mill Roll Shells	222.170	277.710	174.950	218.690	146.580	183.230	127.670	159.590	114.190	142.740	104.050	130.060	96.900	120.240	89.880	112.350	84.720	105.900	80.430	100.540
Coupling Boxes	50.470	63.090	39.130	48.910	32.480	40.600	28.140	35.180	25.050	31.310	22.770	28.460	21.000	26.250	19.590	24.490	18.430	23.040	17.480	21.850
Trash Plates	21.640	27.050	17.210	21.510	14.140	17.680	12.450	15.560	10.980	13.730	10.080	12.600	9.220	11.530	8.680	10.850	8.120	10.150	7.740	9.680
Scraper Plates	7.600	9.500	6.060	7.580	5.100	6.380	4.380	5.480	3.930	4.910	3.590	4.490	3.290	4.110	3.080	3.850	2.920	3.650	2.750	3.440
Manhole Frames & Covers	5.080	6.350	3.930	4.990	3.350	4.190	2.920	3.650	2.610	3.260	2.380	2.980	2.220	2.780	2.050	2.560	1.940	2.430	1.840	2.300

* 25% Mark-up has been applied to the total cost

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GUYANA NATIONAL ENGINEERING CORPORATION LIMITED

FOUNDRY

COST ANALYSIS

- RE (1) ACTIVITIES - FERROUS
(2) ACTIVITIES - NON-FERROUS

METHOD OF ARRIVING AT FIGURES

1. Actual production (in tons) for 1989 were obtained.
2. 1989 actual cost was obtained and broken down into variable and Fixed expenses.
3. Depreciation cost relating to the induction furnace has not been included in this exercise.
4. In the absence of more reliable information, the following assumptions were made to arrive at current cost per ton for the various ranges of production.
 - (a) Wages would increase by 7% over 1989.
 - (b) Materials would increase by 25% over 1989.
 - (c) Electricity would increase by 112% over 1989.
 - (d) Fixed expenses would increase by 25% over 1989.
5. 1989 production quantities were valued using these increased prices. This valuation then formed the basis of arriving at the cost per ton at the various ranges of production.
6. Fixed costs (Foundry Indirect Expenses) were allocated to the ferrous and non-ferrous products based on tons produced.

TABLE 47

GUYANA NATIONAL ENGINEERING CORPORATION LIMITED

FOUNDRY DIVISION - COSTING OF PRODUCTION (FERROUS)

	1989 Actual	Projected Cost for 37.9 Tons For 1990	P R O D U C T I O N R A N G E					
			0 - 50	0 - 100	0 - 150	0 - 200	0 - 250	0 - 300
VARIABLE EXPENSES								
Wages	69	74	98	196	294	392	490	588
Service Rework	7	7	9	18	27	36	45	54
Electricity	643	1363	1798	3596	5394	7192	8990	10788
Direct materials	271	325	429	858	1287	1716	2145	2574
Transportation	20	25	33	66	99	132	165	198
Total Variable Expenses	1010	1794	2367	4734	7101	9468	11835	14202
FIXED EXPENSES - (FOUNDRY)								
Salaries & Wages	384	411						
Travelling & Emp. Benefit	292	312						
Electricity	531	1126						
Repairs & Maint.	253	316						
Insurance/taxes	48	60						
Rental of Equipment	51	64						
Depreciation	59	59						
Security	261	326						
Telephone & Cables	8	10						
Bank Charges	-	-						
Sales Promotion	-	-						
Total Fixed Expenses	1887	2684						
Admin/Selling & General Expns	1939	1904						
Total Operating Expenses	4836	6382						
Production Cost Per Ton	$\frac{2897}{37.9} = 76.44$	$\frac{4478}{37.9} = 118.15$	$\frac{5051}{50} = 101.02$	$\frac{7418}{100} = 74.18$	$\frac{9785}{150} = 65.23$	$\frac{12152}{200} = 60.76$	$\frac{14519}{250} = 58.08$	$\frac{16886}{300} = 56.28$
Production Cost + AS & GE per ton	$\frac{4836}{37.9} = 127.60$	$\frac{6382}{37.9} = 168.39$	$\frac{6955}{50} = 139.10$	$\frac{9322}{100} = 93.22$	$\frac{11689}{150} = 77.93$	$\frac{14056}{200} = 70.28$	$\frac{16423}{250} = 65.69$	$\frac{18790}{300} = 62.63$

TABLE 48

GUYANA NATIONAL ENGINEERING CORPORATION LIMITEDFOUNDRYPRODUCTION - NON-FERROUS
\$ 000

VARIABLE EXPENSES	1989 Actual	Projected Cost For 12.5 Tons For 1990	P R O D U C T I O N		
			0 - 50	0 - 100	R A N G E 0 - 130
Wages	58	62	248	496	645
Service Rework	6	6	24	48	62
Electricity	447	948	3792	7584	9859
Direct Materials	261	326	1304	2608	3390
Transportation	7	9	36	72	94
Total Variable Expenses	779	1351	5404	10808	14050
<u>FIXED EXPENSES (FOUNDRY)</u>					
Salaries & Wages	128	137			
Travelling & Emp. Benefit	98	105			
Electricity	177	375			
Repairs & Maintenance	84	105			
Insurance/Taxes	16	20			
Rental of Equipment	17	21			
Depreciation	19	19			
Security	87	109			
Telephone & cables	3	4			
Bank Charges	-	-			
Sales Promotion	-	-			
Total Fixed Expenses	629	895			
Admin, Selling & General Expenses	646	635			
Total Operating Expenses	2054	2881			
Production Cost Per Ton	$\frac{1408}{12.5} = 112.64$	$\frac{2246}{12.5} = 179.68$	$\frac{6299}{50} = 125.98$	$\frac{11703}{100} = 117.03$	$\frac{14945}{130} = 114.96$
Production Cost + AS & GE Per Ton	$\frac{2054}{12.5} = 164.32$	$\frac{2881}{12.5} = 230.48$	$\frac{6934}{50} = 138.68$	$\frac{12338}{100} = 123.38$	$\frac{15580}{130} = 119.85$

TABLE - 50

ADDITIONAL EQUIPMENT AND MANPOWER REQUIREMENT

FROM: W. Bhola	TO: Mr. Arun Santhosh
DIVISION: Factory Operations	DIVISION: UNIDO Consultant
DEPARTMENT:	DEPARTMENT:
OUR REF:	YOUR REF:
SUBJECT: Re: Requirements for differing levels of Production - Foundry	DATE: 90.03.26

We wish to refer to our meeting on 09.11.28 and to your subsequent request for the following information:

- (a) Schedule of staff and equipment for our present Production;
 - (b) Schedule of staff and equipment for 300 tons per annum of castings using the Cupola;
 - (c) Schedule of staff and equipment for 1145 tons per annum using the Induction Furnaces;
- and (d) Schedule of staff and equipment for the improvement in the Non-Ferrous Production:

Assumptions

- It is assumed that all consumables, labour and electricity supply, etc. would be adequate and timely in order to achieve (b), (c) and (d) above.
- It is assumed that the building now housing the non-ferrous foundry would be improved in order to accommodate an E.C.T. Crane.
- That new and replacement moulding boxes would be procured in order to meet the targets projected.
- That the industrial relations climate remains stable and the workers adequately remunerated and highly motivated.
- That most of the patterns required for the moulding machines, would either be supplied by the customers or bought-out.
- That spares for the Plant are available and a good maintenance system implemented.

EQUIPMENT REQUIREMENT

Equipment

In the case of the Ferrous Foundry, the requirements are -

Heavy Duty Boxes for Trash Plates	- a) 108" X 26X" X 15X" (Cope)	2 pairs
	108" X 26X" X 5" (Drag)	2 pairs
	B) 95" X 26X" X 15½" (Cope)	8 pairs
	95" X 26X" X 5" (Drag)	8 pairs
Heavy Duty Boxes for Scraper Plates	- 95" X 26X" X 8" (Cope)	8 pairs
	95" X 26X" X 5" (Drag)	8 pairs
Heavy Duty Coupling Boxes	- 50" DIA X 36" Long	2 pairs
	50" DIA X 7" Long	4 pairs
Special Boxes	- 56" X 31½" X 8" (Cope)	8 pairs
	56" X 31½" X 6" (Drag)	8 pairs
	32" X 30" X 15" (Cope)	10 pairs
	32" X 30" X 5" (Drag)	10 pairs

Additional Equipment

In order to maintain the production level of 1145 tons/yr operating the Induction Furnaces, we feel that a more reliable power supply is needed. Hence there is need to include 3 - off 1.5 MW Diesel Generating Sets.

These sets, if properly managed, can supply power to the entire Lombard Street complex. If this concept is accepted then both the investment and operating costs can be spread over the complex thus reducing the Foundry's costs considerably.

Non-Ferrous

In the case of this Foundry, a number of adjustments has to be made in order to improve production. These are -

Building & Equipment

- The roof has to be raised in order to accommodate an E.O.T. Crane which is in the system.
- Columns, Girders, Rails, Down-shop Pick-up Electric Cables, Connectors, Isolators, etc. have to be secured and installed.
- Temperature control equipment is required in order to improve quality.

- Moulding Boxes

<u>Size</u>	<u>Quantity</u>
15" X 14" X 6"	36 pieces

N.B.

It should be noted that trainees, apprentices and office staff and other support groups i.e. Store Keeper, Tool Room Attendant, etc. are not included in these schedules.

We trust that the information will assist you in the completion of your study.

c.c. Cde. C.A. Saul
Exec. Chairman

MANPOWER REQUIREMENTS - FERROUS

SECTION	AREA	CUPOLA		INDUCTION	
		PRESENT 80T/YR	300T/YR	1145T/YR	
1	<u>Scrap Yard</u>				
	Crane Driver	-	1	1	
	Slinger	-	1	1	
		-	2	2	
2	<u>Melting</u>				
	Furnacemen	1	2	1	
	Casters	-	3	3	
	Crane Driver	1	-	1	
	Foreman (1 & 2)	-	-	1	
		2	5	6	
3	<u>Heavy Moulding</u>				
	Moulders	2	3	5	
	Mixer Operator	1	1	1	
		3	4	6	
	<u>Machine Moulding</u>				
	Moulders	-	2	2	
	Core Placing	-	-	1	
	Weight "	-	1	2	
	Shake Out	-	1	2	
		-	4	7	
4	<u>Sand Plant</u>				
	Mill Operator	-	1	1	
	Sand Operation	-	1	1	
		-	2	2	
5	<u>Core Making</u>				
	Mixer Operator	-	-	1	Staff to rotate between sections 2 &
	Core M/C "	-	1	1	
	Hand Cores	-	-	1	
	Stove & General	-	1	1	
	Inspection	-	-	1	
	Chargehands	-	1	3	Sections 3 & 5
	Foreman	-	-	1	Sections 3, 4 & 5
		-	3	9	

Section	Area	Cupola		Induction
		Present 80T/yr	300T/Yr	1145T/Yr
6	<u>Fettling</u>			
	Shot-blast Room	-	1	1
	S/F Grinders	()	1
	Grinder Opera-tors	(1	1)	1
	Fettling (Bench) Foreman	1 -	1 -	3 1
		2	3	7
7	<u>Pattern-making</u>			
	Pattern makers	2	3	8
	Foreman	-	-	1
	Chargehand	1	1	-
		3	4	9
8	<u>Maintenance</u>			
	Mechanical	2	2	4
	Oiler/Greaser	1	1	1
	Electricians	2	2	3
	Box Repairers	2	1	2
	Chargehand/s Foreman	3 -	2 -	2 1
		10	8	13
9	<u>Services</u>			
	Material Handlers	2	2	2)
	Labourers/Cleaners	2	2	3)
	Brick Layer	-	1	1
	Inspection Despatch	1	1	2
	Chargehand	1	1	1
			6	7
10	Quality Control			
	Metallurgist	1	1	2
	Sand Testing	-	1	1
		1	2	3

MANPOWER REQUIREMENTS - MANAGERIAL AND TECHNICAL

Section	Area	Cupola		Induction	
		Present 80T/Yr	300T/Yr	1145T/Yr	
11	<u>Management</u>				
	Div. Manager	1	1	1	
	Prod. "	-	-	1	
	Office "	1	1	1	
	Maintenance Manager	-	-	1	
	Design Draughtsman	-	-	1	
	Assistant	1	1	1	
			3	3	6

MANPOWER REQUIREMENTS - NON-FERROUS

NON-FERROUS FOUNDRY

SECTION	AREA	PRESENT T/YR	IMPROVED
1	<u>Scrap Yard</u>	-	-
<hr style="border-top: 1px dashed black;"/>			
2	<u>Melting</u>		
	Furnacemen	1	2
	Castors	2	2
	Crane Driver	-	1
		3	5
<hr style="border-top: 1px dashed black;"/>			
3	<u>Moulding</u>		
	Moulders	3	4
	Mixer Operator	1	1
		4	5
<hr style="border-top: 1px dashed black;"/>			
4	<u>Core Making</u>		
	Core Maker	-	-
	" M/C Operator	-	-
	Hand Cores	1	1
	Stove & General	-	-
	Inspection	-	-
		1	1
<hr style="border-top: 1px dashed black;"/>			
5	<u>Fettling</u>		
	Bench Fettling	-	1
		-	1
<hr style="border-top: 1px dashed black;"/>			
6	Pattern Making	-	-)
	Maintenance	-	-)
	Services	-	-)
	Material Handlers	1	2
	Labourers/ Cleaners	1	1
	Inspection/ Despatch	-	-)
	Quality Control	-	-)
	Management	-	-)
	Drawing Office	-	-)
		2	3
<hr style="border-top: 1px dashed black;"/>			

TO BE SHARED BY IRON FOUNDRY

" " " "

TABLE - 1.

SHIPBUILDING/SHIPREPAIRS PRODUCTION - 1986

CARGO VESSELS YEAR 1986 (ACTUAL & ESTIMATED MANHOURS)

SHIP NAMES	JOB No.	LOCATION	ACTUAL HRS SHIPREPAIRS	EST. HRS SHIPREPAIRS	ACTUAL HRS WELDING	EST. HRS WELDING	ACTUAL HRS MECH/MAR. OUT.	EST. HRS MECH/MAR. OUT.	DAYS
M.V ALEXANDER 'K'	S-860111	IN DOCK	1572	1128	1376	1100	884	649	20
		OUT OF DOCK	47	34	41	33	44	33	
M.V SAETRE	S-860306	IN DOCK	610	376	455	264	915	576	8
		OUT OF DOCK	18	11	14	8	115	29	
M.V GUYTIDE	S-860313	IN DOCK	486	414	376	333	553	543	13
		OUT OF DOCK	14	12	11	10	28	53	
M.V BENDY	S-860525	IN DOCK	382	344	440	348	287	228	11
		OUT OF DOCK	12	10	13	10	14	11	
M.V EORIS	S-860705	IN DOCK	186	176	68	64	178	173	4
		OUT OF DOCK	6	5	2	2	10	4	
M.V EDAM	S-860813	IN DOCK	460	412	360	329	420	382	16
		OUT OF DOCK	14	12	11	10	21	19	
M.V ULLA ORTE	S-860911	IN DOCK	3057	3406	2462	2601	1304	1630	49
		OUT OF DOCK	340	102	274	80	300	82	

SHIPBUILDING/SHIPREPAIRS PRODUCTION - 1986

TUGS TRAWLERS PATROL BOAT REPAIRED IN YEAR 1986 ACTUAL AND ESTIMATED MANHOURS

SHIP NAMES	JOB NO	LOCATION	ACTUAL HRS SHIPREPAIRS	ESTIMATED HRS SHIPREPAIRS	ACTUAL HRS WELDING	ESTIMATED HRS WELDING	ACTUAL HRS MECH/MARINE OUTFIT	ESTIMATED HRS MECH/MARINE OUTFIT	DAYS
D.F MAKANDRA	S-860438	IN DOCK	450	385	245	212	164	139	5
		OUT OF DOCK	17.5	11.55	12.25	6.36	8.2	6.35	
D.F KARASASI	S-860438	IN DOCK	192	164	83	55	45	55	5
		OUT OF DOCK	5.85	4.92	4.15	1.65	7.25	2.75	
D.F AGOUTI	S-860440	IN DOCK	402	391	285	289	452	423	10
		OUT OF DOCK	12.06	11.73	14.25	8.67	22.6	21.15	
D.F PECCARI	S-860727	IN DOCK	325	136	96	102	384	352	18
		OUT OF DOCK	9.75	4.04	4.8	3.06	19.5	17.6	
<u>TANKER TYPE VESSELS REPAIRED IN YEAR 1986 ACTUAL AND ESTIMATED MANHOURS</u>									
M.V. KIMBLA	S-861103	IN DOCK	471	532	615	708	597	690	14
		OUT OF DOCK	14.15	15.96	30.75	21.24	29.85	34.55	
M.V STEVE 'N'	S-860202	IN DOCK	1309	1246	1382	1334	1891	1827	17
		OUT OF DOCK	39.27	37.38	69.1	40.02	74.55	91.35	

PIRE CLASS PATROL BOAT SLIP 1986 ACTUAL AND ESTIMATED MANHOURS

SHIP NAMES	JOB NO	LOCATION	ACTUAL HRS SHIPREPAIRS	ESTIMATED HRS SHIPREPAIRS	ACTUAL HRS WELDING	ESTIMATED HRS WELDING	ACTUAL HRS MECH/MARINE OUTFIT	ESTIMATED HRS MECH/MARINE OUTFIT	DAYS
D.F. HAIMARA	S-860432	IN DOCK	163	144	104	94	610	477	21
		OUT OF DOCK	4.89	4.32	5.2	2.82	30.5	23.85	
D.F. PIRAI	S-860434	IN DOCK	252	250	119	12	194	112	21
		OUT OF DOCK	7.56	7.5	5.94	0.36	9.7	5.6	
D.F. HASSAR	S-860428	IN DOCK	34	32	24	18	151	190	0
		OUT OF DOCK	1.02	.96	1.2	.54	7.55	9.5	
D.F. HOURI	S-860430	IN DOCK	125	116	128	116	539	504	15
		OUT OF DOCK	3.75	3.48	6.4	3.48	26.95	25.2	

SHIPBUILDING/SHIPREPAIRS PRODUCTION - 1987
CARGO VESSELS YEAR 1987 (ACTUAL & ESTIMATED MANHOURS)

SHIP NAMES	JOB No.	LOCATION	ACTUAL HRS SR. FABN.	EST. HRS SR. FABN.	ACTUAL HRS WELDING	EST. HRS WELDING	ACTUAL HRS MECH/MAR. OUT.	EST. HRS MECH/MAR. OUT.	DAYS
M.V. GUYTIDE	S-870526	IN DOCK	1491	1535	2254	1496	1203	1450	45
		OUT OF DOCK	44.73	46.05	67.62	44.88	60.15	72.5	
M.V. ALEXANDER 'K'	S-870712	IN DOCK	361		714		1075		19
		OUT OF DOCK	10.83		21.42		33.75		
M.V. VINCENT	S-870837	IN DOCK	1913	1477	1680	1424	323	795	29
		OUT OF DOCK	57.39	44.31	50.4	42.72	16.15	39.75	
M.V. KOLADA	S-870725	IN DOCK	1789	1654	1504	1238	1248	1412	30
		OUT OF DOCK	53.55	49.62	45.12	37.14	62.4	70.6	
M.V. EDRIS	S-870931	IN DOCK	993	923	1415	799	1128	1268	43
		OUT OF DOCK	29.79	27.69	42.45	23.97	56.4	63.4	
M.V. MAC VAE 'A'	S-870115	IN DOCK	3069	2028	2797	1924	205	150	40
		OUT OF DOCK	9207	60.84	83.91	57.72	10.25	2.5	
M.V. BRINDA	S-870306	IN DOCK	2793	2324	2940	2524	368	870	46
		OUT OF DOCK	83.79	69.72	88.2	75.72	18.4	43.5	
M.V. VEDETTE	S-871117	IN DOCK	776	717	739	687	998	899	58
		OUT OF DOCK	23.28	21.21	22.17	20.61	49.9	44.95	

SHIP NAMES	JOB No.	LOCATION	ACTUAL HRS SHIPREPAIRS	EST. HRS SHIPREPAIRS	ACTUAL HRS WELDING	EST. HRS WELDING	ACTUAL HRS MECH/MAR. OUT.	EST. HRS MECH/MAR. OUT.	DAYS
M.V LIFANA	S-861025	IN DOCK	4336	2879	2892	2200	1693	1338	105
		OUT OF DOCK	480	86	320	68	180	67	
M.V NADIYA	S-861105	IN DOCK	264	234	116	122	180	225	11
		OUT OF DOCK	8	7	4	4	9	11	
M.V PHOENIX	S-861204	IN DOCK	1559	1033	706	474	118	64	29
		OUT OF DOCK	47	31	21	14	6	3	
M.V GUYTIDE	S-861216	IN DOCK	115	155	126	131	357	365	12
		OUT OF DOCK	5	5	4	4	10	18	
M.V FREE STAR	S-860518	IN DOCK	4275	5646	4066	5405	521	628	63
		OUT OF DOCK	128	169	121	162	26	31	
M.V KANKU	S-860802	IN DOCK	2741	2798	2447	2571	1958	2021	20
		OUT OF DOCK	82	84	73	77	48	101	
M.V SOLVE	S-860323	IN DOCK	4879	3603	2610	1957	1361	966	57
		OUT OF DOCK	146	108	78	59	68	48	

TANKER VESSELS YEAR 1987 (ACTUAL & ESTIMATED MANHOURS)

SHIP NAMES	JOB No.	LOCATION	ACTUAL HRS SR. FABN	EST. HRS SR. FABN	ACTUAL HRS WELDING	EST. HRS WELDING	ACTUAL HRS MECH/MAR. OUT.	EST. HRS MECH/MAR. OUT	DAYS
M.V GUY SUPPLIER	S-870217	IN DOCK	1220	1552	1097	1441	1433	1881	35
		OUT OF DOCK	36.6	46.56	32.91	43.23	71.65	94.05	
M.V GUY SUPPLIER	S-870433	IN DOCK	146		130		175		12
		OUT OF DOCK	4.38		3.9		8.75		

FERRY REPAIRED YEAR 1987 (ACTUAL & ESTIMATED MANHOURS)

M.V MALALI	S-870830	IN DOCK	290	264	521	336	1075	1135	13
		OUT OF DOCK	8.7	7.92	15.63	10.08	53.75	56.75	

TABLE - 2

SB/SR DIVISION PROFIT AND LOSS ACCOUNT (1985 - JUNE 1989)

	\$000's				
	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>	June 1989
Revenues	6,870	7,062	8,908	11,982	2,323
Less cost of sales	5,448	5,516	5,345	7,568	1,530
Gross profit	1,422	1,546	3,563	4,414	793
Gross Profit/Rev. %	20.7%	21.9%	40.0%	36.8%	34.1%
Cost of Sales/Rev. %	79.3%	78.1%	60.0%	63.2%	65.9%
Divisional Expenses	(371)	1,702	3,763	2,926	1,162
Divisional Profit	1,793	(156)	(200)	1,488	(369)
Divisional Profit/Rev. %	26.1%	(2.2%)	(2.2%)	12.4%	(15.9%)
Management Expenses	494	928	1,577	1,835	600
	1,299	(1,084)	(1,777)	(347)	(969)
Other Income	-	-	97	129	26
Profit Before Tax	1,299	(1,084)	(1,680)	(218)	(943)
Less Tax	80	-	129	-	42
Profit After Tax	1,219	(1,084)	(1,809)	(218)	(985)
Net Profit Revenue	17.7%	(15.3%)	(20.3%)	(1.8%)	(42.4%)

TABLE - 3

SB/SR DIVISION BALANCE SHEET (1985 - JUNE 1989)

	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>
Fixed Assets	3,559	3,582	5,943	9,994	9,994
Less Depreciation	<u>1,468</u>	<u>1,780</u>	<u>3,146</u>	<u>5,007</u>	<u>5,443</u>
Net Book Value	2,091	1,802	2,797	4,917	4,551
Construction work-in-progress	<u>117</u>	<u>790</u>	<u>541</u>	<u>1,771</u>	<u>2,155</u>
Total Fixed Assets	2,208	2,592	3,338	6,688	6,706
<u>Current Assets</u>					
Inventory	-	-	-	-	-
Raw Materials	1,926	1,771	1,982	2,908	3,462
In Progress	<u>3,225</u>	<u>507</u>	<u>804</u>	<u>3,844</u>	<u>9,859</u>
Total:	5,151	2,278	2,786	6,752	12,821
Accounts Receivables	2,215	2,254	534	2,312	1,485
Less: Prov. for Bad Debts	<u>271</u>	<u>219</u>	<u>159</u>	<u>947</u>	<u>947</u>
Estimated A/c Receivables	1,944	2,635	375	1,365	538
Pre-payments	7	42	318	367	431
Cash	1	1	1	14	14
External Payment Deposits	<u>1,902</u>	<u>2,248</u>	<u>2,248</u>	<u>3,614</u>	<u>3,992</u>
Total Current Assets	9,005	7,204	5,728	12,112	17,796
<u>Less Current Liabilities</u>					
A/c Payables/Accruals	2,266	3,036	4,165	8,443	9,714
Current Portion of Long Term Loan	927	1,703	1,815	1,815	1,815
Accrued Taxes	<u>485</u>	<u>485</u>	<u>614</u>	<u>(504)</u>	<u>(928)</u>
Other Taxes	39	91	136	361	317
Deposit on work-in-progress	512	806	1,049	2,569	5,504
Leave & Travel	<u>13</u>	<u>8</u>			
Total Current Liabilities	4,411	6,129	7,779	12,684	16,422
Working Capital	7,506	1,075	(2,051)	(572)	1,374
Capital Employed	8,988	3,667	1,287	6,116	8,080

TABLE - 4

SB/SR DIVISION MANPOWER - PRESENT AND REQUIRED

1. DEPARTMENT - DOCKS/ALLIED TRADES

PRESENT WORK FORCE STRENGTH

<u>DOCKS</u>	<u>ALLIED TRADES</u>
1 - FOREMAN	1 - FOREMAN
1 - CHARGEHAND	1 - SHIPWRIGHT/CARPENTER
4 - DOCK LABOURERS	1 - CARPENTER
<u>6</u>	1 - PAINTER
	<u>1 - TRAINEE</u>
	<u>5</u>

OPTIMUM WORK FORCE STRENGTH

<u>DOCKS</u>	<u>ALLIED TRADES</u>
1 - FOREMAN	1 - SENIOR SUPERVISOR
2 - CHARGEHANDS	1 - FOREMAN
11 - DOCK ATTENDANTS	1 - CHARGEHAND
<u>14</u>	6 - SHIPWRIGHT/CARPENTER
	2 - PAINTERS
	1 - RIGGER
	<u>3 - APPRENTICES/TRAINees</u>
	<u>15</u>

2. DEPARTMENT - WELDING

PRESENT WORK FORCE

14 - JOURNEYMEN
6 - APPRENTICES/TRAINees
1 - CHARGEHAND
1 - FOREMAN
<u>1 - SENIOR SUPERVISOR</u>
<u>23</u>

OPTIMUM WORK FORCE

27 - JOURNEYMEN
6 - APPRENTICES/TRAINees
2 - CHARGEHANDS
1 - FOREMAN
<u>1 - SENIOR SUPERVISOR</u>
<u>37</u>

3. DEPARTMENT - SHIPFABRICATION

PRESENT WORK FORCE STRENGTH

7 - (FABRICATORS FABRICATORS HELPER)
2 - CHARGEHANDS
2 - FOREMEN
<u>1 - SENIOR SUPERVISOR</u>
<u>12</u>

REQUIRED WORK FORCE

11 - FABRICATORS
9 - FABRICATOR HELPERS
6 - APPRENTICES/TRAINees
2 - CHARGEHANDS
2 - FOREMEN
<u>1 - SENIOR SUPERVISOR</u>
<u>31</u>

4. MARINE OUTFITTINGS DEPT.

PRESENT WORK FORCE STRENGTH

9 - SKILLED/JOURNEYMEN
6 - SEMI SKILLED
3 - TRAINEES/APPRENTICES
3 - CHARGEHANDS
___ FOREMEN
1 SENIOR SUPERVISOR
22

REQUIPED/OPTIMUM STRENGTH

14 - SKILLED
8 - SEMI SKILLED
6 - TRAINEES/APPRENTICES
3 - CHARGEHANDS
3 - FOREMEN
1 - SENIOR SUPERVISOR
35

5. MACHINE SHOP - INSIDE FITTINGS DEPT.

PRESENT WORK FORCE

6 - MACHINIST
6 - APPRENTICE/TRAINees
1 - LABOURER
1 - FOREMAN
1 - SENIOR SUPERVISOR
15

(INSIDE FITTING)

4 - BENCH FITTER
3 - TRAINEES
1 - LABOURER
1 - FOREMAN
9

OPTIMUM (MACHINE SHOP)

15 - MACHINIST
6 - APPRENTICES/TRAINees
2 - LABOURERS
1 - CHARGEHAND
1 - FOREMAN
1 - SENIOR SUPERVISOR
26

OPTIMUM (INSIDE FITTING)

11 - BENCH FITTERS
6 - APPRENTICES/TRAINees
1 - LABOURER
1 - CHARGEHAND
1 - FOREMAN
20

TABLE - 5

MAJOR OWNERS OF SHIPS/OTHER CRAFT IN GUYANA

Potential Customers	Cargo Ships	Ferry Boats	Patrol Boats	Barges	Tugs	Trawlers	Remarks
1. Transport & Harbours Dept.		10					Four smaller boats serviced at Harbours Dept shipway.
2. Rambarran Shipping Co.	3						One large ship, too large for GNEC.
3. Stoll Brothers Shipping Co.	5						
4. Guyana Defence Force			7				
5. Guyana Police Force			2				
6. Guyana National Service	1		2				
7. Cari Banks Shipping Co	2						
8. Guyana Customs	1		1				
9. Kings Shipping Co	2						
10. Mazaherally & Sons	1						
11. Guyana Oil Company	1						
12. Guyana National Shipping Corp.	1						
13. GUYMINE				10			Use own facility for minor repair.
14. Toolsie Persaud	1			5			Use own service for building & servicing
15. Caribbean Resources Ltd.				5	3		Use own service facility.

Potential Customers	Cargo Ships	Ferry Boats	Patrol Boats	Barges	Tugs	Trawlers	Remarks
16. Kolada Shipping Co	1						
17. Alchatra Shipping	1						
18. GUYSUCCO				4			
19. Guyana Fisheries Ltd						25	Repairs by own facility Use own shipway for servicing.
TOTAL	20	10	12	24	3	25	

NOTE: In addition to these estimates there are a number of owners having small craft, pontoons, punts etc.

TABLE - 6

ORGANISATIONS/RESPONDENTS CONTACTED - GUYANA

- | | | | |
|------|--|------|--|
| (1) | Cde. Dunston Barrow
Chairman & Chief Executive Officer
Guyana Mining Enterprise Ltd.
Linden | (11) | The General Manager
Guyana National Shipping Corp.
5-9 Lombard Street
La Penitence
Georgetown |
| (2) | Cde. Harold Davis
Executive Chairman
Guyana Sugar Corporation
Church Street
Georgetown | (12) | Mr. Yacoob Ally
Managing Director
A. Mazarally & Sons
22 Wright's Lane
Kingston |
| (3) | The Executive Chairman
Guyana Fisheries Limited
McDoom Village
East Bank Demerara | (13) | The General Manager
King's Shipping & Trading Co. Ltd.
Robb & King Streets
Lacytown |
| (4) | Mr. F. Ramdeholl
National Hardware (Guyana) Ltd.
15A Water Street
Georgetown | (14) | Mr. Morris Gajadar
Comptroller
Customs & Excise Department
66, Garnett Street - Newtown, Kitty |
| (5) | Cde. Carl Duncan (Managing Director)
Caribbean Resources Limited
Houston Public Road
East Bank Demerara | (15) | Brigadier Norman McLean
Guyana Defence Force
Camp Ayangana
Georgetown |
| (6) | Cde. J. Bissessar
140, E $\frac{1}{2}$ Crown Street
Queenstown
Georgetown | (16) | Cde. Balram Raghbir
Commissioner of Police
Eve Leary
Georgetown |
| (7) | Cde. Dennis Rambarran
Rambarran Shipping Company
24, Meadow Bank
East Bank Demerara | (17) | Cde. Joseph Singh
Director General
Guyana National Service
91 Middle Street |
| (8) | Toolsie Persaud Limited
1-4 & 10-12 Lombard Street
Georgetown | (18) | The General Manager
Transport & Harbours Department
Battery Road
Kingston
Georgetown |
| (9) | Guyana Oil Company
Waterloo Street
Georgetown | (19) | Mr. R. Adams
Shipping Manager
Caribanks Shipping Co.
Banks DIH
Thirst Park
Industrial Site
Ruimveldt |
| (10) | Stoll Bros. Shipping Co.
Friendship Village
East Bank Demerara | | |

TABLE - 7

SB/SR DIVISION PENDING ORDERS

TENTATIVE FUTURE DOCKING SCHEDULE

<u>Vessel</u>	<u>Estimated Docking Time</u>
<u>Northern Dock</u>	
1. M.V. John 'W'	2½ mths
2. Guysupplier	2½ mths
3. Sorel Point	1 mth
4. M.V. Willie B	1 mth
5. M.V. Cay Verde	1 mth
6. Millgrader	1 mth
7. Caribou Reefer	1.mth
8. M.V. Jaimito	1 mth
9. DFS 1008 Karasisi)	3 wks
10. DFS 1017 Makendra)	
11. DFS 1010 Peccari)	3 wks
12. DFS 1007 Agouti)	
13. Alexander K	1 mth
14. Viking	1 mth
15. Vedette	1 mth
16. Vinicent	1 mth
17. Coster	2 mths
18. Anarika	6 mths
19. Fokke De Jonge	1 mth
20. Edam	1 mth
21. Kolada	<u>2 mths</u>
	28.50 mths

<u>Vessel</u>	<u>Estimated Docking Time</u>
<u>Southern Dock</u>	
M.V 'Kimbia'	1 mth
M.V 'Malali'	7 mths
M.V 'Torani'	7 mths
M.V 'Makouria'	7 mths
M.V 'Steve N'	3 mths
M.V 'Acquero'	3 mths
M.V 'Windglow'	4 mths
M.V 'Brinda'	2 mths
M.V 'Gran Rio R'	2 mths
M.V 'Lifana'	<u>2 mths</u>
	38 mths

TABLE - 8

REGIONAL ORGANISATIONS/RESPONDENTS CONTACTED

1. Jamaica Shippers Council
Caribbean Confederation of Shippers Council
Mr. M. McIntosh, Chairman
2. Shipping Association of Jamaica
Mr. Alvin Henry/Mr. Ludlow Stewart
3. Registrar of Shipping
Miss Reed/Miss Martin
4. Registrar of Shipping,
Trinidad
5. Registrar of Shipping and Dir. of Maritime Affairs, Barbados
Mrs. Neblet Fleming/Miss Bynoe
6. De Castas Ltd., Barbados
Mr. George D.I. Shortt
7. Mr. Hondaff Mahabar (Ship Owner)
Barbados
8. Port Authority, Antigua
Capt. J.F. Bicker/Ms. Brown
9. Mr. R. Smith, Ship Owner
St. John's, Antigua
10. Registrar, Customs and Registrar, St. Vincent
Mr. Bailey, Comptroller of Registrar
Mr. James, Asst. Comptroller
11. Capt. Frank Olivierre, Ship Owner
Kingston, St. Vincent
12. Mr. Francis Bynoe, Ship Owner
Bequia, St. Vincent
13. Comptroller of Customs, St. Kitts
Mr. Joseph/Mr. Werner.

TABLE 9
SUMMARY OF SHIPPING VESSELS REGISTERED - JAMAICA

No.	Name of Vessel	Official Number	Date of Registry	Owner & Address	Gross Tonnage	Net Tonnage	Length Feet	Breadth	Type of Vessel	No. of Engine	Speed Knot	BHP
3.	SEA WITCH	3	16.6.75	Albert Chin 2 South St. Montego Bay	62.34	33.54	62	10	Motor single screw	one	9	200
4.	BORNET	5	2.3.76	Bryan V Mill 21 Charlemount Ave. Egn. 6	99.92	46.46	69	25	Motor	two		450
5.	DORCHESTER	6	2.3.76	-do-	221.79	99.75	102	17	Motor single screw	one		500
6.	WINN	7	2.3.76	-do-	304.03	128.92	115	-		one		600
7.	AN ANE	10	22.1.79	Port Cold Ltd 127-128 Third St. Newport West Egn.	2495.06	1678.52	275	8	-do-	two		2000
				<u>PREVIOUS OWNERS</u>								
8.	CAPTAIN B	14	10.12.79	PhV Company Ltd. 13 Sayree Road Kingston 10	121.25	82.45	74	12	-do-	one	9	430
				<u>NEW OWNERS</u>								
8.	CAPTAIN B			Quality Fish Co. Ltd. 29 Oliver Place Egn. Jamaica								
				Change of Ownership No. CR 40328/on 27/1/82								
9.	FORBANT BAY	15	4.8.81	JHR Atlantic Ln 40-46 Knutsford Blvd. Egn 5	1548.84	784.68	369	2.5	Motor twin screw	two	15	4700
10.	ST. ANNE'S BAY REGISTRATION CANCELLED	16	2.6.81 Oct. 1988	-do-	3442.18	2317.02	310	3	Motor single screw	one	15	4000

← Name changed to Gregory - Nav Number 39 Sold to EC Shipping

No.	Name of Vessel	Number	Registry	Addresses	Tonnage	Tonnage	Feet	Tenths	Vessel	Engine	Knot	
1.	MAHMOE	156143	4. 0.39	William Ernest Sinclair 18 Brockley Hall Road London SE4	8.97	5.13	26	2	Sailing			
2.	SUNNY SOUTH	156140	22. 4.42	1. Czar V. Hurlston Shipwright 7 John Street 2. Arville P. Dacosta 1 Grafton Road Kingston	22.9	14.1	41	-	Sailing with aux. gas motor	1 set		
3.	MARSUTANA	174250	6.10.53	Victor B. Khalil 32 First Avenue	52.93	29.49	58	3	Aux. sailing & single screw	one	8	155
4.	MARIBEAU	174252	11. 5.60	Deluxe Enterprise 18a Duke Street Kingston	109.23	66.05	85	-	Motor twin screw	two	9	450
5.	LADY HUGGINS	156769	25. 4.61	Dredging & Hocks Ltd NCB, King Street Kingston	69.05	21.81	90	-	Motor	one	10	150
6.	PORTCEN	174253	29. 8.61	Caribbean Cement Co. Rockford, Ja. W.I.	41.40	21.63	52	9	Motor tug	two	10	300
7.	YACHT MYSTIC	174253	6.11.61	1. Arthur C. Lewis 4 Hopefield Avenue 2. Lawrence M. Scott 9 Kingshouse Road Kingston 10.	10.13	9.57	30	3	Sail with Aux. single crew	one	6	15
8.	BELLEROPHON	302185	27.11.61	Gilbert E. Chin Port Antonio P.O. Portland	50.54	22.12	61	3	Motor Ship single screw	one	8.2	120
9.	COCOBAN	174256	1. 6.66	Keith Jones Golden Avenue St. Thomas	16.18	19.56	33	-	Sailing with aux.	one	4	30
10.	UNUUA	174257	10. 0.66	Julian Harré Christensen 40 Hereford, London W2	108.27	66.43	107	6	Motor	two	10	225
11.	NOBUKA	174257	12. 5.67	Paul M. Chapman Discovery Bay St. Ann	5	3	30	-	Twin screw sailing			
12.	ANANCY II	2	12. 6.75	Fish of Jamaica Co. Ltd. 77 First Street Newport West, Kingston.	88.94	48.57	68	16	Motor ship single screw	one	9	365

No.	Name of Vessel	Official Number	Date of Registry	Owner & Addresses	Gross Tonnage	Net Tonnage	Length Feet	tenth	Type of Vessel
21.	LANNILL'S	20	22.4.82	Trevor Chung 3 Brenton Drive Kingston 8		29	48	-	Motor Diesel
22.	LEDA	21	7.10.82	Casina T. Muschette 16 Primrose Terrace Kingston	60	34	64	-	Motor Diesel
23.	ADEL	22	7.10.82	Albert Porter 34 Gore Terrace	47.32	31.64	52	-	Motor Trawler Single Screw
24.	JAMAICA II	25	24.10.83	Port Authority 15-17 Duke Street	231.04	71.36	98	42.5	Motor Diesel
25.	DAISY ANN	26	26.1.84	Ocean Pride Fisheries Ltd. 14 Cassia Park Avenue Kingston 10	88.94	48.51	68	1.6	Motor Single Screw
26.	CALICO	28	11.12.84	Rum Runner Cruises Box 1116, MO.BAY	21	16	44	05	Aux. Sail
27.	GERONIMO	662.621	11.1.85	Central Fisheries 32½ Duke Street Kingston	91.69	51.63	60	-	Motor Ship
28.	CARANX	30	19.7.85	University of the West Indies Mona, Kingston	57.75	51.63	60	-	Motor ship diesel
29.	ERIF	31	8.1.85	Government of Jamaica c/o York Park Fire Station			76	5	Motor ship

TABLE - 10

SUMMARY OF SHIPPING VESSELS REGISTERED - BARBADOS

P	OFFICIAL NO.	NAME OF VESSEL ANN. INSPECTION YR/DATE	REG. NO.	VESSEL CARGO / PAY NAME OF OWNERS FEES DUE	NET GRT
1	171370 X	Sunshine R	2-1948	Lloyd Ekins Alleyne Fontabelle, St. Michael ✓	25.01 25.01
1	159832 X	Carib	5-1952	Theodore Gordon McKinsory & Shirley Margaret McKinsory, Cariacou, Grenada ✓	4.02 4.02
1	139667 X	Mary M. Lewis	4-1953	Random Properties Ltd, Nassau, Bahamas ✓	69.09 107.60
	153833 X	Arctic Prince	1-1954	Labrador Shipping Ltd Halifax, Nova Scotia, Canada ✓	921.79 921.79
	153834	Gracfish	1-1955	David Oliver Payne 'Brightwood', St. Lawrence Gap, Ch. Ch. ✓	
	153837 X	Island Queen	2-1959	Herbert Hartley Smith Com. Royal Canadian Navy, P.O. Box 287 Armdale, Halifax County, Nova Scotia ✓ Robert Alleyne Purdy Jnr, Deep Brook, Annapolis County Nova Scotia. Atlantic Royal Bank of Canada 2801, Agric. Dept Halifax, Nova Scotia	20.02 49.39 0 3 11 42

SUMMARY OF VESSELS ENTERED ON BARBADOS REGISTER

OFFICIAL NO.	NAME OF VESSEL ANN. INSPECTION Y/N/DATE	REG. NO.	VESSEL CARGO / PAY NAME OF OWNERS FEES DUE	NET GRT
153839	Vanda II	4-1959	Barbados Boat Co. Ltd Buckley Beach, Bay St, St Michael	15.14 22.26
153840	Ecrasy	1-1960	Ulter Edward Godard, Lyric, St. Michael	20.80 30.59
315817	Bajan Queen	1-1964	Tug Government of Barbados	NET 203.97
315818	Culpepper	2-1964	Tug Government of Barbados 1981 - 1982	70.00 148.97
315819	Calamar	1-1966	Agricultural Development Corporation, Grace Hall Plantation, Christ Church	57.57 136.79
316423	Arckuna	1-1968	Fishing Blair Rampaul, Caroni Savannah Rd, Chaguanas Caroni County, Trinidad	39.20 81.13
316421	Macusi	2-1968	H + H. Ard, Crescent Beach, St. Lawrence Barbados	39.31 84.43

SUMMARY OF VESSELS ENTERED ON BARBADOS REGISTER

OFFICIAL NO.	NAME OF VESSEL DATE INSPECTION 4/11/DATE	REG. NO.	VESSEL CARGO / PAY NAME OF OWNERS FEES DUE	NRT GRT
315820	Privateer	1-1969	Water Sports Abdulhia Debra, Sobers Lane, Bridgetown ✓	22.50 - 25.65
131769	Rione	2-1970	Colony Hotel Limited, St. James ✓	8.96 14.34
343536	Ocean Carib I	1-1972	Fishing Ramroop, B First Street, Cummings Lodge, East Coast, Demerara, Greater Georgetown ✓	59.70 117.14
243537	Ocean Carib II	2-1972	Fishing Ocean Trawlers (West Indies) Ltd, Cockspur House, Bridgetown 1973 1974 § 10 VII	59.70 117.14
343538	Ocean Carib III	1-1973	Fishing as at 45	54.46 109.48
343539	Ocean Carib IV	2-1973	Fishing as at 45	54.46 109.48
343540	Ocean Carrier	3-1973	Ocean Caribbean Ltd, C/o Cockspur House, P.O. Box 143, Bridgetown Barbados	59.15 117.72

SUMMARY OF VESSELS ENTERED ON BARBADOS REGISTER

OFFICIAL NO.	NAME OF VESSEL ANN. INSPECTION Y/N/DATE	REG. NO.	VESSEL CARGO / PAY NAME OF OWNERS FEES DUE	NRT GRT
343541	Barbados	4-1973	Tag Government of Barbados 1981-1989	N/A 232.82
343542	Ann-Lou VI	1-1974	Earl Bryon Clarke Villa Road, St. Michael's 429-3603	15.2 18.76
343543	Barbados 1	2-1974	Fishing International Sea Foods Ltd, Lucas Street, Bridgetown	85 127
343544	Barbados 2	3-1974	Frank Brawley 153 June Drive, Cocoa Beach, Florida 32931 USA	85 127
343545	Barbados 3	4-1974	as at 51	85 127
356406	Barbados 4	5-1974	as at 51	85 127
356407	Barbados 5	6-1974	as at 51	85 127
356408	Barbados 6	7-1974	as at 51	85 127

SUMMARY OF VESSELS ENTERED ON BARBADOS REGISTER

OFFICIAL NO.	NAME OF VESSEL ANN. INSPECTION Y/N/DATE	REG. NO.	VESSEL CARGO / PAY NAME OF OWNERS FEES DUE	NET GRT
356409	Barbados 7	8-1974	as at 51	85 127
356410	Captain: Bowsie	9-1974	Fishing Barbados Fisheries Corp Neil's Plantation, St. Michael	85 127
356411	Heidi Marce	10-1974	Fishing as at 58	85 127
356412	Miss Patsy	11-1974	Fishing as at 58	85 127
346789	La Paloma	13-1974	Isolde Roswitha Cheesman, Hastings, Christ Church	23.9 33.9
356413	Billy Ann	14-1974	David William Hill, Sunshine Black Rock, St. Michael	98.14 241.2
317933	AFLO No 4	15-1974	as at 45	49.3 85.4
317937	AFLO No. 5	16-1974	as at 45	49.3 85.4

Summary of Vessels Entered on Barbados Register

OFFICIAL NO.	NAME OF VESSEL ANN. INSPECTION Y/M/DATE	REG. NO.	VESSEL CLASS / PAY NAME OF OWNERS FEES DUE	NRT GRT
7938	RFCB No. 6	17-1974		49.31 85.46
356414	Ocean Carib V	1-1975	as at 45	60.18 119.75
356415	Ocean Carib VI	2-1975	as at 45	51.27 98.73
356706	Ocean Carib VII	3-1975	as at 45	51.27 98.73
356707	Midnight II	4-1975	Azariah Stoney 49 Border Avenue, Kingston 8, Jamaica	109.48 55.36
356708	Tara-Lee	5-1975	Fishing Henry and Ingrid Meyer, # 49 Acquamarine Drive, Diamond Vale Digo Martin, Trinidad.	85 127
356709	Miss Nina	6-1975	Fishing as at 58	85 127
356710	Captain Antonio	7-1975	Fishing as at 58	85 127

SUMMARY OF VESSELS ENTERED ON BARBADOS REGISTER

OFFICIAL NO.	NAME OF VESSEL ANN. INSPECTION Yr/DATE	REG. NO.	VESSEL CARGO / PAY NAME OF OWNERS FEES DUE	NRJ GRT
356711	Barbados 15	8-1975	as at 51	85 127
356712	X Barbados 16	9-1975	as at 51	85 127
356713	Miss Suzanne	10-1975	Hosch Khan, 99 Tenth Street, Bara Lena, Port of Spain, Trinidad and Tobago ✓ 1981	85 127
356714	Captain Jonathon 1981	11-1975	Gary Tywang, 6 Manner Drive, Westmoorings Gardens, Trinidad ✓ 1981	85 127
356715	Barbados 19	12-1975	as at 51	85 127
356716	Barbados 20	13-1975	as at 51	85 127
356717	X Captain Fernando	14-1975	Fishing Anthony Bassant, #3 1013 Drive, Don Miguel Road, San Juan, Trinidad and Tobago ✓ 1981	

SUMMARY OF VESSELS ENTERED ON BARBADOS REGISTER

OFFICIAL NO.	NAME OF VESSEL DATE OF INSPECTION	REG. NO.	VESSEL CARGO / PAY NAME OF OWNERS FEE DUE	NET GRT
332874	Guyfish I	15-1975	William D. Ince, Redland, St George Barbados	34.72 74.48
356718	Grayac I	1-1977	as at 45	101.98 47.46
356719	Mary Florida	2-1977	Richard Atkinson, Flint Hall, St. Michael Denis Atkinson, The Crene, St. Philip, Challena Jones, Wells Plantation, St. Michael 115.184	57.41 124.754
356720	Angela t	3-1977	Angela Sylvia Hall, Sunnyside, Black Rock, St. Michael	96 218
356721	Fjordbo	1-1979	Earl Bryon Clarke, 38 Gullyfield Avenue, Bayville, St. Michael	84.06 149.54
356722	Strangri La	1-1981	Trevor Holdings Ltd, 'Trevor' Black Rock, St. Michael	23 25
356723	Crispin Wayne	2-1981	Coastal Cruises Jolly Roger Ltd, Pmt 78 Bridgetown Barbados	36 52.61

SUMMARY OF VESSELS ENTERED ON BARBADOS REGISTER

OFFICIAL NO.	NAME OF VESSEL ANN. INSPECTION YR/DATE	REG. NO.	VESSEL CARGO / PAY NAME OF OWNERS FEES DUE	NRT GRT
702092	Stella S-2	4-1982	Plantation Investments (Cayman) Ltd, George- town, Grand Cayman	208.22 427.99
00101	Caricom Express	1-1984	^{Cargo} WISLO, 48150 Sockwell Street, Port of Spain, Trinidad and Tobago	997.85 1599.99
00102	Caricom Enterprise	2-1984	North West Caribbean Shipping Co Ltd, P.O. Box 145 George- town, Grand Cayman, B.S.	665.71 836.92
00103	Caricom Venture	3-1984	as at 92	997.88 1599.99
00104	San Juan	1-1985	^{Fishing} National Fisheries Co. Ltd, Sea Lots, P.O. Box 896 Port of Spain, Trinidad and Tobago.	57.00 98.00
00105	Arima	2-1985	as at 95	57.00 98.00
00106	Diego Martin	8-1985	as at 95	57.00 98.00
00107	Sangre Grande	4-1985	as at 95	61.23

SUMMARY OF VESSELS ENTERED ON BARBADOS REGISTER

OFFICIAL NO.	NAME OF VESSEL ANN. INSPECTION YR/DATE	REG. NO.	VESSEL CARGO / PAY NAME OF OWNERS FEES DUE	NET GRT
00108	San Fernando	5-1985	as at 95	88.76 182.58
00109	Nariva	6-1985	as at 95	88.76 182.58
00110	Caroni	7-1985	as at 95	88.76 182.58
00111	El Dorado	8-1985	as at 95	57.00 98.00
00112	Sasche	9-1985	Fishing Horace Balksh, Rosmie Drive, San Juan, Trinidad Herbert Roberts, Peter Valley, Trinidad	57.00 98.00
00113	Barataria	10-1985	as at 95	61.23 108.09
00114	Atlantis II	1-1987	Sub Aquatics Develop- ment, Corporation, 191 West, 6 Avenue, Vancouver B.C. Canada	14.42 14.67
00115	Yukon II	2-1987	as at 105	25.80 34.41
00116	Secret Love	3-1987	Pleasure Cruises Secret Love Limited Co Corporate Services Ltd, Collingwood Road, St.	12.00 23.00

TABLE - 11

SUMMARY OF SHIPPING VESSELS REGISTERED - ANTIGUA

NAME OF VESSEL	OFFICIAL NO.	GROSS TONS	NET TONS	REGISTRATION DATE	T Y P E	CALL SIGN	REC. NO
AFROESSA IV	1017	25.82	20.74	18/02/81	P		108
ANDESCOL	1030	190.86	120.50	14/08/86	P		117
ANNY VAN HAMBURG	2507	124.00	37.00	09/02/89	P	V2PH	257
ANOMALLY	1043	1.41	0.93	10/04/86	P		130
ANTIGUA BIG DIPPER	7956	147.12	100.04	17/12/78	P		98
ASWAD	1132	2.90	2.20	20/02/89	P		256
BALLY HOO	1041	10.10	5.10	05/03/86	P		128
BIJOU	1139	0.30	0.00	10/07/89	P		290
BRENDA LIZ	6725	149.08	90.42	30/03/83	P		112
BRETT ASHLEY	1076	12.59	11.15	07/10/86	P		138
BUENA FORTUNA	1079	14.00	10.80	07/05/87	P		141
CAMPECHANO	1074	8.78	5.78	23/01/87	P		135
CAPTAIN SAM	1090	55.70	37.88	15/09/87	P		146
CARAMEL	1086	8.92	4.47	21/08/87	P		149
CC & F	1044	1.51	1.07	20/03/86	P		131
CENTILIA SCOTT	1007	47.90	36.20	05/02/80	P		100
CHEKE-DINA	1029	17.93	17.93	01/03/84	P		116
CHERYL KING & BROTHERS	1042	36.11	27.75	25/03/88	P		129
CHRISMIS OF SARK	1123	48.30	42.59	08/06/88	P	V2ZE1	210
CISSOU	1120	1.02	0.00	26/05/88	P	V2ZB1	211
CITY DELL	1020	24.29	14.13	13/10/81	P		109
COCONUT	1022	64.29	51.00	02/07/82	P		110
CON-CIL	2504	276.87	143.69	04/06/88	P	V2FE	221
DABULAMANZI	1097	25.03	22.20	25/11/87	P	V2ZF	151
DANIELA	1089	22.70	22.70	19/05/87	P		148
DANNY BOY	1136	84.00	57.00	05/05/89	P	V2ZR1	280
DENISE E	2592	42.80	32.65	/ /	P		95
DOMINICA	2511	4056.05	2523.86	09/02/89	P	V2FL	258
EDITH M	2588	149.19	74.06	01/01/75	P		93
EDRIS	1046	424.35	275.95	21/05/86	P		133
FALMOUTH BAY	1073	298.88	100.45	14/11/86	P		132
FIRST RUN 2	1104	8.90	5.90	01/03/88	P	V2ZL	189
FREDERICK HUGHES	1012	310.94	160.49	23/06/80	P		105
GIGI SHORTY'S	1028	11.50	9.93	16/01/84	P		115
GOLDEN DRUM	1050	47.25	37.35	24/09/86	P		137
GOLDEN RULE	1047	51.48	15.32	23/09/89	P		114
HELEN J	1040	27.01	10.01	10/03/86	P		127
HODGES BAY 1	1128	0.35	0.00	23/09/88	P	V2ZJ1	237
HYBUR STAR	1131	1071.83	728.75	01/02/89	P	V2ZM1	235
ICILYN	1029	31.69	26.55	07/10/81	P		114
INDEPENDENCE	1077	14.90	7.20	18/04/83	P		139
INGANESS BAY	1011	297.85	156.83	11/08/88	P	V2ZE*	106
IRONA F.	1077	10.17	32.71	23/01/86	P		124
ISE	1019	999.47	717.15	13/06/89	P	V2FR	202
JENNIFER	1092	31.10	17.86	07/10/87	P		147

DEPARTMENT OF MARINE SERVICES & MERCHANT SHIPPING
 P.O. BOX 1052 ST. JOHN'S
 ANTIGUA West Indies

Tele (809) 462 1273 Telex 2179 ANFORT AK Fax (809) 462-2510

NAME OF VESSEL	OFFICIAL NO.	GROSS TONS	NET TONS	REGIST'N DATE	T Y P E	CALL SIGN	REC. NO
JESSICA	2513	996.20	577.77	26/04/89	F	V2FN	265
JOAN S	1028	73.48	56.32	12/07/83	F		113
JOHANNA	2519	996.33	609.39	16/06/89	F	V2PT	197
JOLLY ROGER	1039	96.63	63.49	05/02/86	F		125
KAYGIE-ANN	1033	22.94	16.66	29/11/85	F		119
KENMARE	2500	998.57	669.20	14/01/88	F	V2PA	246
LADY BERNITA	1096	57.68	51.00	23/11/88	F	V2ZD	150
LADY HENRY	2595	56.20	41.60	25/05/78	F		96
LADY MERL	1023	16.73	13.31	14/07/82	F		111
LOAMI M	1009	499.00	290.75	02/02/80	F		102
NISSHINE MARU 53	2590	263.74	102.96	01/06/76	F		94
OCEAN MISTRAL	1108	98.48	91.66	06/04/88	F	V2ZP	190
PATRICIA	2502	1466.26	1086.44	22/04/88	F	V2PC	220
FENELOPE 11	2587	133.01	90.56	21/09/88	F		123
FENELOPE 111	1137	98.00	66.00	05/05/89	F	V2ZS1	281
RANA B	1003	95.13	68.45	29/04/88	F		97
RAVELIN	1081	13.14	12.62	12/05/87	F		143
REEFER MADNESS	1107	0.00	0.00	31/03/88	F	V2ZD	209
REIN DE BEAULIAU	1011	29.93	25.62	03/03/80	F		104
REMONA 11	1084	16.00	16.00	09/06/87	F		145
ROGEN	2505	3505.76	2166.12	12/08/88	F	V2PF	218
SEA HAWK	1034	14.09	8.08	09/12/85	F		120
SEA HUNTER	1098	22.64	19.94	21/12/87	F		152
SEA WIND	1102	59.92	39.08	28/01/87	F	V2ZJ	167
SHADOW HAWK	5172	19.00	15.00	28/02/86	F		126
SHEARLENE B	1006	35.26	24.84	13/08/79	F		99
SIBONEY	1118	2.68	0.00	10/05/88	F	V2ZZ	208
SIGN OF THE DOVE	1075	9.28	0.00	14/01/87	F		136
SONIA J	1035	0.00	0.00	17/12/85	F		121
ST. LUCIA PRIDE	1008	36.02	22.32	16/10/82	F		101
STANLEY B	1141	40.00	27.00	01/09/89	F		293
STANLEY B	1141	40.00	27.00	01/09/89	F		294
TALARIA	1121	45.73	0.00	30/05/88	F	V2ZC1	235
TANGO	1129	6.35	3.85	12/12/88	F		269
THRESHOLD	1031	8.00	7.00	18/06/85	F		245
THRILLER	1088	19.00	17.00	27/08/88	F		236
TURTLE BAY	1078	43.00	35.00	28/04/87	F		140
UNAMAR	2503	499.95	312.61	22/03/89	F	V2FD	217
UNITED BROTHERS	1016	26.00	23.00	28/01/81	F		107
URSULA	2508	699.98	426.48	20/12/88	F	V2FI	69
VERONICA C	1142	24.30	19.00	01/09/89	F		295
WHITE KNIGHT	1082	4.37	2.87	07/04/87	F		144
WILLCW	2501	493.10	297.23	12/08/88	F	V2FB	240
WINCHESTER	1010	59.83	41.31	12/02/80	F		103
WIZARD	1103	12.00	10.00	25/02/88	F	V2ZF	234

DEPARTMENT OF MARINE SERVICES & MERCHANT SHIPPING
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NAME OF VESSEL	OFFI- CIAL NO.	GROSS TONS	NET TONS	REGIST'N DATE	T Y P E	CALL SIGN	REC. NO
YACHT SCALZA	1036	3.42	3.32	20/02/87	F		122
YACHT SIRIUS	1072	69.50	0.00	17/02/87	F		142
*** Total ***		21153.47	13314.19				

TABLE 12

SUMMARY OF SHIPPING VESSELS REGISTERED - ST. VINCENT

TYPE OF VESSEL	NET REG TON	VINCENTIAN OWNED	FOREIGN OWNED	INTER-ISLAND TRADE	REGIONAL TRADE	EXTRA REGIONAL TRADE
Fishing mainly	12.03	Yes	-	Yes	Yes	-
	8.36	"	-	"	"	-
	6.40	"	-	"	"	-
	13.54	"	-	"	"	-
	7.88	"	-	"	"	-
	181.43	-	yes	-	"	yes
	150.78	-	"	-	"	"
	129.72	-	"	-	"	"
	61.17	-	"	yes	"	"
	58.66	-	"	"	"	"
	61.17	-	"	"	"	"
	115.00	-	"	"	"	"
	167.95	-	"	"	"	"
	35.24	-	"	-	"	-
	167.83	-	"	-	"	yes
	157.55	-	"	-	"	"
	433.02	-	"	-	"	"
	9.56	yes	-	yes	"	-
	<u>1777.34</u>					

TYPE OF VESSEL	NET REG TON	VINCENTIAN OWNED	FOREIGN OWNED	INTER-ISLAND TRADE	REGIONAL TRADE	EXTRA-REGIONAL TRADE
Pleasure	3.93	-	yes	yes	yes	yes
	25.03	yes	-	yes	yes	yes
	4.23	yes	-	yes	yes	yes
	1.75	-	yes	yes	yes	yes
	246.46	-	yes	yes	yes	yes
	2.5	-	yes	yes	yes	yes
	5.3	yes	-	yes	yes	-
	266.68	-	yes	yes	yes	yes
	40.57	-	yes	yes	yes	yes
	170.98	yes	-	yes	yes	yes
	103.62	-	yes	yes	yes	yes
	207.26	-	yes	yes	yes	yes
	117.05	-	yes	yes	yes	yes
	12.0	-	yes	yes	yes	yes
	7.32	yes	-	yes	yes	yes
	9.72	-	yes	yes	yes	yes
	19.5	-	yes	yes	yes	yes
	22.0	-	yes	yes	yes	yes
	12.83	-	yes	yes	yes	yes
	8.74	yes	-	yes	yes	yes
	30.91	yes	-	yes	yes	yes
	17.38	yes	-	yes	yes	yes
	401.43	yes	-	-	yes	yes
	1759.92					

TYPE OF VESSEL	NET REG TON	VINCENTIAN OWNED	FOREIGN OWNED	INTER-ISLAND TRADE	REGIONAL TRADE	EXTRA-REGIONAL TRADE
General Cargo	6.03	yes	-	yes	yes	-
and Passenger	30.12	yes	-	yes	yes	-
and Fishing	26.09	yes	-	yes	yes	-
	16.12	yes	-	yes	yes	-
	4.46	yes	-	yes	yes	-
	39.70	yes	-	yes	yes	-
	40.96	yes	-	yes	yes	-
	35.91	yes	-	yes	yes	-
	241.20	-	yes	-	yes	yes
	10.51	yes	-	yes	yes	-
	10.90	yes	-	yes	yes	-
	69.32	yes	-	yes	yes	-
	30.95	-	yes	-	yes	yes
	62.1	yes	-	yes	yes	-
	6.49	yes	-	yes	yes	-
	40.0	-	yes	-	yes	-
	47.24	yes	-	yes	yes	-
	149.51	-	yes	-	yes	yes
	60.39	-	yes	-	yes	-
	209.02	-	yes	-	yes	yes
	35.61	yes	-	yes	yes	-

TYPE OF VESSEL	NET REG TON	VINCENTIAN OWNED	FOREIGN OWNED	INTER-ISLAND TRADE	REGIONAL TRADE	EXTRA-REGIONAL TRADE
General Cargo	199.40	-	yes	-	yes	yes
and Passenger	163.02	-	yes	-	yes	yes
and Fishing	167.97	yes	-	-	yes	yes
	70.10	-	yes	-	yes	-
	113.15	-	yes	-	yes	yes
	89.96	-	yes	-	yes	-
	187.80	-	yes	-	yes	yes
	14.97	yes	-	yes	yes	-
	221.79	-	yes	-	yes	yes
	130.17	-	yes	-	yes	-
	105.19	yes	-	-	yes	-
	121.89	-	yes	-	yes	-
	16.73	yes	-	yes	yes	-
	264.56	-	yes	-	yes	yes
	1.25	yes	-	-	yes	-
	5.8	yes	-	yes	yes	-
	203.24	-	yes	-	yes	yes
	44.69	yes	-	yes	yes	-
	96.47	yes	-	-	yes	-
	45.09	-	yes	-	yes	-
	53.20	yes	-	yes	-	-
	50.58	yes	-	-	yes	-
	179.93	yes	-	-	yes	-
	111.31	-	yes	-	yes	-

TYPE OF VESSEL	NET REG TON	VINCENTIAN OWNED	FOREIGN OWNED	INTER-ISLAND TRADE	REGIONAL TRADE	EXTRA-REGIONAL TRADE
General Cargo	750.95	yes	-	-	yes	yes
and Passenger	11.67	-	yes	yes	yes	-
and Fishing	339.57	yes	-	-	yes	yes
	152.62	yes	-	-	yes	-
	193.12	-	yes	-	yes	-
	49.63	-	yes	-	yes	-
	125.96	-	yes	-	yes	-
	151.36	-	yes	-	yes	-
	2.63	-	yes	-	yes	yes
	99.29	-	yes	-	yes	-
	59.39	-	yes	yes	yes	-
	183.35	-	yes	-	yes	-
	160.94	-	yes	-	yes	-
	190.90	-	yes	-	yes	yes
	24.52	yes	-	yes	yes	-
	103.69	-	yes	-	yes	-
	110.81	-	yes	-	yes	-
	116.85	-	yes	-	yes	-
	60.53	-	yes	-	yes	-
	607.74	-	yes	-	yes	yes
	306.12	-	yes	-	yes	yes
	122.32	-	yes	-	yes	-
	83.50	-	yes	-	yes	-
	126.00	-	yes	-	yes	-
	145.58	-	yes	-	yes	-

TYPE OF VESSEL	NET REG TON	VINCENTIAN OWNED	FOREIGN OWNED	INTER-ISLAND TRADE	REGIONAL TRADE	EXTRA-REGIONAL TRADE
General Cargo	52.56	-	yes	yes	yes	-
and Passenger	264.52	-	yes	-	yes	yes
and Fishing	151.36	-	yes	-	yes	-
	17.71	-	yes	yes	yes	-
	8.48	-	yes	-	yes	-
	73.44	-	yes	-	yes	-
	19.94	yes	-	-	yes	-
	6.53	-	yes	yes	yes	-
	297.53	-	yes	-	yes	yes
	522.14	-	yes	-	yes	yes
	19.08	yes	-	-	yes	-
	95.75	-	yes	-	yes	-
	64.06	-	yes	-	yes	-
	27.24	yes	-	yes	yes	-
	217.36	yes	-	-	yes	-
	49.86	-	yes	-	yes	-
	90.42	-	yes	-	yes	-
	225.58	yes	-	-	yes	-
	16.46	yes	-	yes	yes	-
	522.14	-	yes	-	yes	yes
	148.60	yes	-	-	yes	-
	1.14	-	yes	-	yes	-
	272.46	yes	-	-	yes	yes
	157.50	-	yes	-	yes	-
	513.15	-	yes	-	yes	yes

TYPE OF VESSEL	NET REG TON	VINCENNTIAL OWNED	FOREIGN OWNED	INTER-ISLAND TRADE	REGIONAL TRADE	EXTRA-REGIONAL TRADE
General Cargo	97.08	yes	-	-	yes	-
and Passenger	114.10	yes	-	-	yes	-
and Fishing	559.74	-	yes	-	yes	yes
	325.79	yes	-	-	yes	yes
	193.13	-	yes	-	yes	-
	62.46	-	yes	-	yes	-
	82.25	yes	-	yes	yes	-
	502.68	-	yes	-	yes	yes
	136.77	yes	-	-	yes	-
	147.50	yes	-	-	yes	-
	209.66	-	yes	-	yes	yes
	19.70	yes	-	yes	yes	-
	41.90	-	yes	-	yes	-
	920.51	-	yes	-	yes	yes
	345.66	yes	-	-	yes	yes
	50.90	yes	-	-	yes	-
	109.57	-	yes	-	yes	-
	211.26	yes	-	-	yes	yes
	236.16	-	yes	-	yes	yes
	64.96	yes	-	yes	yes	-
	521.67	-	yes	-	yes	yes
	14.90	yes	-	yes	yes	-

TYPE OF VESSEL	NET REG TON	VINCENTIAN OWNED	FOREIGN OWNED	INTER-ISLAND TRADE	REGIONAL TRADE	EXTRA-REGIONAL TRADE
General Cargo	1400.65	-	yes	-	yes	yes
and Passenger	139.64	-	yes	-	yes	yes
and Fishing	32.39	yes	-	yes	yes	-
	50.35	yes	-	yes	-	-
	600.00	yes	-	yes	yes	-
	120.43	-	yes	-	yes	yes
	10.00	yes	-	yes	yes	-
	67.00	-	yes	yes	yes	-
	240.56	yes	-	-	yes	-
	162.02	yes	-	yes	yes	-
	108.10	-	yes	-	yes	yes
	210.40	-	yes	-	yes	yes
	139.62	-	yes	-	yes	yes
	18.08	yes	-	yes	yes	-
	152.02	yes	-	-	yes	-
	299.29	-	yes	-	yes	yes
	243.90	-	yes	-	yes	yes
	255.95	yes	-	-	yes	yes
	246.02	-	yes	-	yes	yes
	1.22	-	yes	-	yes	yes
	183.60	-	yes	-	yes	yes
	145.88	-	yes	-	yes	yes
	59.25	yes	-	yes	yes	-
	475.56	-	yes	-	yes	yes
	222.50	yes	-	-	yes	-

TYPE OF VESSEL	NET TONNAGE	VINCENTIAN OWNED	FOREIGN OWNED	INTER-ISLAND TRADE	REGIONAL TRADE	EXTRA-REGIONAL TRADE
General Cargo	173.37	-	yes	-	yes	-
and Passenger	46.46	yes	-	yes	yes	-
and Fishing	907.67	yes	-	-	yes	yes
	178.42	yes	-	yes	yes	-
	162.04	yes	-	-	yes	-
	76.00	-	-	-	yes	-
	457.96	-	yes	-	yes	-
	<u>259433.22</u>					

TYPE OF VESSEL	NET REG TON	VINCENTIAN OWNED	FOREIGN OWNED	INTER-ISLAND TRADE	REGIONAL TRADE	EXTRA-REGIONAL TRADE
General Cargo	173.37	-	yes	-	yes	-
and Passenger	46.46	yes	-	yes	yes	-
and Fishing	907.67	yes	-	-	yes	yes
	178.42	yes	-	yes	yes	-
	162.04	yes	-	-	yes	-
	76.00	-	-	-	yes	-
	457.96	-	yes	-	yes	-
	<u>259433.22</u>					