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PROJECT REPORT

STEEL RETENTION STUDY

R-394

FEBRUARY, 1988

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TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

PAGE

Note: Appendices are bound under a separate cover.

1.0 - EXECUTIVE SUMMARY

1.1 - Goals of the Study

The goals of this Steel Retention Study, as set forth in the Request for Proposals are as follows:

The steel retention study will provide information necessary to Allegheny County and the City of Pittsburgh to formulate policies that will guide public investment in support of private efforts to retain those portions of the local steel industry that can be competitive in the foreseeable future. The study is structured to achieve the following goals:

A. Analyze the market dynamics of the steel industry as it affects all major facilities within approximately three hundred miles of Pittsburgh.

B. Identify potential market niches in which local steel facilities could play a sustainable role.

C. Develop an informed conclusion on the capacity of all major steel facilities within the region to effectively compete within the steel markets of the foreseeable future.

D. Identify steel facilities within the region that could fill the potential market niches.

E. Conduct preliminary feasibility analyses of specific public/private projects that could take advantage of opportunities uncovered during the study.

1.2 - Study Approach

This study was undertaken by Arthur D. Little, Inc. and Hatch Associates Consultants, Inc. under separate contracts based on their independent proposals. Neither firm was responsible for the work product of the other, but the two firms kept each other informed of their progress and findings over the course of the effort. This combined report has been produced, as a result of the specific request of the Steel Retention Study Management Committee, from the separate draft reports independently prepared by each of the two consultants.

During the course of the study, both firms met on a regular basis with the Study Management Committee, chaired by Raymond L. Reaves, and its advisor, Mr. Phillip H. Smith, and reported three times to the Study Advisory Committee, chaired by Mr. William Copeland. We would like to express our appreciation for the help and insights which were provided by all of the members of both groups.

1.3 - Findings

1.3.1 - Markets

Steel continues to be the industrial metal used in the largest volume and with the largest dollar value in our economy. However, its total use has not been growing over the past decade, and increasing levels of imports of products such as automobiles and machinery made of steel had reduced the consumption of steel mill products in this period. While changes in the international scene, including the dollar's exchange rate against major European and Japanese currencies may improve the outlook for certain manufacturing sectors, overall growth in the steel mill product demand is projected to be only 1 to 3% per year over the next decade.

The majority of all consumption of steel mill products is in geographical areas which can be served at little or no freight cost disadvantage from a Pittsburgh area location. Except for products made in small, scrap-based steel plants, which are situated in virtually all major consuming areas and are used mainly in the construction industry, consumption of steel products in the market areas which would be targeted by a producer in the Pittsburgh area is much larger than the potential capacity of any single production facility.

However, current supplies are more than adequate to service the available markets, so that a new supplier would have to displace existing sources. Thus, the critical factor in entering the steel business today is not the size of the markets, but the ability of the new entrant to produce at total cost and with levels of product quality which place it in the forefront of the competition.

1.3.2 - Technology

Over the past decade, steel producing firms in the U.S. have achieved major reductions in their costs. Among the most important factors in this effort have been the installation of new equipment such as continuous casting, the total rehabilitation and modernization of selected facilities, the concentration of production at the best and lowest cost operations, and improved productivity of both hourly and salaried employees. It has been as part of this effort that major facilities in the Allegheny County are have been closed. Production equipment in the area's closed steel plants is, with a few notable exceptions, of designs from the 1950s and earlier. Such equipment is costly to operate and incapable of producing product qualities which are acceptable to today's markets. Investments required to bring such facilities up to modern standards are very near those required for completely new facilities, and such spending is difficult or impossible to justify for products which are in an over-capacity condition.

New product and process technologies are creating an evolutionary change in the steel industry. The focus of major developments are reduction of capital costs per unit of capacity, reductions in product cost, and improved abilities of steels to meet customer needs. The existing Pittsburgh-area steel plants do not represent favorable bases for the installation of such technologies because the scale and layout of the existing facilities are based on the high volume production of commodity products which typified the steel industry of the 1940s and 1950s.

1.3.3 - Industry Structure

At the same time, changes in the structure of the steel industry are resulting in the emergence of new types of industry participants-particularly suppliers of materials to other steel companies for further processing, and independent processors of semi-finished materials into finished products. In the Pittsburgh area several such operations already exist - Metaltech in steel galvanizing, and the former LTV Aliquippa structural mill (now J&L Structural) in rolling product from purchased semi-finished steel, for example. In this study we examined the possible operation of the best of the area's facilities on a non-integrated basis, and determined that there is an unmet demand for semi-finished steel slabs. This demand emanates from steel companies which have steel rolling capacities in excess of their own low-cost slab manufacturing capacities. We expect that this demand will increase over the next several years, and will be increasingly met by imports, as domestic producers do not choose to, or cannot afford to, increase steel slab manufacturing capacity. This situation does not exist to the same degree in other semi-finished steel products - blooms and billets, as substantial excess capacity exists in the domestic industry for such products.

1.3.4 - Area Facilities

Steel facilities in the area which could be considered as the basis for a restructured operation are concentrated in four plants: LTV South Works, USX Homestead Works, LTV Aliquippa Works, and Wheeling Pittsburgh Monessen Works. Examination of the facilities and equipment in these plants, in terms of its technological modernity, physical condition, product and competitive capabilities, and its fit with related (upstream-downstream) equipment and the available markets resulted in the determination that the only facility which represents a realistic, potentially viable stand-alone business opportunity is the LTV South Works Electric Furnace steelmaking shop. This facility, with the installation of a new continuous slab caster appears to have the possibility of being a viable supplier of semi-finished steel slabs to steel rolling mills, which are increasingly interested in sourcing a portion of their slab requirements from outside producers.

1.3.5 - Opportunity Concept

The LTV arc furnace shop has the ability to produce up to about 1.7 million tons per year of molten steel. With the investment of approximately $220 million for in-shop upgrading and a continuous slab caster, this plant could produce up to 1.6 million tons per year of steel slabs for sale. There are approximately 10 potential slab customers which are expected to require, in the early 1990s, between 3 and 8 million tons per year more slabs than they can currently produce. Slab sales can be expected to be made primarily on the basis of annual or multi-year contracts with selected users, providing a solid basis for regular operations and income, and reducing the risk to the operation.

Currently, steel slabs are being sold by several domestic producers, notably Bethlehem Steel and U.S. Steel, and by foreign suppliers. At the present time, imports of steel slabs are limited by agreements between the U.S. Government and many foreign governments. Slab users have been unable to meet their demands from the available domestic and foreign supply, and at least five firms have asked for government approval to increase the import allocation under the so-called "short supply" provision. While the current market conditions may change, we believe that there will be a long-term demand for steel slabs based on the changing steel industry structure in the United States and the limited amount of capital spending for steel production by many steel companies.

1.3.6 - Preliminary Feasibility Analysis

We have examined the market prospects, capital costs, production economics, and financial characteristics of the slab venture in our preliminary feasibility analysis. Based on a set of assumptions which appear reasonable at this preliminary stage of analysis, the results are encouraging. Nonetheless, it must be understood that any individual, group, or firm which will seriously consider investing their own funds and raising the necessary debt to undertake this project will need to develop in substantially greater depth than was attempted in this study, the specific project parameters including:

- Capital requirement for acquisition of the site and existing facilities.

- Design and capital cost requirements for the improvements and new facilities, especially the continuous caster.

- The availability and cost of the various grades of scrap which would make up the lowest cost raw materials mix for the product requirements.

- Specific price and volume commitments obtainable from potential slab buyers, including possible price terms for contracts tied to the market price of finished steel products.

- Electricity prices and terms.

- Availability, cost, and employment terms of salaried and hourly labor forces.

  Possible financial structures, including different levels of debt to equity, debt repayment and interest terms, possible benefits of leasing and complete or partial employee ownership.

Each potential investor group will have its own ideas and concepts for many of these factors. The attractiveness of the venture to any investor group depends on its ability to meet the group's financial objectives at an acceptable level of risk.

While all of the parameters of the project listed above have potential impacts on the feasibility of the project, clearly the most critical is the future spread between the cost of suitable scrap (which represents over 60% of production cost) and the price for slabs at which contracts for the output of the venture can be obtained. Historically, prices of scrap and steel products have always been related. We expect this pattern to continue. This relationship represents a possible method for the venture's pattern of earning to be made less variable, through tying slab sales prices to market prices for the finished steel products. However, this can only be confirmed through direct discussions between the potential venture investors and the potential slab buyers.

For this preliminary feasibility analysis we have utilized a series of assumptions which, based on our preliminary analysis of capital costs, operating costs and market conditions, represent a reasonable first view.

- Capital costs include a highly flexible, sophisticated, continuous casting facility estimated to cost substantially more per annual ton of capacity than a number of slab casters recently installed at major plants in the U.S. On the other hand, only a nominal cost has been assumed for the purchase price of the existing facility.

- Operating costs assume the availability of low-cost power and manning levels and employment cost equivalent to modern, efficient, medium-size steel plants. It has been assumed that the new venture would start with a "clean slate" relative to the former LTV operation.

- Scrap costs were assumed to be higher than the average levels of the last three years, when both steel demand and steel prices were depressed, but not as high as in the last three months of 1987.

- The specific scrap mix requirements were not determined; this is an important, location-specific factor which must be determined in a full feasibility analysis.

- Slab prices were assumed to be at a level which was competitive with imported and domestic slab delivered to major potential customers in mid-1987. Prices for both slabs and finished products have been increasing in 1987 and 1988, and the assumed price would appear to be attractive to slab buyers relative to the prices of the products they would manufacture from them.

- All prices and costs in the preliminary analysis were assumed to remain constant over the project life - i.e., no inflation was considered. Inflation, assuming it impacts prices and costs equally, would increase the dollar profitability and reduce the nominal dollar cost of debt repayment.

- Assumptions regarding financial structure are entirely proforma; that is, simple representations of what, in reality, can be very complex. No consideration has been given to minimization of tax liabilities, for example. It has been assumed that debt repayment and interest only begin upon the start of production, which may understate the cash requirements during the construction period.

The principal findings of the preliminary feasibility analysis, based on the assumptions and with the caveats noted above are:

- There are eight to ten potential slab purchasers which are within an acceptable transport cost range which are projected to be seeking 5 to 8 million tons of slab annually within the next several years. Discussions with six of these firms indicated a significant interest, given appropriate price and quality, in contracting for annual or multi-annual slab purchases from a new supplier.

- Existing steelmaking furnaces at the LTV South Pittsburgh Works are relatively modern and in reasonable condition. Installation of an appropriate slab continuous casting machine is possible. Preliminary estimates of capital cost for a very high quality facility for slab production are in the area of $200 to $230 million, for an annual capacity of about 1.6 million tons. This investment is much smaller than would be required for construction of a blast furnace-based steel slab plant of similar capacity.

- Production costs for steel slab, assuming a scrap price of $110 per gross ton (substantially above the average level of the past three years), electricity costs at $.03/kWh as per discussions with Duquesne Light Company, and employment levels and costs patterned after modern, efficient steel operations, are estimated to be under $180 per ton of salable product. This would place the venture in the lowest cost 25% (lower quartile) of all slab producers in the eastern half of the United States.

- Total employment of the venture would be about 410 people after start-up is complete.

- Based on an assumed financial structure with 90% of initial investment coming from loans, a project life of 15 years, and a high level of capacity utilization from the fourth year of operation on, the venture would:

  -- generate an attractive return on the initial equity invested (IRR = 28%);

  -- produce positive net profits beginning in the second year of operations;

  -- generate a cash flow from operations more than twice as large as required to cover its interest and debt repayment requirements from the fourth year of operation onward;

  -- be able to break even on a cash flow base at a production level of approximately 50% of capacity after the third year of operation.

Based on the findings of the preliminary feasibility analysis, we believe this project has a realistic probability of success which warrants the expenditure of efforts by concerned public and private groups to move it forward.

1.4 - Next Steps

Based on the comprehensive market, supply and facilities studies which have been performed, we recommend that the LTV South Works arc furnace concept be the focus of the efforts for reactivation of Pittsburgh area steel facilities and that minimal resources be devoted to the other shuttered facilities in the area.

To move the LTV plant-based venture ahead, it is critical that a group be formed from concerned public agencies and private interests to spearhead the effort. This group would be responsible for taking the necessary actions to identify potential investors and assist them in conducting a detailed feasibility study of the venture. Among the actions for which this group should be responsible in the near-term are the following:

1. A small, high-level group representing the concerned and involved organizations should meet with the appropriate people at LTV Corporation in order to establish a dialogue regarding procedures for interested investors to obtain access to the physical facilities and records of the plant, and ultimately negotiate with LTV for the purchase of the facility.

2. This group should also determine whether there may be hinderances to potential investors which could be overcome through government actions (for example - liens on the facilities, separation of the property into parcels, improvement in access to the plant, etc.).

3. It may be necessary or desirable for an outside consultant to be retained to identify prospective investors and present the results of the preliminary analysis to them in order to encourage their interest in the project.

4. A realistic appraisal of the various types of government assistance available to a private investor group should be undertaken, so that this information is readily available if needed for putting a final package together for an investor.

5. This group should be prepared to obtain or assist in obtaining the legal, financial, business and engineering expertise necessary to move the project forward.

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2.0 - INTRODUCTION

2.1 - Background to the Study

Allegheny County and the City if Pittsburgh have seen significant declines in the levels of steel industry activity in recent years. These declines have created economic hardships and dislocations for workers, businesses, and local governments which have gone far beyond the direct impacts of plant closings. Furthermore, the reduction in steel activity in the region has implications for its future industrial base, which are complex and are not the subject of this Steel Retention Study.

There presently exists in the region both active steel facilities and facilities which are inactive or seriously under-utilized. It is the hypothesis of this study that one or more currently inactive facilities may have the possibility of being reconstituted into viable operating entities under new ownership with different cost structures, objectives, and constraints.

In order to provide Allegheny County and the City of Pittsburgh information necessary for the formulation of policies supportive of potentially successful private-sector efforts to retain or reactivate competitive local steel industry activities, this Steel Retention Study was undertaken. It is the first of two steps, or phases, which constitute the total program. The objective of Phase I is to identify specific opportunities for the reactivation of steel facilities in the local area. The opportunities identified must have a reasonable probability of success based on market demand for the products, potential cost competitiveness of the operation and the likelihood that a private sector firm could be attracted to finance, own, and operate the facility as a viable, long-term business.

If one or more such opportunities is identified in the Phase I study, then the second Phase would be undertaken. The Phase II program would be a feasibility study of the selected opportunity. It would examine in detail the market and sales prospects, capital requirements, (including purchase, facilities construction and/or modernization, and working capital) potential structure of the business (e.g., new private ownership, joint venture, employee/management buyouts, etc.), possible methods of raising necessary financing and financial structures. Upon the completion of the Phase II study, assuming the results are positive, the documentation would be in hand to proceed to attract private sector groups to carry out the implementation of this project.

2.2 - Phase I Study - Purpose and Scope

The purpose of Phase I is to identify realistic and supportable opportunities in the Allegheny County area for restructured steel operations based on existing facilities. This identification and evaluation was based on the economically-serviceable markets for various steel products and the potential ability of a facility in the region to supply that demand and operate as a viable business entity. In order to accomplish this purpose, the Phase I Study examined: a) the demand for semi-finished and finished steel products; b) supply and economics of semi-finished and finished steel products; c) the structure of and participants in the steel business in the relevant geographical and product areas; d) the basis upon which a feasibility opportunity must be able to succeed; and e) the specific facilities in the area which might be the basis for an opportunity. Two separate organizations were retained to carry out this study: Arthur D. Little, Inc. and Hatch Associates Consultants, Inc.

2.3 - Arthur D. Little Study

The Arthur D. Little, Inc. study examined the current demand for steel products by geographical region and product category in order to determine the consumption of products which could be manufactured in an Allegheny County location in the areas which could be economically served from such a location. A total of twelve product groups were examined, representing items which are produced in similar types of facilities. Total market demand was divided into eight regional markets, and for each regional market area consumption of both domestically produced and imported steel was estimated. Based on the costs of delivery from Allegheny County and the locations of other sources of supply, those regions which represent potential markets and their demand levels were established for each product.

Existing domestic suppliers were identified for each product, and their locations and capacities were determined. Those plants which serve the same regional markets as could be served by an Allegheny County producer were analyzed in order to determine the total supply of each product which is potentially available from current producers. The costs of producing each product were estimated for these producers utilizing the ADL Steel Industry Model.

Steel industry developments including changes in plant capacities, technologies and production methods which are underway or committed to by the various producers were included in the above analysis. Other prospective changes have been considered in the development of the analysis of potential opportunities, but must be recognized to have a high degree of uncertainty. For example, the future form, or even existence, of several bankrupt steel firms is unknown, even to the firms themselves at this point. Changes in production and product technologies were also considered, both from the standpoints of the possible opportunities they might represent for a restructured producer and the ability of equipment in existing area facilities to produce cost and quality-competitive products, even with large capital inputs.

2.4 - Hatch Associates Consultants, Inc. Study

Hatch Associates Consultants, Inc. received the assignment of evaluating the steel industry in the Pittsburgh Pennsylvania area, with emphasis on these facilities located in Allegheny County. The objectives of this study were to develop informed opinions on the current state of, and future possibilities for, these steelmaking facilities, and to identify potential market niches that can be served by existing and new or optimized plants.

Data on the facilities and product information developed by Arthur D. Little was updated and reviewed by Hatch Associates. Process equipment of Pittsburgh are facilities was evaluated to establish its ability to compete with other suppliers on the basis of product quality and cost in today's fiercly competitive markets.

Visits to two successful mini-mills, Auburn Steel and Chaparral Steel, were conducted to establish and confirm state-of-the-art operations. Inspection visits and detailed evaluations of major shutdown facilities in the are included LTV-Pittsburgh, USX-Homestead, LTV-Aliquippa and Wheeling Pittsburgh-Monessen.

After the facility review, evaluation and market survey, an in-house task group considered all facility and market information in light of existing and anticipated finishing and semi-finished production facilities within the region. Conclusions were drawn on the capability of each major production facility to compete effectively based on existing supply and demand relationships, as identified by Arthur D. Little. For each market niches, feasibility parameters for a local facility seeking to serve that market were defined, and the ability of existing and potential facilities within the region to serve these market needs were ranked and assessed.

Potential facilities and niches which grew out of contributions from others were considered in light of area capabilities. These included some new product areas and the possible theoretical combination of facilities.

3.0 - MARKETS FOR A PITTSBURGH AREA STEEL PRODUCER

3.1 - National Steel Markets

Steel is the most important structural material in modern economies for the production of a broad variety of consumer, commercial, and industrial products and structures. It far outstrips all other metals combined in the volume of its use. However, over the past decade the demand for steel mill products in the United States has been declining.

There have been many reasons for this decline, ranging from the changing nature of the overall economy which has impacted upon the sectors which consume large quantities of steel, to increased imports of high steel content products such as cars and machinery, change in product design like "downsizing" of automobiles, loss of markets to alternative materials such as aluminum in beverage cans, and increased efficiency in the use of steel itself through better design and improved steel properties. Of course, steel has had its victories as well, gaining increased use in construction products, for example. Nonetheless, steel is now regarded as a mature material and is unlikely to find new, rapidly growing applications in the future. Overall trends in steel product demand in the U.S. are likely to be flat - little or no volume growth - over the next five to ten years. Arthur D. Little is not alone in this belief. In a report to the United Steelworkers of America published in late 1985, another consultant* projected as its base case, that steel demand in the four-year period ending at 1990 would barely exceed that in the 1982-1985 period.

*Confronting the Crises: The Challenge for Labor
Locker/Albrecht Associates, Inc.

3.2 - Steel Product Groups

Products are made by the steel industry in an enormous variety of shapes, sizes and grades for use in thousands of applications. Product group categories usually used in discussing steel typically reflect the type of facilities used for their production and the degree of processing required. For example, structural shapes may be of various sizes, cross sections (beams, angles, channels) or grades (carbon, alloy), but are all produced on structural mills. Most product groups find their major usage in a few end-use markets. For example, ninety percent of all galvanized and other coated sheets are consumed by manufacturers of automobiles and auto parts, construction products (roofing, siding, duct work), or resold through the steel service center and distributor industry. The geographic distribution of consumption of the various product groups varies depending on the concentration of the consuming sectors. Products mainly used in manufacturing continue to be heavily concentrated in America's industrial heartland, the lower Great Lakes states, while those used in construction are spread out more evenly across the nation, although focused in the growing population centers.

Major product groups, their total consumption, and principal end-use markets, are shown in Table 3.2.1. Also shown in this table is the total percentage change in consumption for each product group between 1981 (the last cyclical peak in steel demand) and 1986. As noted, all product groups except for galvanized and coated sheets, wire rods, and stainless steels suffered declines in consumption. Coated sheet demand growth was largely due to increased requirements for rust protection in automobiles, where this product replaced uncoated, cold rolled, steel sheets. Increased consumption of wire rod reflected mainly a change in the structure of the wire industry away from being part of the steel industry so that shipments are now more heavily concentrated in rod and less in wire and wire products. The small increase in stainless steel demand was also primarily due to increased use of stainless steels in the automotive industry, mainly in exhaust system components.

Declines in market demand were particularly severe in products consumed in industries servicing the oil and gas sector, which literally collapsed in 1982, in railroad products, and in the container markets where tinplate sheets for cans continue to face intense inter-material competition and changing consumer packaging preferences.

X TABLE 3.2.1

STEEL PRODUCT SUMMARY

Product Group	1986 US Demand (mill. tons)	Percent of Total Steel	Principal End Use Markets	Percent Change in Producer Shipments 1981-1986
Cold Rolled Sheet	15.9	19	Autos, Appliances	-10
Hot Rolled Sheet	14.3	17	Pipe-makers, Autos	- 9
Galvanized Sheet	11.4	13	Auto, Construction	+36
Hot Rolled Bars	6.6	8	Auto, Construction	-18
Structural Shapes	6.5	8	Construction	-14
Pipe and Tubes	5.1	6	Oil & Gas, Construction	-72
Wire Rods	4.9	6	Wire Makers, Construction	+14
Reinforcing Bars	4.5	5	Construction	- 7
Plates	4.3	5	Construction, Machinery	-52
Tin Plate Sheets	3.8	4	Containers	-21
Railroad Rails	0.8	1	Railroads	-52
Stainless Steels	1.6	2	Auto, Construction	+ 2

Sources: American Iron and Steel Institute Annual reports, U.S. Dept. of Commerce

3.3 - Geographic Target Markets

A steel producer markets its products mainly in areas which can be served at a level of transport costs which allow the firm to be price competitive at customers' plants while maintaining an acceptable level of profit. Because the steel business is intensely competitive, buyers typically expect their steel suppliers to meet competitors' delivered steel price plus delivery costs, and to the extent that any supplier has a higher freight cost, it is expected to absorb that part of freight cost necessary to "equalize" the delivered cost to the customer. This results in a very complex mix of freight costs to be absorbed by the steel producer, and depending on its ability to market steel close to its plant, a varying level of marketing effort further away is required. In this era of transportation industry deregulation, there is also the possibility for many special freight deals, often depending on, for example, equipment available for backhauls which would otherwise be empty. Examples of freight rates and ranges of freight equalization required for a Pittsburgh area producer for steel products are shown in Table 3.3.1. Target markets for a Pittsburgh-area steel producer will vary by product, depending upon the location of the consumers, the locations of the competing suppliers, the transport modes and rates available, and the manufacturing profit margins at the producing location.

We have examined the consumption patterns for steel products in each of eight geographical regions and have found that for the purpose of defining the potential markets for a Pittsburgh-area plant we can use just four regions. The original eight and final four areas are shown in Exhibits 3.3.1 and 3.3.2 and Table 3.3.2.

Based on a combination of information on freight costs from Pittsburgh, locations of other suppliers, and on our understanding of the patterns of marketing of current suppliers of the different product groups, we have developed the areas which we believe should be considered as representing potential markets for a Pittsburgh-area producer, and the consumption in each area. These are shown in Table 3.3.3.

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TABLE 3.3.1

STEEL PRODUCT FREIGHT WEIGHTS

PITTSBURGH TO VARIOUS DESTINATIONS

1986 - $/TON

Region/City	Lowest Published Rate Truck or Rail	Lowest Potential Negotiated Rate	Range of Freight Equivalization Cost
Middle Atlantic			
Buffalo	14	13	None
Philadelphia	25	19	0-10
Metro New York	29	20	0-10
New England			
Boston	40	29	10-20
Metro New York	29	20	0-10
East North Central			
Cleveland	11	11	None
Detroit	17	16	0-10
Dayton	16	14	0-10
Indianapolis	19	17	0-10
Chicago	22	20	0-10
South			
Baltimore	17	16	0-10
Charlotte	28	27	0-20
Atlanta	32	31	10-20
Birmingham	32	23	0-10
Nashville	27	22	0-10
New Orleans	42	36	10-20
Louisville	20	20	0-10

Source: USX Traffic Department

EXHIBIT 3.3.1
ORIGINAL GEOGRAPHIC MARKET AREAS
(% of 1986 Steel Consumption)

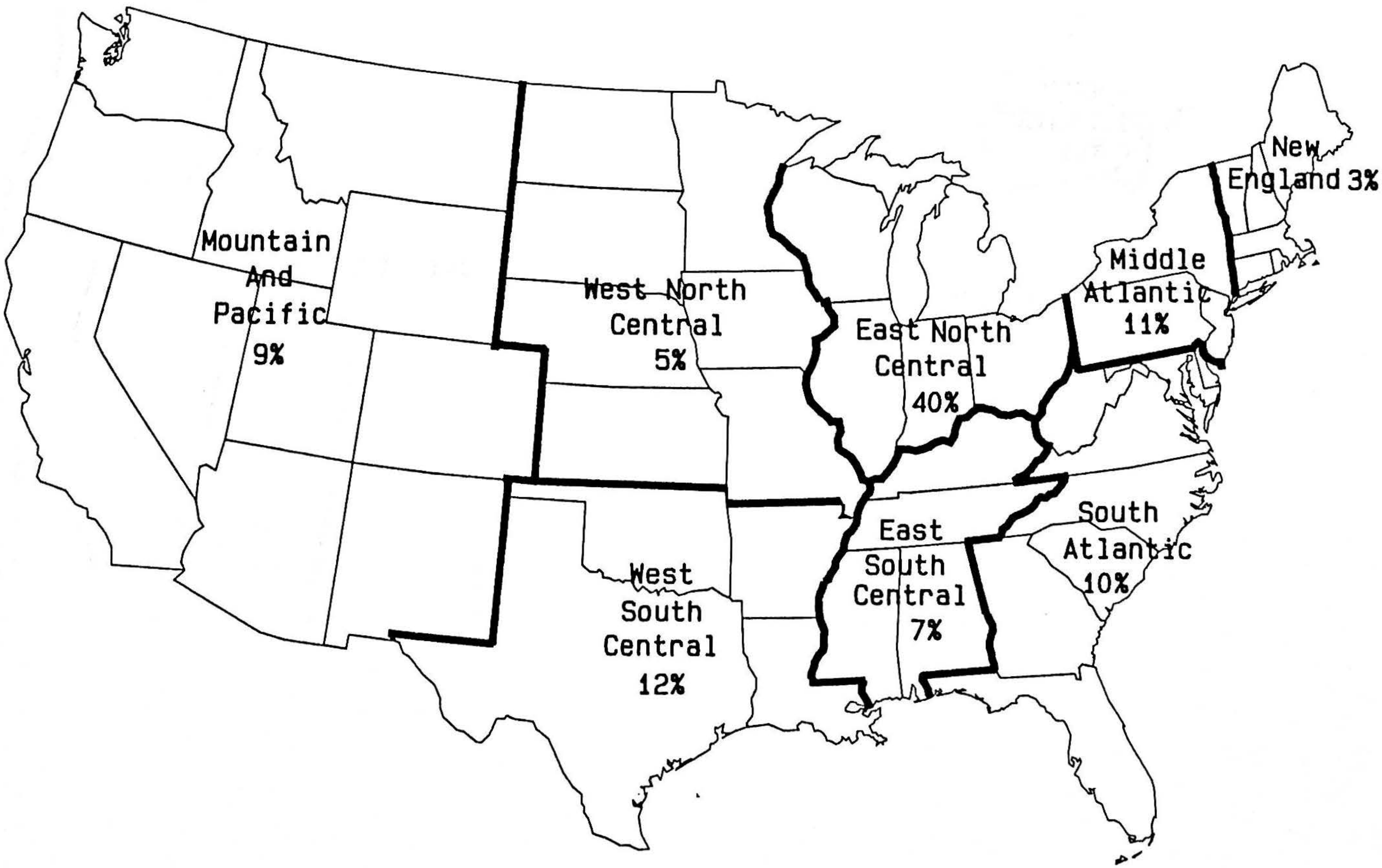


EXHIBIT 3.3.2
TARGET MARKET AREAS
(% of 1986 Steel Consumption)

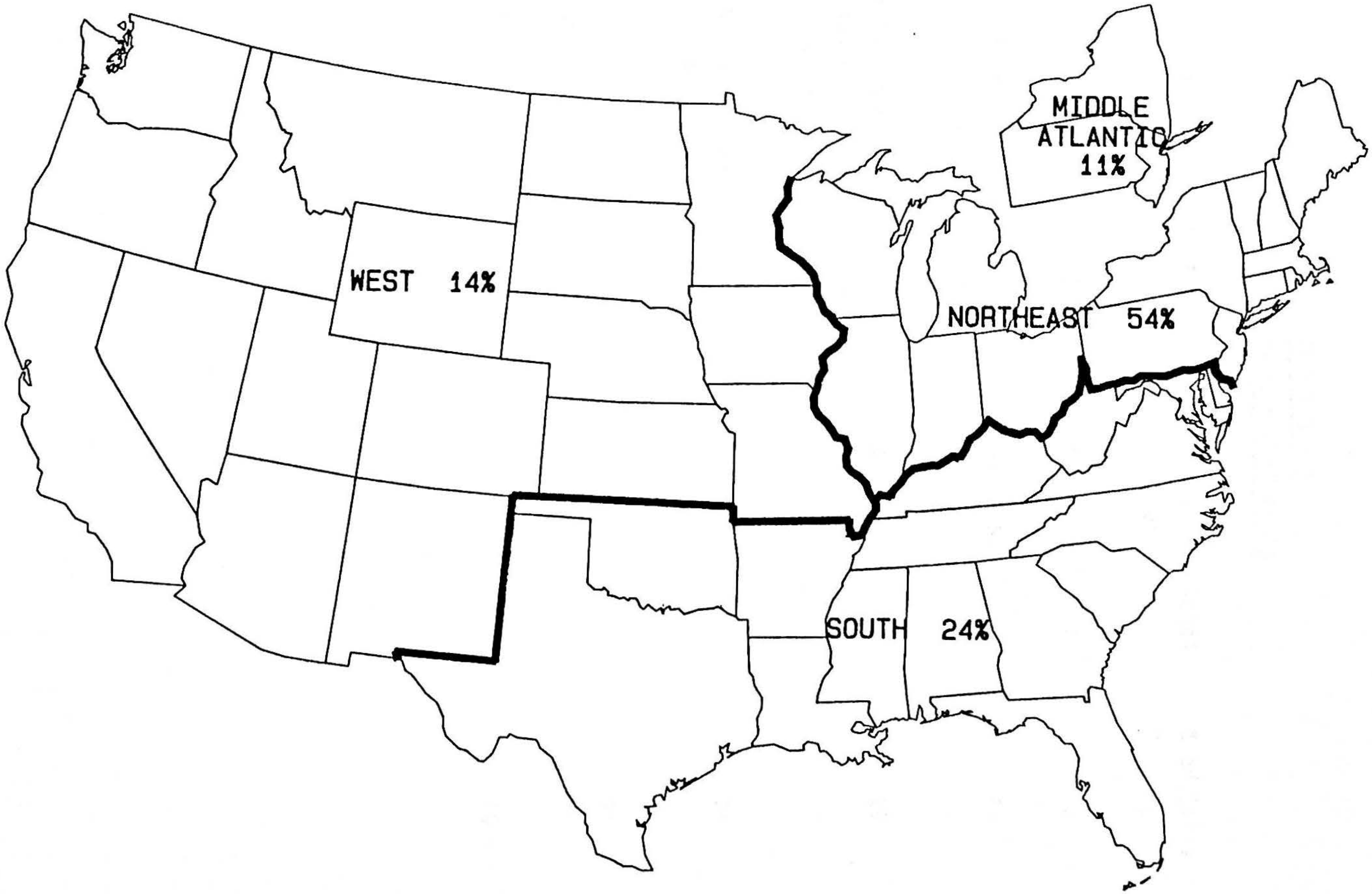


TABLE 3.3.2

GEOGRAPHIC MARKET AREAS

Original Regional Divisions	% of Steel Consumption	Revised Regional Divisions	% of Steel Consumption
Middle Atlantic	11	Middle Atlantic	11
New England	3	Other Northeast	43
East North Central	40		
South Atlantic	10	South	29
East South Central	7		
West South Central	12		
West North Central	5	West	14
Mountain & Pacific	9		
	97		97
Unknown	3		3
U.S. Total	100%		100%

TABLE 3.3.3

TARGET MARKET AREAS FOR A PITTSBURGH MILL

Product Group Areas	Areas	1986 Consumption (million tons)	% of Total Consumption Located in Target Market
Cold Rolled Sheet	MA, other NE, South	13.5	85
Hot Rolled Sheet	"	11.7	82
Galvanized Sheet	"	8.8	77
Hot Rolled Bars	MA, other NE	3.6	55
Structural Shapes	MA, other NE, South	3.7	57
Pipe and Tube	"	2.4	47
Wire Rods	MA, other NE	1.9	39
Reinforcing Bars	MA	.4	9
Plates	MA, other NE, South	2.7	63
Tin Plate Sheets	"	2.7	71
Railroad Rails	All	0.7	100
Stainless Steels	MA, other NE, South	1.3	81
All finished products		53.4	

Source: ADL Estimates

The proportions of U.S. consumption which would be served from a Pittsburgh-area location represent high percentages of U.S. demand for almost all products. The center of the manufacturing sector of the economy continues to be in the midwest industrial states from Ohio to Illinois, with growing activity in the areas along the Ohio, Mississippi, and Tennessee River waterways. Construction activity, particularly for the commercial and industrial sectors which use most of the steel products, is less concentrated than manufacturing, but still primarily taking place in the heavily populated eastern half of the country.

We have taken an aggressive position on the market areas which could be served from a Pittsburgh area location, recognizing that while, perhaps, business done with customers at the fringes of the area would not be as profitable as customers closer to the plant site, the reality is that every steel producer does have a mix of customer locations, and that we should not ignore the potential in areas closer to the competition, as they do not ignore customers in our area.

Exhibits 3.3.3 through 3.3.14 summarize the characteristics of each product group, the markets which consume them, and the potential target markets for a Pittsburgh-area producer.

The potential markets for each product group are large relative to the capacity of a single modern production facility. Therefore, given an appropriate level of product quality and cost relative to the market price and the costs of competitive producers, it is possible that a revitalized Pittsburgh facility could find a base of customers within the market area.

EXHIBIT 3.3.3
STEEL PRODUCT MARKETS

1. Product Category

   Cold rolled sheet and strip

2. Product Description

   Thin, flat steel sheets with smooth surface finish produced from hot rolled sheet by further rolling at room temperature and appropriate finishing.

3. Markets Served

   Cold rolled sheet is used in applications where surface appearance is important, such as automotive, appliance, and metal furniture, and in other applications where the formability and strength of cold rolled materials is required.

Major customers of steel mills are:	%
Auto and auto parts producers	30
Service centers and distributors	30
Appliance producers	10
Electrical equipment manufacturers	8
Commercial equipment producers	5
Shipping drums and pails	5

4. Geographic Distribution

	Tons	%
Northeast	11,190,000	70
South	2,260,000	15
West	2,216,000	15

5. Potential Market for Pittsburgh-area Producer

   Northeast and South - 13,450,000 tons

   Current import share - 23%

6. Recent Developments and Special Situations

In the automotive sector, which is the largest market for cold rolled, over 80% is used by the big auto companies and only 20% by independent suppliers. In appliances, cooking, refrigeration, and laundry products each use about 30%. Cold rolled faces heavy concentration of buyers, and consequently intense price, quality, and service competition.

EXHIBIT 3.3.4

STEEL PRODUCT MARKETS

1. Product Category
   Hot rolled sheet and strip

2. Product Description

   Thin, flat steel sheets in cut pieces or coils, produced off hot rolling mills. Includes product further processed by surface cleaning (pickling) and trimming to size.

3. Markets Served

   Hot rolled sheet is used for the production of other steel products such as welded pipe and tube and cold rolled sheet. It is also a major material for producers of auto parts, storage tanks and bins and component for the construction and machinery industries.

Major customers of steel mills are:	%
Steel service centers and distributors	40
Independent pipe, tube, and sheet producers	25
Auto companies and parts producers	15
Construction products companies	5

4. Geographic Distribution

	Tons	%
Northeast	10,180,000	73
South	1,560,000	11
West	2,280,000	16

5. Potential Market for Pittsburgh-area Producer
   Northeast and South - 11,740,000 tons
   Current import share - 16%

6. Recent Developments and Special Situations

Hot rolled sheet is used as a structural, rather than an appearance item. Over half of its use in the automotive sector is by independent parts fabricators.

EXHIBIT 3.3.5

STEEL PRODUCT MARKETS

1. Product Category

   Galvanized and other coated sheet

2. Product Description

   Cold rolled sheets coated with zinc or other corrosion-resistant materials. (This category excluded tin-coated steels.)

3. Markets Served

   Galvanized steel sheets are used in applications where corrosion is a problem, such as in certain parts of autos, appliances and in construction products exposed to the weather or condensation.

Major customers of steel mills are:	%
Auto and auto part producers	35
Construction products firms	25
Steel service centers and distributors	30

4. Geographic Distribution

	Tons	%
Northeast	7,040,000	63
South	1,750,000	15
West	2,410,000	22

5. Potential Market for Pittsburgh-area Producer

   Northeast and South - 8,790,000 tons

   Current import share - 18%

6. Recent Developments and Special Situations

Galvanized and other coated steel have grown in use as corrosion resistance in cars in particular has become a priority for the auto industry. Electrolytic processes for applying zinc and zinc alloys to steel have been recently installed by all of the major steel sheet producing firms.

EXHIBIT 3.3.6

STEEL PRODUCT MARKETS

1. Product Category
   Hot rolled bars

2. Product Description

   Bars are long products which are round, square, rectangular or, to a minor degree, other shapes in cross section. They are used in carbon steel (80%) and alloy steel (20%). (This category does not include reinforcing bars which are considered separately.)

   Bars are produced to standard specifications for use in construction, fabrication, and many manufacturing applications.

   They are produced to customer-specific specifications for particular, engineered manufacturing uses.

3. Markets Served

   Bars are used in perhaps the broadest range of market of any steel product, and are sold in volume both direct to users and to service centers and distributors.

Major customers of steel mills are:	%
Steel service centers and distributors	35
Automotive and auto parts producers	20
Construction and construction products	15
Bar convertors	10
Forging companies	5
Machinery and industrial equip. mfgrs.	5

4. Geographic Distribution

	Tons	%
Northeast	3,610,000	57
South	950,000	15
West	1,810,000	28

5. Potential Market for Pittsburgh-area Producer

Northeast - 3,610,000 tons
Current import share - 10%

6. Recent Developments and Special Situations

Bar products fall into two main categories: merchant and special bar quality. Merchant bar, used largely in construction products and fabrications, is purely a commodity and mainly provided by mini-mills. Special bar, which includes most alloy bar, is used in forgings and machined parts in the automotive, industrial machinery and related markets. While much of the special bar is still made by the integrated and specialty sectors of the steel industry, the more advanced mini-mills are beginning to make significant inroads.

EXHIBIT 3.3.7

STEEL PRODUCT MARKETS

1. Product Category

Heavy structurals, including piling

2. Product Description

Wide-flange beams, I-beams, angles, channels, and other miscellaneous hot rolled shapes. Includes all such products with any one dimension of 3 inches or larger. Products are virtually all produced to standard specifications.

3. Markets Served

Products are consumed mainly (over 90%) in construction of buildings, civil works, and industrial and utility plant. Minor uses include transport equipment (truck and trailer, rail car, ships and barges), oil and gas equipment (drill rigs, including offshore), and industrial equipment.

Customers of steel mills are:	%
Construction fabricators and contractors	70
Service centers and distributors	25
Transportation and industrial equip. manuf.	5

4. Geographic Distribution - 1986

	Tons	%
Northeast	2,020,000	31
South	1,728,000	26
West	2,483,000	38

5. Potential Market for Pittsburgh-area Producer

Northeast and South - 3,748,000 tons
Current import share - 29%

6. Recent Developments and Special Situations

Structural shape demand is primarily dependent on the level of non-residential construction. New product development is minimal. Building codes restrict rate of potential change, although improvements in engineering design have reduced weight of steel in highrise structures. Mini-mills have become a major competitive factor in medium-size structural shapes and are moving into all but the largest sizes of beams.

EXHIBIT 3.3.8
STEEL PRODUCT MARKETS

1. Product Category
   Pipe and tubing

2. Product Description

   Includes pipes used for plumbing and heating, fluid transmission in factories and plants, long distance transmission of gas and oil (pipelines), oil and gas well pipes, and pipes and tubes used for structural components and for manufacturing mechanical parts.

3. Markets Served

   Major users of pipe and tube are the construction industry, oil and gas industry, automotive producers and their suppliers, and industrial machinery companies.

Major customers of steel mills are:	%
Service centers and distributors	34
Oil and gas	31
Industrial machinery	8
Automotive	5
Construction and Building Products	4

4. Geographic Distribution

	Tons	%
Northeast	1,840,000	32
South	600,000	11
West	2,900,000	51

5. Potential Market for Pittsburgh-area Producer

Northeast and South - 2,440,000 tons
Current import share - 51%

6. Recent Developments and Special Situations

Overall demand for pipe and tube continues to be depressed because of low levels of oil and gas drilling activity. Welded pipe has taken over many applications formerly served by seamless pipe. Low priced imports are a major market factor in standard types of pipe used for plumbing and mechanical applications. Large excess pipe capacity abroad has resulted in intense import competition in these products.

EXHIBIT 3.3.9

STEEL PRODUCT MARKETS

1. Product Category

   Wire Rod

2. Product Description

   Wire rod is a round, small-diameter (7/32" to 1/2") material used as the raw material for production of wire. While some steel producers make wire, a large and increasing proportion of rod is sold to independent wire producers. Over 95% of all wire rod is in carbon steel grades.

3. Markets Served

   Wire rod is sold to producers of wire and wire products, and producers of wire items used in the construction, automotive, industrial equipment and industrial equipment industries, and to producers of furniture and bedding and farm products. Major uses include reinforcing mesh, bolts and screws, welding wire and rods, furniture and mattress springs, and fencing.

Major customers of steel mills are:	%
Independent wire producers	50
Construction products manufacturers	25
Auto parts producers	4
Furniture and bedding producers	4
Industrial and welding materials	8
Agricultural products	3

4. Geographic Distribution

	Tons	%
Northeast	1,860,000	40
South	1,160,000	25
West	1,530,000	35

5. Potential Market for Pittsburgh-area Producer

Northeast - 1,860,000 tons
Current import share - 28%

6. Recent Developments and Special Situations

Over the last ten years mini-mills have almost completely taken over the wire rod markets in the U.S. except in selected, small volume specialties where imports are highly competitive.

EXHIBIT 3.3.10

STEEL PRODUCT MARKETS

1. Product Category

   Reinforcing bars

2. Product Description

   Bars used for reinforcing of concrete in construction. Products range from about 3/8" up to 2-" in diameter, with the vast bulk in sizes under 1". All are in carbon steel.

3. Markets Served

   Reinforcing bars are sold almost exclusively to businesses which cut, bend, and prepare bars for placement on the construction site.

Major customers of steel mills are:	%
Rebar fabricators	95
Steel service centers and distributors	5

4. Geographic Distribution

	Tons	%
Northeast	1,210,000	17
South	1,500,000	34
West	1,750,000	39

5. Potential Market for Pittsburgh-area Producer

   Northeast - 1,210,000 tons
   Current imports share - 10%

6. Recent Developments and Special Situations

Rebar is now supplied almost exclusively by the mini-mill sector, and is the lowest in price of all steel products.

Demand varies with construction activity and can be very different from region-to-region in a given year. Mills may offer rebar at special rates outside their normal marketing area when local demand is poor.

EXHIBIT 3.3.11
STEEL PRODUCT MARKETS

1. Product Category

   Plates

2. Product Description

   Includes flat steel products over 3/16" in thickness in rectangular shapes. About 75% of demand is for product under 1-" thick and under 96" in width. Carbon steel accounts for about 85% of demand, high strength low alloy steel about 10%, and alloy steel about 5%.

3. Markets Served

   The largest uses for steel plates are in the construction of civil works and industrial plants and equipment. Storage tanks and process vessels, bridges, and boilers are particularly important. Plates are also consumed in the railroad equipment, ship, barge, and marine equipment, and off-highway equipment industries. Plate is used to make large pipes for oil and gas pipelines.

Major customers of steel mills are service centers are:	%
Service centers and distributors	40
Construction fabricators and contractors	20
Industrial equipment manufacturers	15
Ship, barge, and marine equipment producers	5
Railway equipment producers	4
Pipe producers	3

4. Geographic Distribution

	Tons	%
Northeast	1,993,000	46
South	690,000	16
West	1,312,000	31

5. Potential Market for Pittsburgh-area Producer

Northeast and south - 2,683,000 tons
Current import share - 23%

6. Recent Developments and Special Situations

Plate demand has been depressed due to lack of activity in capitol spending by heavy industry (steel, oil, chemicals), utilities, and transportation. Low plate prices have forced producers to reduce production costs and idle excess capacity.

There are no new market or product developments occurring which will create major new areas of demand in the near future.

EXHIBIT 3.3.12

STEEL PRODUCT MARKETS

1. Product Category

Tin-mill products

2. Product Description

Included tin-plated steel sheets, tin-free (chrome-chrome oxide coated) steel sheets, and thin, uncoated steel sheets in thicknesses normally produced for tin coating (tin-mill blackplate).

3. Markets Served

Principle market is the production of cans and containers for food, beverages, and general packaging (paints, toiletries, household products). Tin mill products also find uses in many applications where thin, formable sheet is required such as oil filter bodies for cars, and light-duty housewares.

Major steel industry customers are:	%
Container producers	82
Steel service centers and distributors	10
Auto parts, utensils and housewares	3

4. Geographic Distribution

	Tons	%
Northeast	1,890,000	50
South	770,000	20
West	1,170,000	30

5. Potential Market for PIttsburgh-area Producer

Northeast and South - 2,660,000 tons
Current import share - 12%

6. Recent Developments and Special Situations

Markets for steel in cans continue to decline due to changes in eating patterns and competition from other materials (aluminum, glass, plastics).

EXHIBIT 3.3.13
STEEL PRODUCT MARKETS

1. Product Category

   Railroad rails and accessories

2. Product Description

   Rails and tie plate for new and replacement use by railroads and, to a very minor degree, industrial and mining firms for in-plant use.

3. Markets Served

Markets Served	%
Railroad companies	95
Distributors	5

4. Geographic Distribution

	Tons	%
Northeast	230,000	30
South	145,000	20
West	360,000	50

5. Potential Market for Pittsburgh-area Producer

   Total U.S. market - 740,000 tons
   Current import share - 43%

6. Recent Developments and Special Situations

   Market for rail and accessory is very depressed due to lack of capital spending and extensive abandonment of lines. New rail is mainly used in mainline applications. Demand for rail in long lengths and with special wear-resistance has become increasingly important. Import volume has not declined as rapidly as domestic shipments, resulting in a high import share.

EXHIBIT 3.3.14
STEEL PRODUCT MARKETS

1. Product Category

   Specialty Steel

2. Product Description

   Includes stainless steel, high temperature resistant alloy steel, and alloy tool steel in all forms.

3. Markets Served

   Major uses of specialty steels are applications where resistance to corrosion and wear is demanded. The operating environment may be severe, or appearance may be critical. Major applications are in auto exhaust components, food and beverage equipment, chemical industry piping and vessels, and in metalworking tools.

Major customers of steel mills are:	%
Service centers and distributors	47
Auto and auto parts producers	16
Pipe and strip makers	15
Construction and building products	4
Appliances and utensils	3

4. Geographic Distribution

	Tons	%
Northeast	1,058,000	63
South	235,000	14
West	393,000	23

5. Potential Market for Pittsburgh-area Producer

Northeast and South - 1,293,000 tons
Current import share - 20%

6. Recent Developments and Special Situations

Over 80% of the demand is in flat rolled products (sheet, strip, plate). Demand growth in recent years has been mainly due to increased stainless use in auto exhaust systems and service industry equipment (health care, food service).

4.0 - SUPPLY AND COMPETITION IN STEEL PRODUCTS

The major components and process steps in the steelmaking process are illustrated in figure 4.1.1. The first step in the process is the conversion of raw materials (iron ore, coal, etc.) to molten iron. Coal, a major raw material, is converted into coke in the coke ovens and then charged with iron ore and limestone into a blast furnace to remove impurities from the ore and reduce it to molten iron. Molten iron and steel scrap are then charged into a basic oxygen furnace (BOF) or a open hearth furnace where oxygen and other elements are added to further reduce the impurities and create molten steel.

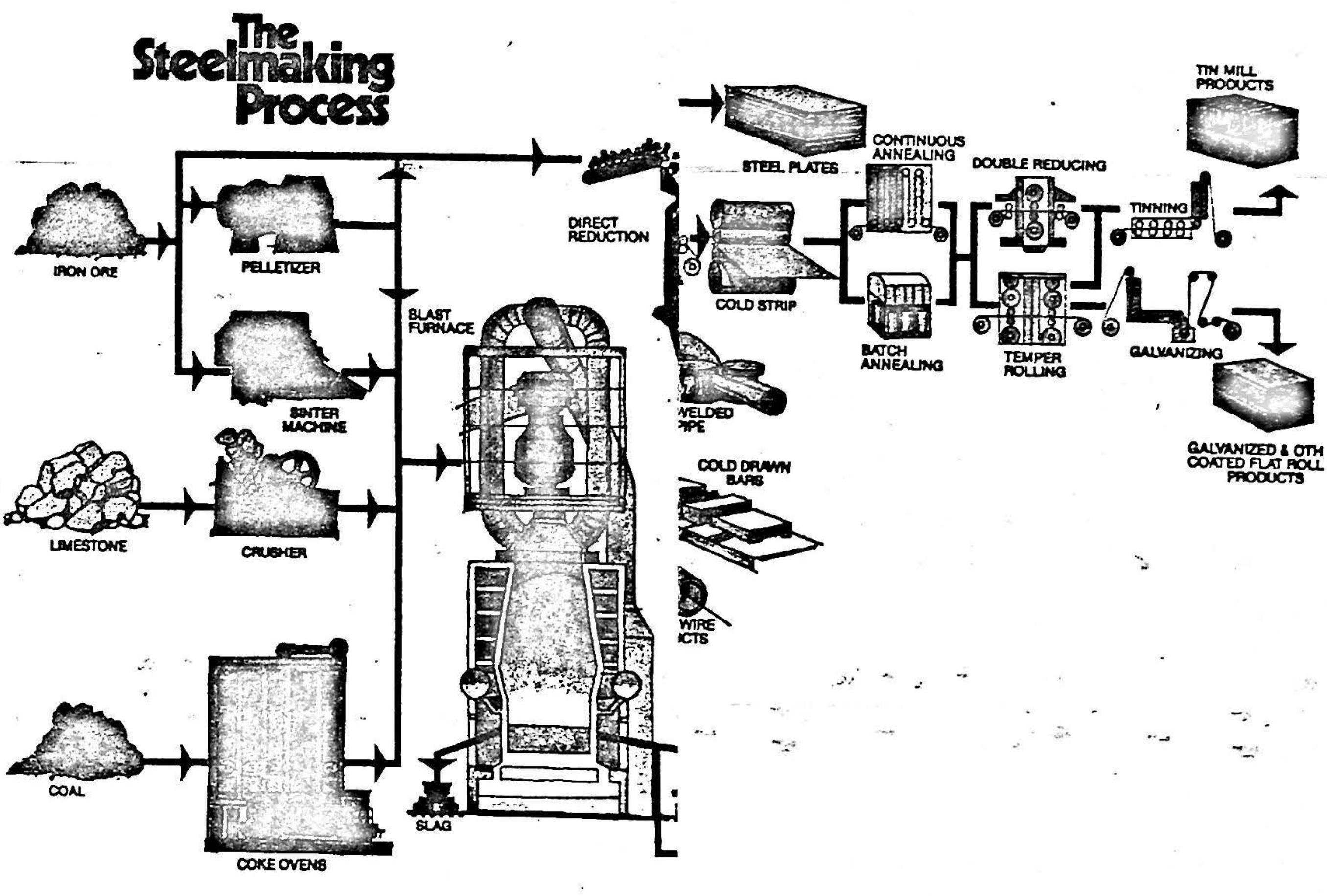
Another method of making molten steel is in an electric arc furnace (EAF) in which the primary raw material used is scrap.

Initially EAFs were used to make alloy, stainless, tool and specialty steels, products typically produced in smaller quantities, but have since been developed in size and capability to produce high tonnages of carbon steel also.

Direct Reduced Iron (DRI) is produced by one of many direct reduction processes in which ore is reduced to pellets rich enough in iron content to be used as a metallic charge in the EAF. DRI can be used in the EAF as a scrap substitute when scrap supplies are short or in combination with lower quality scrap.

Molten steel from the BOF, EAF or open hearth furnace is then tapped (poured) into ladles and then tapped into molds to form ingots or is continuously cast into semifinished products such as slabs, billets or blooms. In the ingot process the molten steel is solidified in cast iron molds, then stripped from the molds and placed in furnaces called soaking pits until they reach a uniform temperature throughout. The steel ingots are then rolled to the semifinished product in a roughing mill. A small percentage of ingot steel is formed in forging presses to make large shafts for power plants, nuclear plant components and other products.

FIGURE 4.1.1


The Steelmaking Process
IRON ORE
PELLETIZER
SINTER MACHINE
LIMESTONE
CRUSHER
COAL
COKE OVENS
BLAST FURNACE
SLAG
DIRECT REDUCTION
STEEL PLATES
COLD STRIP
CONTINUOUS ANNEALING
BATCH ANNEALING
DOUBLE REDUCING
TEMPER ROLLING
TINNING
GALVANIZING
TIN MILL PRODUCTS
GALVANIZED & OTH COATED FLAT ROLL PRODUCTS
COLD DRAWN BARS

An alternative to the ingot process is the forming of molten steel into semifinished shapes by continuous casting. In this process the molten steel is formed into the semifinished product by pouring the steel through a water cooled mold. As the liquid steel exits the mold the outer surface of the shape forms a skin. The steel continues to harden as it is cooled in the caster spray cooling system. The continuous length of steel is then cut to desired lengths. The semifinished product is then sent to a rolling mill where it is formed into the finished product. Slabs are the wide semi-finished product used to produce sheets, strip, plate and other flat rolled steel products. Blooms are large and mostly square in cross section and are primarily used to roll large structural shapes and rails. Billets are also mostly square but longer and smaller than blooms. They are used to produce bars, pipes, wire rods and smaller structural shapes. These finished products can then go through a cold finishing process such as annealing, galvanizing, cold drawing, etc.

4.1 - Introduction

As noted, consumption of steel products is concentrated in the geographic area which could be served from a Pittsburgh location. Steel production and production capacity is, to an even larger degree, concentrated in this same area. Furthermore, steel producing capacity at presently operating plants is in excess of current and projected market demand in virtually every product group.

As can be seen in Table 4.1.2, in 1970, Pennsylvania led the nation in raw steel production, producing 30 million tons which was 22.8% of the total domestic production in that year. In that same year, Indiana was the second largest steel producing state with over 18 million tons which totaled 14.1% of the domestic production. During the period from 1975 through 1981 inclusive, Pennsylvania's share of the total domestic raw steel production in the United States dropped from 22.1% to 19.9% and Indiana's share increased from 17% to 18.7% . Even though this change

X

Table 4.1.2

RAW STEEL PRODUCTION BY STATES (1970-1985)
(PERCENTAGE OF NET TONS)

STATES	1985	1984	1983	1982	1981	1980	1979	1978	1977	1976	1975	1974	1973	1972	1971	1970
NEW YORK	0.5%	0.6%	1.5%	1.9%	2.6%	2.4%	3.0%	3.1%	3.2%	3.7%	2.9%	3.8%	4.2%	3.1%	3.6%	4.4%
PENNSYLVANIA	13.6%	15.5%	15.4%	14.6%	19.9%	21.0%	20.7%	20.5%	20.5%	20.9%	22.1%	23.0%	22.5%	22.8%	23.0%	22.8%
R.I., CONN., N.J., DEL., MD.	5.2%	5.5%	4.7%	5.4%	4.8%	4.6%	4.9%	4.6%	4.2%	4.6%	4.4%	4.7%	5.0%	4.7%	5.8%	6.3%
VA., W.VA., GA., FLA., N.C., S.C., LA.	7.1%	6.8%	6.2%	6.6%	5.4%	5.4%	5.0%	4.7%	4.4%	4.2%	4.1%	3.9%	3.8%	4.2%	3.8%	3.5%
KENTUCKY	2.6%	2.5%	2.2%	1.9%	2.0%	1.9%	1.8%	1.8%	1.8%	1.7%	1.8%	1.9%	1.8%	1.8%	1.9%	1.8%
ALA., TENN., MISS., ARK.	4.2%	2.8%	1.7%	2.0%	3.0%	3.1%	3.3%	3.1%	3.2%	3.2%	3.7%	3.3%	3.2%	3.6%	3.8%	3.8%
OHIO	16.0%	16.7%	17.2%	16.3%	15.0%	14.4%	15.5%	15.5%	17.1%	17.5%	16.8%	17.3%	17.6%	17.9%	16.7%	16.5%
INDIANA	22.3%	21.4%	23.9%	22.1%	18.7%	17.7%	16.8%	17.8%	17.1%	17.3%	17.0%	15.8%	15.7%	16.0%	14.4%	14.1%
ILLINOIS	7.3%	7.0%	6.4%	6.8%	7.5%	8.0%	8.6%	9.1%	8.7%	8.6%	8.2%	8.9%	8.9%	9.1%	9.0%	8.9%
MICHIGAN	8.3%	8.4%	8.6%	8.1%	7.4%	7.0%	8.0%	7.9%	8.0%	8.1%	7.8%	7.2%	7.3%	7.0%	7.5%	7.3%
TEX., MINN., MO., OKLA., NEBR., IOWA	7.7%	7.8%	7.1%	8.2%	7.5%	7.7%	6.1%	5.7%	5.4%	4.0%	4.6%	3.9%	3.7%	3.6%	4.1%	4.0%
ARIZ., CO., UTAH, WASH, OREG., CA., HAWAII	5.1%	4.9%	5.1%	4.1%	4.0%	4.3%	3.8%	3.6%	3.8%	3.5%	3.8%	3.4%	3.3%	3.4%	3.5%	3.5%
CALIFORNIA	+	+	+	1.8%	2.2%	2.3%	2.7%	2.5%	2.6%	2.7%	2.9%	2.9%	3.0%	2.7%	3.0%	3.0%
TOTAL	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

did not seem to be appreciable, it did indicate a trend. During the period from 1982 through 1985 inclusive, Pennsylvania's raw steel production has remained at approximately 15% of the total and Indiana has produced approximately 22% of the total raw steel during this four year period. In terms of raw steel production, Pennsylvania and Indiana have reversed positions; Pennsylvania which produced 22.8% of the steel in 1970 produced only 13.6% in 1985, and Indiana which produced 14.1% in 1970 produced 22.3% in 1985.

Steel production facilities can generally be classified into three categories; integrated, specialty steel and mini mills.

4.2 - Integrated Carbon Steel

An integrated steel plant generally consists of coke oven batteries, blast furnaces, basic oxygen furnaces (BOF), casters and rolling mills, and perform most steelmaking process steps from raw material to finished product. There are process variations in that merchant coke producers may supply coke to more than one steel company and some blast furnaces may produce cold pig iron or ferromanganese for sale. In some cases an integrated steel plant will purchase semi-finished products such as slabs or billets for use in their rolling mills.

In 1979, 76% of the raw steel made in the United States (103 million tons) was produced in integrated plants. Approximately 84 million tons was produced in BOF's and 19 million tons in open hearth furnaces. By 1985, only 66% of raw steel was produced in integrated plants and only 6.4 million tons in open hearths. These discouraging statistics have a special meaning to the people in the Pittsburgh area, as it has been the center of the integrated steel industry.

It is unlikely that there will be another integrated steel plant built in the Pittsburgh area. The best that can be expected is that existing facilities will be updated and optimized, perhaps linking process capabilities of separate facilities.

Each of the major integrated steel companies in the United States is very complex in products and processes. As an example, the matrix Table 4.2.1 shows the plant locations and production facilities that make up LTV Steel. To determine all the production capability options for an organization such as this would require extensive study. Within any company, deciding which facilities should be considered obsolete and which should be considered effective steelmaking capacity can be a subject of intense debate and very difficult decisionmaking.

In the public eye, the Pittsburgh steel industry has been closely associated with the integrated corporations, United States Steel (USX), Wheeling Pittsburgh Steel, Jones & Laughlin Steel (LTV) and National Steel. United States Steel is the only major steel company that continues to operate integrated plants in the area. Some steel companies maintain headquarters in Pittsburgh and operate integrated plants in adjacent states such as Ohio and West Virginia.

The shutdown of the Monessen Plant of Wheeling-Pittsburgh Steel Corporation is an example of the difficulties which can occur when an old integrated facility is combined with state-of-the-art equipment, such as Monessen's modern rolling mill. Even though the primary end of this facility includes a modern bloom caster, the high cost of molten steel and market conditions have forced the shutdown of the entire plant. In this case, possible solutions might be to replace the blast furnace and BOF's with an electric furnace; or to bring in blooms from an outside source and roll them on an optimized mill facility.

The major domestic integrated steel plants are located in the Chicago area, which is now the center of the United States market. These include the Indiana Harbor Works of Inland Steel, the Indiana Harbor Works of LTV, the Burns Harbor Plant of Bethlehem Steel and the Gary Works of United State Steel. A number of other large integrated steel plants operated by companies such as Armco, Bethlehem Steel, National Steel, LTV and United States Steel are elsewhere in the industrial heartland but are not as favorably located as the aforementioned plants.

HATCH ASSOCIATES

LTV STEEL FACILITIES

	ALIQUIPPA WORKS	PITTSBURGH WORKS	INDIANA HARBOR WORKS	HENNEPIN WORKS	SOUTH CHICAGO WORKS	CLEVELAND WEST	CLEVELAND EAST	WARREN WORKS	CANTON / MASSILLON	CAMPBELL WORKS	ENDURO DIVISION	CHICAGO WIRE MILL	BEAVER FALLS, PA.	GARY, INDIANA	ATCO, NEW JERSEY	WILTON, IOWA	HAMMOND, INDIANA	YOUNGSTOWN, OHIO	WILLIMANTIC, CT.	GULFPORT, MISS.	MAHONING BAR PLANT	MASSILLON, OHIO	CLEVELAND, OHIO	ELYRIA, OHIO	DETROIT, MICHIGAN	BROOKLYN, NEW YORK	COUNCE, TENNESSEE	GEORGIA TUBING	YOUNGSTOWN WORKS	BUFFALO WORKS
COKE OVENS	●	●	●		●		●	●		●																			●	
SINTER PLANT			●																										●	
BLAST FURNACE	●		●		●	●	●	●																					●	●
BASIC OXYGEN FURNACE	●		●		●	●	●	●																						●
ELECTRIC ARC FURNACE		●			●	●			●																					
ARGON OXYGEN DECARBURIZATION									●																					
VACUUM ARC REMELT											●																			
ELECTROSLAG REMELT											●																			
VACUUM DEGASSING									●																					
ROUND CASTER	●																													
BILLET CASTER									●																					
BLOOM CASTER																														
SLAB CASTER			●				●		●																					
BILLET MILL	●				●		●		●																				●	●
BLOOMING MILL	●	●			●		●	●	●																				●	●
SLABBING MILL			●			●	●																							
TUBE / PIPE MILL	●		●		●					●													●	●	●	●	●	●		●
PIPE GALVANIZING			●																						●			●		
PLATING & ENAMELLING (PIPE)																									●	●		●		
SLAB GRINDING																														
HOT STRIP MILL	●		●			●	●	●																						
HOT STRIP FINISHING			●				●	●																						
COLD REDUCTION (TANDEM MILL)	●		●	●		●	●	●			●																			
CONTINUOUS ANNEALING	●		●					●																						
TEMPER MILL	●		●	●		●		●																						
TIN MILL	●		●																											
GALVANIZING			●	●			●	●																						
GALVALUME			●																											
CHROME PLATING			●																											
COLD STRIP FINISHING			●				●	●			●																			
BAR MILL	●	●			●		●		●																				●	●
COLD BAR FINISHING		●											●	●	●	●	●	●	●	●	●	●								
ROD MILL					●																									
WIRE MILL												●																		

Table 4.2.1

There are state-of-the-art integrated steel plants in Canada, such as the Lake Erie Works of Stelco Inc. which is the most modern integrated steel plant in North America. Stelco is also modernizing and optimizing the Hilton Works in Hamilton, Ontario. Dofasco Inc. operates modern facilities and has just completed the installation at Hamilton of a new slab caster designed to accommodate direct charging to their hot mill complex.

4.3 - Specialty Steel

The specialty steel industry is divided into flat rolled stainless, stainless bar products, tool steel, super alloys and special bar quality market segments. Some specialty steel producers are so different from what we normally think of as steel producers that they might be considered almost a separate industry. To some degree, with the exception of the special bar quality market, which could be considered a part of the carbon steel integrated and mini mill sphere, the specialty steel segment has not experienced all the same problems faced by the integrated carbon steel producers.

Timken, Copperweld and Babcock & Wilcox are specialty steel producers and use some technology that is common to the mini mill industry. The major raw material is scrap and their product is not identified entirely by chemical composition but can be based on mechanical properties and surface quality. Producers of high quality special bar have mill and finishing operations that are much more sophisticated than the typical mini mill.

Several years ago, Hatch Associates conducted a comprehensive market study in the Great Lakes states, on forging quality, cold drawing quality and fastener stock for special bar products. It was found that most of the customers for these products are located in the general Pittsburgh-Cleveland area. The mini mill industry has made inroads into the lower quality end of these markets and is trying to broaden its penetration at the expense of integrated producers. These integrated producers were well located geographically, but have had higher costs which have made it impossible to compete in the lower quality markets.

4.4 - Mini Mills

The term mini mill has become a misnomer. Less than two decades ago, this term described a small capacity steel plant that used an electric furnace to produce molten steel from local scrap, a continuous casting machine to produce billets and a rolling mill to produce merchant quality bars that were sold nearby. Today the United States mini mill industry consists of more than 70 steel plants. One mill has an annual declared capacity of 2.4 million tons and utilizes a 400 ton electric arc furnace, the largest in the world. Another, privately owned, company operates five plants producing from 40,000 tons to 700,000 tons per year. Another has expanded into the production of medium size structural sections. Another has announced that they are installing high technology equipment for thin slab casting, with the intent of entering the flat rolled market, previously the preserve of the integrated producers.

From 1979 to 1985, when both the market and the integrated steel plants' share of the market was decreasing, the mini mills were increasing their share. In 1979, approximately 25% of raw steel was produced in electric furnaces and in 1985 that percentage increased to 34%.

The 1987 Directory of Iron and Steel Plants, published by the Association of Iron and Steel Engineers, lists four small mini mills in Pennsylvania having a total capacity of less than 400,000 tons per year. However, electric furnace steel plants operated by specialty steel producers, such as Babcock & Wilcox, Beaver Falls, Pennsylvania and Copperweld, Warren, Ohio can also be classified as mini mills. The Pittsburgh Works of LTV, with its large electric furnaces might be classified as a potential large mini mill.

A mini mill concept for merchant bars, special bar quality, small and mid-size structural shapes, or certain flat rolled products could be part of the future of the steel industry in the Pittsburgh area. Three basic requirements are:

-- availability of labor
-- low cost energy
-- a sufficient supply of suitable scrap

As Pittsburgh has been a steel producing center for generations, it is self evident that labor is available. The availability of low cost electrical energy has to be determined. Pittsburgh is located in an excellent area for scrap as the rivers make it possible to extend the supply network to the Gulf of Mexico if necessary. There is also a mature area collection system for scrap.

4.5 - Steel Production Capacity

Steel production capacity as estimated by the industry has been reduced from 155 million tons per year of raw steel to 128 million tons between 1982 and 1986. This reduction has resulted from the permanent closure of a number of older steelmaking facilities which has more than offset several capacity additions at mini or market mill plants. Capacity for rolling of steel products is significantly in excess of raw steel production capacity at a number of plants, requiring the transfer or purchase of semi-finished steel or limiting production.

4.5.1 - Capacity Serving the Target Market

Estimated capacities for the production of the various product groups made by all of the domestic producers which primarily serve the target market area are shown in Table 4.5.1. Nominal capacities reflect the annualized output of available equipment under ideal conditions of order mix and operating conditions. Practical capacities reflect constraints based on less ideal conditions and requirements for non-operating periods (e.g., maintenance downtime) over a longer period such as a year. The relationships between nominal and practical capacities vary by type of production unit and the methodology for estimation of nominal capacities and range from 80 percent to 95 percent of nominal capacities.

TABLE 4.5.1

CAPACITY AND CONSUMPTION BY PRODUCT GROUP

PITTSBURGH TARGET MARKET AREA

1986

PRODUCT GROUP	NOMINAL/PRACTICAL ROLLING CAPACITY (million tons)	1986 CONSUMPTION (Domestic & Imports)
Cold Rolled Sheet	41.0/35.0	26.7*
Hot Rolled Sheet	61.9/50.0	36.0*
Coated Sheet	8.9/8.0	8.8
Hot Rolled Bars	6.2/5.0	3.6
Structural Shapes	4.8/4.0	3.7
Seamless Pipe and Tube	3.0/2.4	0.8
Wire Rods	2.4/2.2	1.9
Reinforcing Bars	0.6/0.6	0.4
Plates	5.0/4.0	2.7
Tin Plate	4.8/4.0	2.4
Rails	1.0/0.9	0.7
Stainless Steel	1.8/1.7	1.3

* Market demand plus requirement for production of further processed sheet and strip products (cold rolled, coated, tinplate)

Source: ADL Estimates

The availability of excess capacity means that if a new entrant is to successfully obtain a part of the available business, it will have to do so by displacing existing suppliers. In order to do so, the new supplier must provide products of superior quality at competitive prices, and at a service and reliability level which make it stand out among the competition. This, of course, has been the basis of success for producers such as Nucor, Chaparral, Raritan River and others who have gained market share in the U.S. steel markets over the past decade.

X

4.6 - Competitive Costs

In order to achieve financial success, the new entrant must have the ability to produce at low operating cost levels relative to its established competitors, particularly if it has had to make a substantial up-front capital investment to enter the business. The new producer must be able to service the debt load assumed in its early years of operation out of the cash flow it generates. The steel industry has become increasingly efficient over the past decade, and in a situation of excess capacity, the current producers will not easily give up markets to a newcomer even if severe price competition is required to preserve their positions.

Within each relevant product group, the average variable, fixed and total costs of production have been developed for the major producers serving the target market areas. These are shown in Table 4.6.1. Given the competitive conditions, a new producer must be capable of achieving costs substantially below the average of current producers if it is to be viable in the long term.

4.7 - The Roles of Technology and Industry Structure

Over the past decade changes in steel production technologies and in the structure of the U.S. steel industry have created a new and different environment for those firms in, or considering entry into, the business.

TABLE 4.6.1

AVERAGE VARIABLE, FIXED, AND TOTAL COSTS EXISTING DOMESTIC SUPPLIERS TO TARGET MARKETS

($/Ton)

PRODUCT GROUP	VARIABLE COST	FIXED COST	TOTAL COST
Cold Rolled Sheet	402	70	472
Hot Rolled Sheet	270	40	310
Galvanized Sheet	496	90	586
Hot Rolled Bar	302	45	347
Structural Shapes	301	46	347
Wire Rods	255	40	296
Reinforcing Bars	235	35	270
Plate	393	57	450
Tin Plate	484	100	584
Rails	301	46	347
Raw Steel (molten)			
Integrated Plant	170	21	191
Electric Furnace	175	9	184
Semifinished Steel			
Slabs	192	25	217
Billets	201	15	216

Technology changes, while evolutionary rather than revolutionary, have had major impacts on production costs and products quality and consistency. The fact that these improvements have been implemented, at substantial cost during a period of extreme financial distress in the steel industry, indicates how critically they are viewed by the industry for its future viability.

Weak markets and financial crises in the steel industry have created a major change in industry structure through the closure and rationalization of plants and companies, the retreat of many firms from both upstream and downstream businesses (mining and raw materials, specialty finishing operations, for example), and creation of a group of smaller, stand-alone firms which do not have the financial resources to become self-sufficient in terms of supply of required raw materials and semi-finished products. This represents a potential opportunity for others.

4.7.1 - Technology

Steel industry technologies necessary for continuing successful participation in the business are not fundamentally changed from those which progressive companies have installed in the last twenty years - efficient blast furnaces, basic oxygen or high power electric arc steelmaking, continuous casting and modern hot and cold rolling facilities. However, the degree of "fine-tuning" in controls, automation, process optimization and quality control has been improved by an order-of-magnitude over the last decade or so. Most facilities built before 1960, unless they have been almost totally rebuilt and modernized, are not capable of competing on a cost or quality basis in today's environment. Steelmakers, recognizing that steel demand conditions are unlikely to improve dramatically in the long term, have focused their upgrading efforts and resources on those plants which were regarded as having the best basis for future competitive operations - based on past investment, physical constraints, etc.

Unfortunately, many investments were made, particularly in the 1970's, in plants which had severe operating constraints and which, under current and likely future conditions are not viable. This money was essentially wasted yet these companies continue to face repayment of debts incurred for such expenditures.

Facilities which were not installed in the last twenty years, or extensively rebuilt and updated in the last ten years are obsolete. In most cases, these facilities would be impossible to bring to a level of technology necessary for viability for significantly less investment than would be required to start from the ground up in a new location. This is a serious obstacle to the reactivation of most closed facilities, especially in the areas of the country with excess steel capacity.

There are continuing developments in steel industry technology which, over time, will change the nature of the business. In 1987 for example, the first commercial plant for production of flat rolled products in a mini mill is under construction in Indiana. The goals of new technologies are: reduction in the capital intensity of the steel production processes; reduction of production costs (especially energy, manpower and generation of waste and scrap), and reduction in the minimum economic plant size.

The application of these technologies will result in steel plants which are very different in size, equipment configuration and management thrust from virtually all of the closed Pittsburgh-area steel plants. The existence of closed facilities contributes little, if anything, to the attractiveness of a particular locations potential attractiveness for construction of a plant based on the coming steel technologies of the future.

4.7.2 - Industry Structure

The large, integrated (ore to finished products) steel companies which have been the core of the American steel industry and the dominant factors in steel in the industrial heartland are changing. Their strategies in the past focused on control of every aspect of the production process from ownership of huge reserves of raw materials, transportation systems and large, multi-product plants, and on production and sale of all steel products to all potential markets. Today the industry is focusing on the core of the steel business - efficient production of a few product lines in order to service major customers effectively. Some firms talk of their role as "marketers of steel to specific target accounts", and view their production of that steel as only one of the possible sources from which to service the market. Many steel companies have greatly reduced or eliminated their ownership positions in certain raw materials. While a major part of the motivation for doing so was the need for cash from their sale, it does indicate the increasing trend toward disintegration of big steel and the willingness of steel companies to enter business relationships with suppliers of materials, supplies and services. This would not have been considered several years ago.

One area where this development is of relevance to this study is in existing producers' demand for semi-finished steel for rolling into finished products. This activity has seen a substantial increase in the last several years as firms have found such arrangements in their interest due to the possibilities for lower cost material than could be produced internally, or avoidance of (or inability to fund) investments in steelmaking and continuous casting. Table 4.7.2 shows steel companies which are obtaining substantial amounts of semi-finished steel from outside sources.

In addition, there are several companies which are searching for answers as to how they will acquire semi-finished steel supplies in the future- through major capital investments, possible joint ventures, or from foreign or domestic suppliers.

TABLE 4.7.2

STEEL COMPANIES PURCHASING SEMI-FINISHED
STEEL ON A REGULAR BASIS
1987

Company/Location	Type	Reason
Aliquippa Steel, Aliquippa, PA	Billets	no steelmaking
American Steel and Wire, Cleveland, OH	Billets	no steelmaking
California Steel, Fontana, CA	Slabs	no steelmaking
Cameron Iron Works, Houston, TX	Blooms, ingots	no steelmaking
Cyclops, Mansfield, OH	Slabs, ingots	excess rolling capacity
Gulf States Steel, Gadsden, Al	Slabs	excess rolling capacity
Inland Steel, Chicago, IL	Slabs	special grades & qualities
Lone Star Steel, Lone Star, TX	Slabs	no steelmaking
Lukens Steel, Coatesville, PA	Slabs	excess rolling capacity
McDonald Steel, Youngstown, OH	Billets	no steelmaking
Ohio River Steel, Paducah, KY	Billets, blooms	no steelmaking
Raritan River Steel, Perth Amboy, NJ	Billets	special grades
Sharon Steel, Sharon, PA	Slabs	excess rolling capacity
Tuscaloosa Steel, Tuscaloosa, AL	Slabs	no steelmaking
Weirton Steel, Weirton, W.VA.	Slabs	special grades, excess rolling capacity

We believe that the trend toward less reliance on owned production facilities and the opening of the door for utilization of semi-finished steel produced by others represents a real opportunity for the right venture. The characteristics of this venture must include:

-- located to service the potential customers at acceptable transport cost;

-- ability to produce at low and consistent costs relative to other domestic and foreign suppliers;

-- capability to make high and consistent quality products demanded by the users: must have continuous casting;

-- financial structure which permits interest, debt repayment and return on investment to be covered at realistic levels of volume;

-- highly productive and motivated management and labor force.

5.0 - FACILITY BASIS FOR RETENTION

The detailed description and discussion of the Pittsburgh-Allegheny County steel facilities (operating and closed) contained in this report has been developed by Hatch Associates Consultants, Inc. The availability in the area of existing production facilities and equipment which could be acquired, upgraded and returned to production at a total cost significantly below the level of investment necessary for a completely greenfield plant is a key component of the possible creation of a viable steel entity in the area. If there is no match between the existing facilities and the attractive markets, or the expense of making existing facilities cost and quality-competitive is too high, then the opportunity is not attractive to potential investors.

5.1 - Detailed Facility Descriptions

Four major integrated steel works, two located in, and two bordering Allegheny County (Monessen and Aliquippa) were identified as shuttered facilities with some merits which justified a detailed evaluation for possible reopening of some units. These facilities are the best of the areas mothballed or inactive operations. The selected units are LTV Pittsburgh South, LTV Aliquippa, USX Homestead and Wheeling-Pittsburgh Monessen Works. Each facility has been evaluated as to its competitive potential in today's markets. The process equipment existing at each of these four facilities is shown in Table 5.1.1.

5.1.1 - LTV Pittsburgh

From a small ironworks on the south bank of the Monongahela River producing about 25 tons per day in the 1850's, the Pittsburgh Works Division of the Jones & Laughlin Steel Corporation was expanded to an integrated steelmaking facility with an annual capacity of approximately 2,000,000 tons of coke, 2,500,000 tons of hot metal and 3,500,000 tons of steel ingots and castings. The Pittsburgh Works extends along both the north

County of Allegheny

Facility Matrix

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	WHEELING PITTSBURGH MONESSEN WORKS Monessen, PA	USX HOMESTEAD WORKS Homestead, PA	LTV SOUTH WORKS Pittsburgh, PA	LTV ALIQUIPPA WORKS Aliquippa, PA
SINTER PLANT				
COKE OVENS				
BLAST FURNACES				
OPEN HEARTHS				
BASIC OXYGEN FURNACES	200 T, 200 T			207 T, 207 T, 207 T
ELECTRIC ARC FURNACES			350 T, 350 T	
VACUUM DEGASSING				
LADLE METALLURGY				250 T
CONTINUOUS CASTER	5 STRAND BLOOM			6 STRAND BILLET / ROUNDS
HOT STRIP MILL				44"
COLD STRIP MILL				42", 40", TEMPER MILL, TEMPER MILL
ROLLING MILL	40" BILLET MILL, 30" BILLET MILL, 46" BLOOMING MILL	44" BLOOMING MILL, 34" BLOOMING MILL, 45" SLAB MILL	46" BLOOMING MILL	18/21" BILLET / ROUND MILL, 44" BLOOMING MILL, 45" BLOOMING MILL
PLATE MILL		100", 140"		TIN MILL
PIPE & TUBING MILL				
BAR & STRUCTURAL	RAIL MILL	20"/32", 32"	18", 14"	14"
PICKLING				
ANNEALING				
FORGING PRESS				

TABLE 5.1.1

and south shores of the Monongahela River for about 3-1/2 miles. Five blast furnaces located on the north side of the river produced iron which was transported by rail to six basic open hearth furnaces located on the south side. A general map of the Pittsburgh Works and a more detailed layout can be seen in Figures 5.1.1.1 and 5.1.1.2.

To comply with pollution regulations, LTV ceased operation of its open hearth shop in July, 1979. To replace this capacity, two 350-ton electric furnaces were constructed in what was the Number 4 open hearth shop. The shop was converted to electric furnace production in May and June, 1979.

5.1.1.1 - Layout

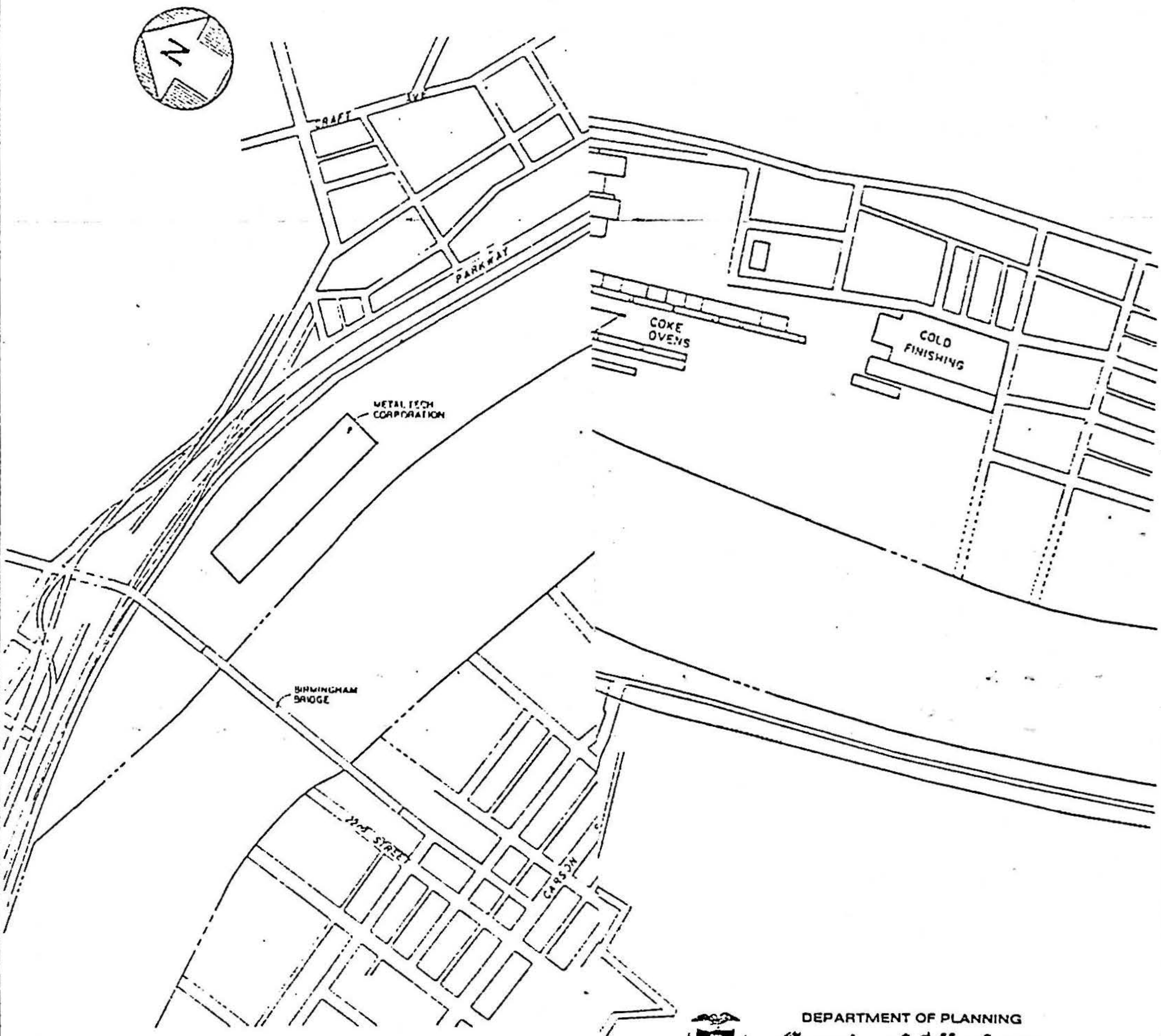
Scrap for the electric furnace steelmaking was unloaded from barges on the north side of the river and loaded onto rail cars which crossed the Monongahela on the bridge that was used to transport hot iron from the blast furnaces. The rail cars were unloaded in the upriver end of the electric furnace shop into scrap charging buckets. Ladles of steel were teemed into ingot molds at the teeming platforms. Ingots moved downriver to the stripper building and, after stripping, moved by rail to the blooming mill where they were rolled to blooms and then shipped by rail to other J&L/LTV facilities for finishing.

Billets for rolling on the 14" and 10" bar mills were delivered from other J&L/LTV facilities.

5.1.1.2 - Equipment

Located upriver from the scrap barge unloading dock are the coke ovens, which are the only facilities presently in operation at Pittsburgh Works. Four batteries, each having an initial daily capacity of 1,020 tons, were built between 1960 and 1963. They furnish coke to other LTV blast furnace operations.

FIGURE 5.1.1.1



DEPARTMENT OF PLANNING
County of Allegheny

LTV STEEL COMPANY
PITTSBURGH WORKS

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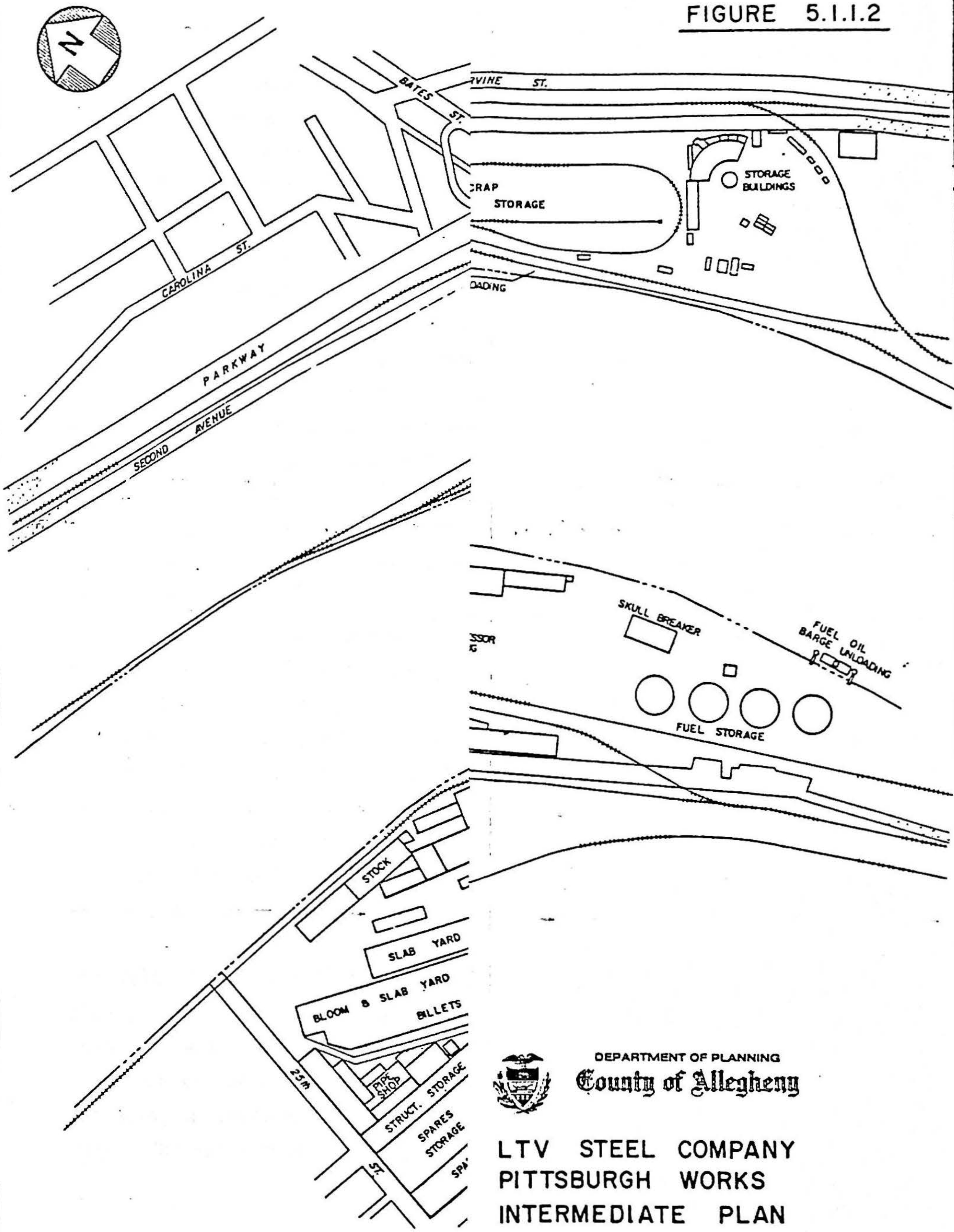
FIGURE 5.1.1.2



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LTV STEEL COMPANY
PITTSBURGH WORKS
INTERMEDIATE PLAN

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The electric furnace melt shop has been idle since 1985. This shop is in good repair. It has been well maintained and mothballed with all fluid drained and equipment protected sufficiently to enable a future start-up. It is estimated that the melt shop could be returned to operation in one month. The facility has two 350 ton arc furnaces and used the best electric furnace melting technology of the 1970's when built. Features of the melt shop include:

-- 137/151 MVA furnace transformers
-- Demand control computer
-- Two high speed scrap bucket loading cranes
-- Computerized inventory system
-- Two scrap charging cranes
-- 175 ton scrap charging buckets
-- Pneumatic flux injection system
-- Oxygen lance
-- Water-cooled roofs and sidewalls
-- Twelve bin ladle additive system
-- Emission control system, including fourth hole in the furnace roof, a slagging hood, a tapping hood and a roof canopy
-- 905,000-SCFM pressurized baghouse
-- Metallurgical laboratory with pneumatic tube system to each furnace for samples and computer network for displaying results at each furnace pulpit
-- 490 ton ladle cranes

The melt shop was designed to produce 1.7 million tons/year of liquid steel, to be teemed into large ingots, stripped and rolled into slabs. This process cannot compete with continuously cast slabs in today's market on either a cost or quality basis. In order to make use of these furnaces, a continuous caster must be installed adjacent to the melt shop. The large heat size dictates that a large and expensive bloom or slab caster would best match the furnaces. This more closely compares with the production rate of a BOF shop/continuous caster installation than with other electric furnace shops which typically make 150 ton heats.

The blooming mill, which is still in position, would require major rebuilds of the soaking pits before it could be operated. Because this mill cannot compete with continuous casters, renovation is not practical.

The 10" and 14" bar mills located on the north side of the river were built in 1953 and 1931 respectively. Little or no improvements have been made since they were originally built.

The 10" bar mill is a 16-stand continuous looping mill with a double sided cooling bed with two finishing outlets and was rated at 30,000 tons per month using 3-1/2" or 4" billets 24' to 30' long. Product range was:

10" BAR MILL PRODUCT

Section	Sizes
Rounds	1/2" to 1-3/8"
Squares	7/16" to 7/8"
Round Cornered Squares	7/16" to 7/8"
Hexagons	15/32" to 1"
Diamond Bars (Rd. Equiv.)	1/2" to 1" and 1" Square Equiv.
Flats	3/16" x 1" to 9/16" x 3-1/2"
Nut Steel	9/16" x 1" to 7/8" x 1-1/2"
Die Rolled Sections	

With this product range the mill would have to compete with a typical mini mill. The following evaluation is therefore compared to this standard.

The mill appeared to be in good repair. It has been fairly well maintained and mothballed with sufficient protection to enable it to be restarted. Machined surfaces are not eroded, hoses appeared intact and electrical components were protected.

The mill has not been upgraded and none of the bar mill technological developments that have been implemented on competitive mills have been installed. (Typical developments which have been implemented on other mills include furnace recuperation, roller bearing mill stands, tension-free speed control system, some automation of the bundling facility and slitting for producing small sizes.)

This mill would not be competitive in today's market against a mini mill facility producing a similar product range. The conversion cost and product quality would require significant improvements.

Upgrading this mill to make it competitive would be costly and would leave a layout that is outdated (looping mill and single bay) and inefficient.

Specific problems include:

-- Purchase price and shipping costs for billets leave too small a margin to compensate for higher conversion costs.

-- Billet size is small by present standards. Modifications required to use 5" square billets are major, and include additional mill stands and furnace modifications.

-- The dimensional accuracy of products rolled on this mill would not be as good as competitive modern mills, because of the fabric bearings on the mill stands and the lack of tension-free speed controls.

-- The double finishing end is labor-intensive. New equipment is required from the cooling bed run-in up to, and including, the bundling discharge area.

The 14" bar mill is a 12 stand cross-country type fed by two pusher reheat furnaces. The mill delivers product to a double-sided cooling bed and twin finishing outlet.

Production is rated at 30,000 tons per month with the following product range:

14" BAR MILL PRODUCT

Section	Sizes
Rounds	1-3/8" to 4-9/16"
Squares	1-9/32" to 2-1/2"
Round Cornered Squares	1" to 3-1/2"
Hexagons	1-5/16" to 2-5/16"
Diamond Bars (Rd. Equiv.)	1-1/8" to 2" Square Equiv.
Flats	
Nut Steel	
Die Rolled Sections	

The comments on the 10" mill generally apply to this mill. However, the equipment is much older and not in as good a state of repair. This mill would not be competitive in today's market.

It should be noted that a competitive modern mini mill plant would be able to roll almost the complete product range and production of both the 10" and the 14" mills.

5.1.2 - LTV-Aliquippa

The LTV Aliquippa Works shown in Figure 5.1.2.1 covers approximately 716 acres on the south bank of the Ohio river 19 miles northwest of Pittsburgh. As a division of Jones & Laughlin Steel Corporation, this facility could produce 3,500,000 tons of steel annually. Some of the rolling equipment on site was installed in 1912. The coke batteries, three blast furnaces, three 207 ton basic oxygen furnaces, continuous round/billet caster, blooming mills, billet mill, round mill and hot strip mill are all shut down. The tin mill is running and being operated by LTV.

A 14" light structural mill has been running and has recently been sold.

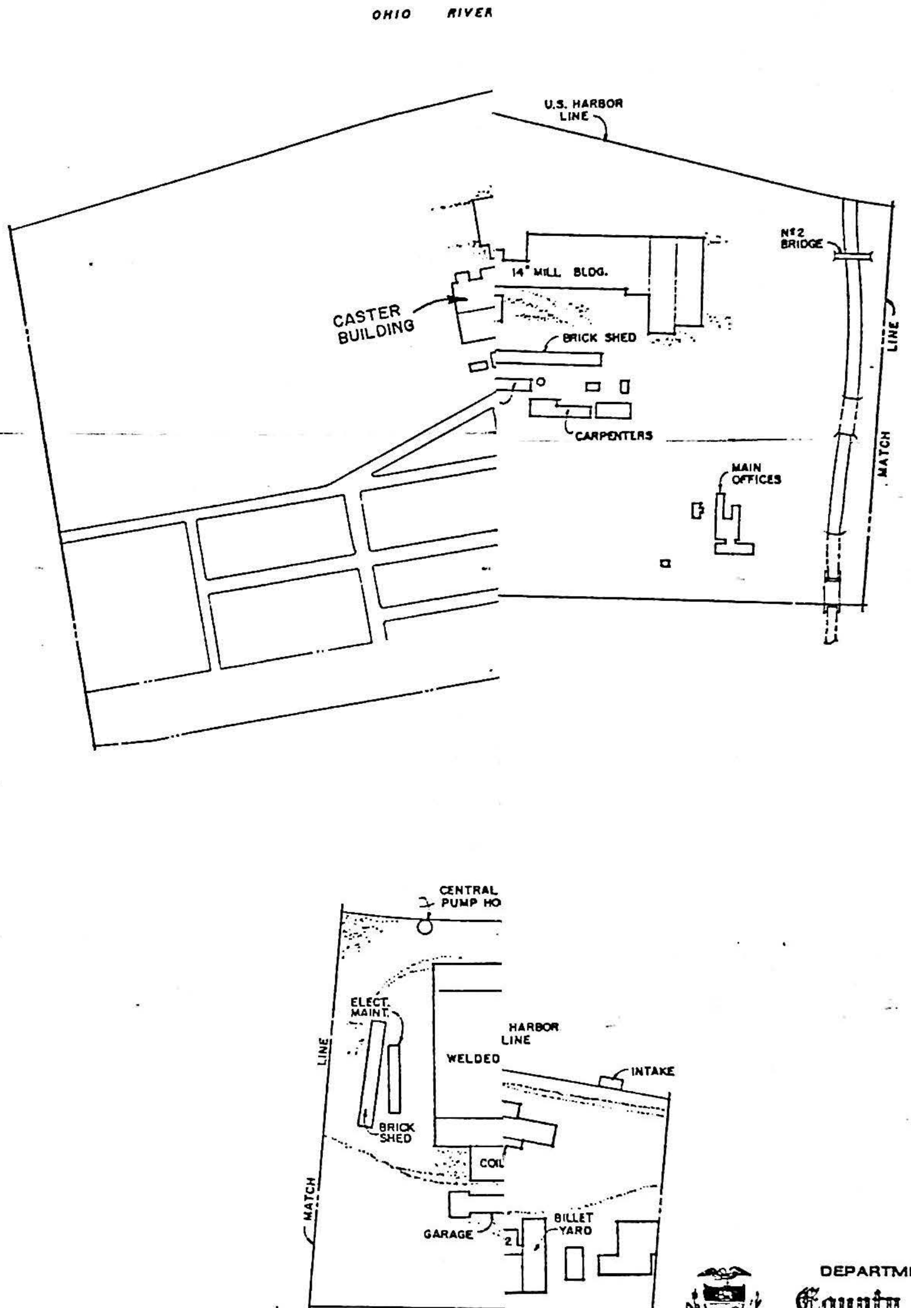
5.1.2.1 - Layout

The LTV Aliquippa Works is long and narrow. The blast furnaces and coke ovens are near the middle of the site with the blast furnaces nearer the land side boundary and the coke ovens along the river. The primary rolling mills are located between the coke ovens and blast furnaces. The BOF shop and six strand continuous caster are located at the downriver end of the site. Upriver from the primary mills are the 14" structural mill, welded tube mills, seamless tube mills, rounds mill, tandem mill, temper mill and tin line.

Generally, all primary rolling was in the upriver direction. Ingots from the BOF were railroaded to the soaking pit furnace building.

Ingots at the 44" blooming mill were rolled into 9" blooms or up to 42" wide slabs. The slabs were cross transferred to the 44" hot strip mill. Blooms continued upriver to either the 21" bar mill or the 21" billet mill. Bars and billets continued through the 13" sections of each mill to the cooling beds.

FIGURE 5.1.2.1



DEPARTMENT OF PLANNING

County of Allegheny

LTV STEEL COMPANY

ALIQUIPPA WORKS

HATCH ASSOCIATES CONSULTANTS, INC. CONSULTING ENGINEERS

HATCH ASSOCIATES

A newer 45" blooming mill is located downriver from the pit furnace building. Product from this mill was railroaded to the hot strip mill or 30" rounds mill.

Slab conveyors allowed the possibility of hot charging into the strip mill roughing stands, however, most slabs were heated in the two pusher reheat furnaces.

The 14" structural mill is upriver of the hot strip mill. Billet storage and the reheat furnace is at the downriver end with the saws and product storage area upriver.

5.1.2.2 - Equipment

The coke ovens, blast furnaces and BOF shop have not been evaluated since the major problem with their operation was the great amount of steel production necessary to be cost effective. The continuous operation required when operating blast furnaces necessitates ingot teeming and blooming to use all of the iron produced in addition to that required for the caster. Ingot production increases the economic inefficiency of the plant.

The continuous billet caster was modernized and is now capable of casting billets and rounds. It is a vertical caster in which the steel solidifies before bending. The strand is bent into a radius, is straightened, and eventually comes out horizontally on a runout table. This configuration requires a high casting floor height. Caster production would be somewhat limited by the layout of the original installation.

The caster has a rated capacity of 500,000 tons per year. The BOF shop annual capacity is 3.5 million tons. If operated in a minimum plant configuration with one blast furnace, there would still be over one million tons of steel produced annually. To produce only continuously cast steel a mini mill configuration must be considered. A single electric arc furnace capable of making 400,000 to 500,000 tons of steel annually from scrap steel or pellets would utilize the caster effectively.

The 45" blooming mill, installed in 1977, is one of the last slabbing mills built. Its effective use is directly tied to high capacity ingot production.

The 44" blooming mill and 21" and 18" billet bar mills were built in 1912. Although some modifications have been made, these mills cannot compete with modern mills.

The 30" rounds mill produces 5"-12" rounds. This is a cross-country mill with three 2-high, in-line, horizontal stands on a common drive. The manually operated transfer table requires two operators and there is only one bar in the mill at a time. This process is too slow and costly to compete with other rounds mills or with continuously cast rounds product.

The 44" hot strip mill was installed in 1957 and appears to be in good condition. With proper gauge control and some refurbishing of existing equipment, the mill could be put into operation. The narrow coil width as compared to most other hot strip mills limits its market.

The 14" structural mill built in 1924 has been sold and continues to operate. It has had a few upgrades over the past 60 years. Tolerances of rolled product are limited to standard structural tolerances.

5.1.3 - USX Homestead

Homestead is located seven miles east of Pittsburgh on 355 acres along the Monongahela River. The main plant is on the south side of the river while the blast furnaces are on the north side in Rankin.

The original plant was built in 1879 and became part of U.S. Steel in 1901. A major expansion was undertaken during World War II. Figure 5.1.3.1 shows the plant layout.

When operating as an integrated facility, 2.5 million tons of finished steel products were produced annually. The blast furnace and open hearth shop were closed in early 1983.

Major Facilities

Primary Mills : A 45" slabbing mill (suspended operation in 1985).

A 100" (suspended operation in 1984) and a 160" (suspended operation in 1985) plate mill.

Blooming Mills : A 44" 2-high, single stand mill (suspended operation in 1985) and a 54" 2-high, single stand mill.

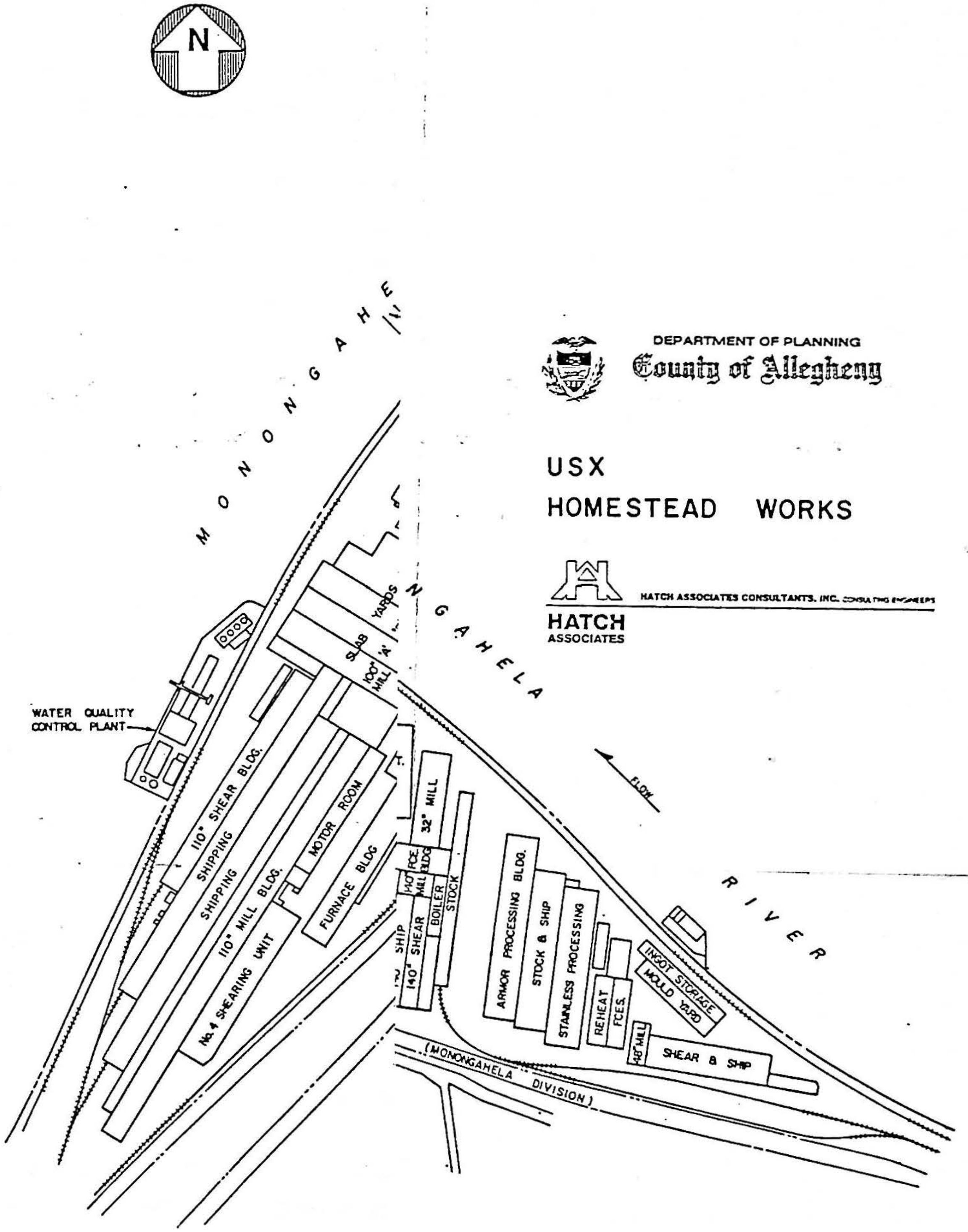
Structural Mills: A 36" 2-high reversing roughing mill; a 28"-32" mill for channels, angles and piling (suspended operation in 1985), and a 52" 3 stand roughing mill.

Forgings : Homestead was USX's only facility for forgings; there are 12,000, 10,000, 4,000 and 2,000 ton presses and vertical furnaces (suspended operations in 1984).

Major Products

Homestead produced plates, structurals and forged products for the capital goods sector. Primary markets for plates are railroad cars, barges, defense applications, heavy construction, industrial vehicles and pressure vessels. Structurals are used for building and bridges. Forged products such as rotors and turbines serve the power generating industry.

FIGURE 5.1.3.1



DEPARTMENT OF PLANNING
County of Allegheny

USX
HOMESTEAD WORKS

HATCH ASSOCIATES CONSULTANTS, INC. CONSULTING ENGINEERS
HATCH
ASSOCIATES

The 4-high reversing stand is an adequate design. However, none of the techniques used for controlling product tolerance and shape on modern plate mills are present on this mill. The product quality would not be up to that of a competitive modern plate mill installation.

The plate finishing facilities have flattening, shearing, edge shearing and plasma arc profile cutting equipment. The warehouse storage space is extensive.

The 100" sheared plate mill is a 7-stand, semi- continuous unit serviced by four reheating furnaces. Plate product ranged from 3/16" to 1-1/2" thick, from 27" to 96" wide and up to 100' long.

Operation of this mill appears to be difficult, with special acquired skills required to operate the numerous buttons and levers located in the control pulpits.

Gauge, shape and edge control would be essential for this installation to produce a product competitive with either hot mill plate or with product from other plate mills.

The bloom and structural mills have three independent units. The No. 1 mill, with 44", 36" and 28/32" mills, rolled a wide range of standard structural steel shapes, beams and channels, equal and unequal angles, flats, archweb and Z sheet piling as well a many proprietary sections for specific customers. The No. 2 mill, with 54" and 52" mills, rolled a complete complement of wide flange beams and produced 6" to 36" beams varying in weight from 85 lbs. to 735 lbs. per linear foot. The hot saw on the 52" mill is computerized and is programmed to cut hot beams to a length which will result in an exact length when the beams cool. The 44" and 54" primary mills produced semi-finished steel blooms and square, rectangular and round cross-sections, including wheel rounds and axle blooms. The product from the primary mill is produced directly from an ingot. The division also rolled alloy and high strength steel grades of standard shapes and piles.

5.1.3.1 - Layout

When in operation, hot metal was transported by rail down and across the river to the open hearth shop.

The open hearth shop is located approximately in the center of the plant with the plate mills downriver and the press shop and structural mills upriver. All areas of the plant are interconnected by rail and off-site rail transportation is available.

The soaking pits are downriver of the slabbing mill. The slab yards are perpendicular to the river and extend from the slab and shear building between the 100" and 160" plate mills. Rolling on the 100" plate mill is downriver while the 160" plate mill was rolled upriver towards the open hearth building.

The soaking pits for the two blooming mills and structural mills are back to back. The product flow on these mills is parallel and upriver. The handling runways are perpendicular to the mills.

5.1.3.2 - Equipment

The 160" plate mill has one scalebreaking stand and one 4-high reversing stand. It is serviced by two continuous and four batch furnaces and other auxiliary equipment. This mill is capable of producing steel plates up to 70' long, 42" to 150" wide, in thicknesses from 3/16" to 15".

The continuous furnaces are in poor condition. They require complete relining and the skids may have to be replaced.

The scalebreaker stand is in a poor state of repair. Machined surfaces are coroded which would make it difficult to set up the equipment.

The mills have old equipment which has not been upgraded. However, some structural products are not required to have close tolerances. Even though product quality would be well below that of a state-of-the-art mill, some marketable product could be made on these mills if all other factors were favorable. Unfortunately the equipment was designed and built in an era when minimization of man hours was not essential. Mills were designed to roll a wide range of sizes and products and are complex and over-designed for smaller product sizes. In order to accommodate the largest sections, large buildings, motors and massive mill stands were required. In modern mills, money is saved by building to roll a narrow product range. In mini mills, the range is narrow and the sizes small, so the rolling mills are more compact, lighter, and easier to operate with fewer people.

The Homestead structural mills are not well suited for either a limited production rate or product range. To have the flexibility for rolling beams from 6" to 36", the machinery became so complex that it compromised operating efficiency. The equipment requires many adjustments and settings (including normally rigid components like the mill housing separators). Fixed components with minimal settings are essential for consistency and repeatable operations. Because of this equipment complexity, a large amount of time is required for stand set up. To solve this problem, a stand is set up off line. Complete mill stands weighing hundreds of tons must be moved regularly. This requires large cranes and buildings. Although capital costs are not a factor now that the facilities exist, the equipment maintenance, operability and manning aspects remain important cost factors. All these comments also apply to the 23"/28" mill, where the large 3-high stands also are exchanged.

The mechanical complexity of the universal mill stands and the bloom outlet tables make them difficult to set up, maintain and control repeatably for most small sizes and production runs. Mill availability and utilization would be low and operating and maintenance costs high if the mill were to be operated.

The mills require high skill levels for setup and control because of the lack of automated controls. The long time operating crews would have been familiar with the idiosyncrasies of the equipment and its operation and would have developed methods over time to work the mills. If these mills were to be started up with new crews, a very long learning curve would be required to reach the level of productivity achieved prior to shutdown. The number of people required to operate the mills and the cost of operating compared to a mini mill operation, make them uneconomical.

The following factors work against the mills reopening:

-- Mill equipment has not been mothballed, but abandoned.

-- Equipment is generally in a poor state of repair.

-- The pusher reheat furnaces designed for the plate mills do not provide uniform heating for thick slabs because of one-sided heating. Modern slab furnaces are almost always walking beam type or pusher type, with multiple top and bottom zones for efficient two side heating.

-- Batch reheating furnaces are almost completely broken down as well as being inefficient and are not capable of heating slabs uniformly.

-- Structural mill utilization would be low because of the complexity of equipment and difficulty of set up and operation for small order sizes.

-- Controls are manual and the skills required to operate the mill would not be readily available in new crews.

-- Product on structural mills is rolled from ingots and is double heated. This adds significantly to the conversion costs and is uneconomical compared to strand cast product.

-- Structurals at the smaller and medium end of the product range are produced by some mini mills (e.g. Chaparral, North Western Steel and Wire and, in the near future, Nucor) from continuous cast blooms or beam blanks. The lower bloom, beam blank and conversion costs for the mini mills make the Homestead Mills uncompetitive.

The state of the mills, their competitiveness with respect to modern mills and the increasing product quality requirements, even for structural shapes, are such that mill start-up is not warranted. The mills would have to compete against more modern domestic and off-shore facilities, all of which have significantly lower operating costs, and which can, from a marketing or product standpoint, supply to high surface quality and/or close tolerances if required.

5.1.4 - Wheeling Pittsburgh Monessen

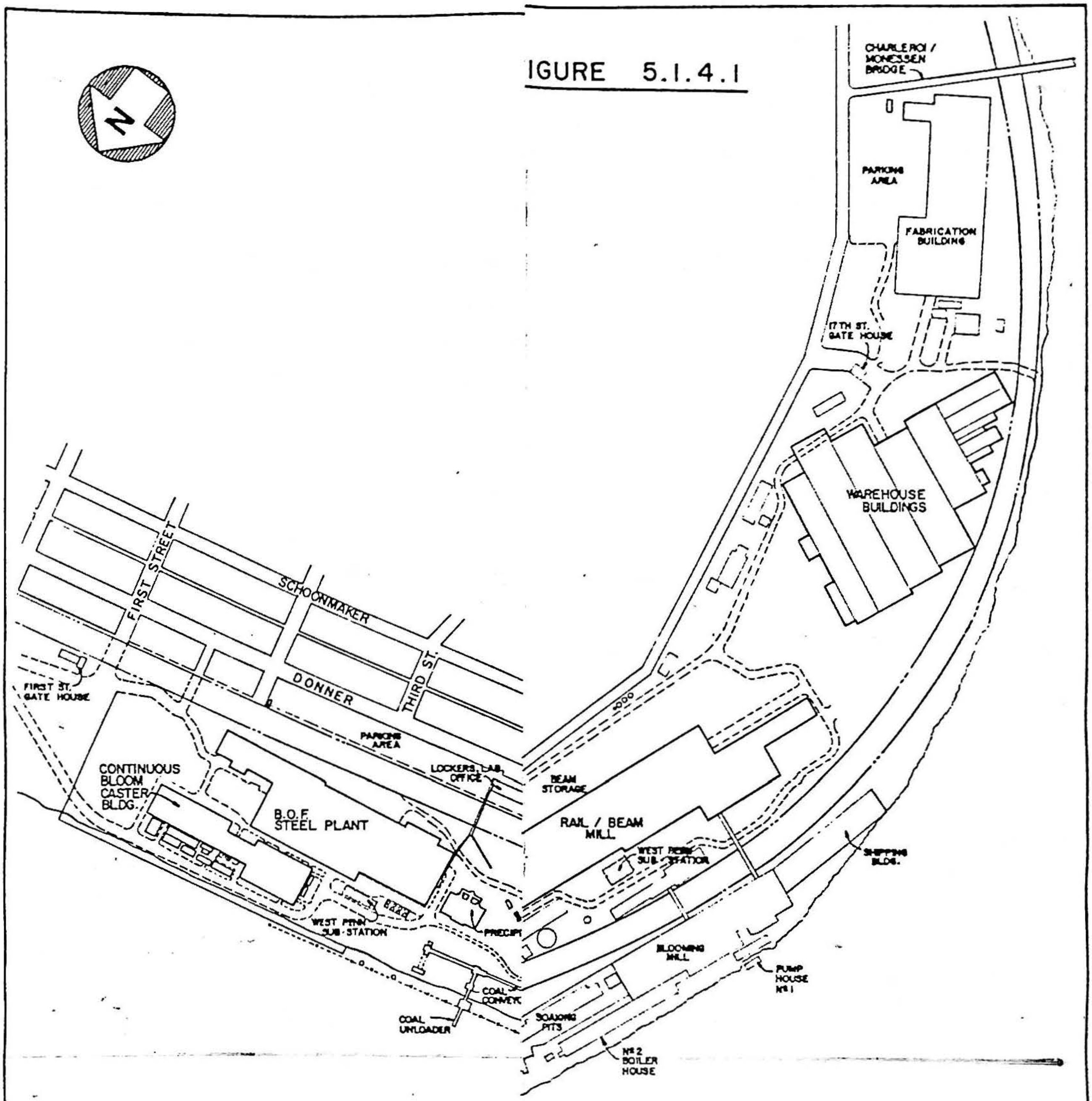
The Monessen Works is located on the south bank of the Monongahela River, approximately 30 miles southwest of Pittsburgh. The primary facilities consist of a sinter plant, coke ovens, blast furnace and basic oxygen furnaces. Secondary facilities include a continuous bloom caster, blooming mill, bar mill and a rail mill. The plant layout is shown in Figure 5.1.4.1.

The facility was started in 1901 by Pittsburgh Steel Company as a wire rod mill.

In 1981 the wire rod mill was replaced by a state-of-the-art rail mill, and in 1983 the continuous caster was brought into operation. Plant capacity is 1,700,000 tons per year.

In July 1986, Wheeling Pittsburgh ceased operation of its primary steelmaking facilities and the continuous caster. The coke ovens operated until the end of 1986 and in April 1987 the rail mill, the last operating facility, was shut down.

IGURE 5.1.4.1



DEPARTMENT OF PLANNING

County of Allegheny

WHEELING PITTSBURGH STEEL

MONESSEN WORKS

HATCH ASSOCIATES CONSULTANTS, INC. CONSULTING ENGINEERS

HATCH ASSOCIATES

5.1.4.1 - Layout

Raw materials for the coke plant and blast furnace operations were received primarily by barge at unloading facilities along the Monongahela River. Coke and sinter were transferred by conveyor, truck or rail to the two blast furnaces located approximately in the middle of the facility.

Liquid iron was transported by torpedo car to the BOF shop. Liquid steel was processed through a ladle metallurgy stand and transferred to the five strand continuous bloom caster adjacent to the BOF shop.

The cast blooms were moved by crane into an adjacent storage area. Blooms could be loaded onto cars and railroaded to the rail mill 1.5 miles upriver. The blooms were then unloaded by a magnet crane and placed in storage or charged to the reheat furnace for rolling. Rails from the mill were placed in cooling boxes prior to straightening and inspection. Finished rails were loaded onto extra long cars or gondolas for shipment.

5.1.4.2 - Equipment

The primary facilities at the Monessen Works consisted of the coke plant, sinter plant, blast furnaces and BOF.

Coke battery No. 1 is divided into 1A and 1B, each unit containing 37 ovens. Battery No. 2 has 19 ovens. In 1982 the ovens of No. 1B and 2 were rebuilt from the pad up. Battery No. 1A was abandoned. The 56 rebuilt ovens had an annual output of 350,000 tons of coke, and have remained on hot idle since the closing of the plant at the end of 1986. They are considered to be state-of-the-art coke oven technology and have a fine fume control system, however the desulfurization station of the by-products plant needs to be completed to have environmental compliance.

There are three blast furnaces, one very small and not feasible to restart. The others have capacities of 700,000 and 500,000 tons per year and require complete relines before restarting.

The BOF shop contains two 200 ton vessels with a monthly capacity of approximately 140,000 tons.

Other facilities include a continuous caster, blooming mill, bar mill and rail mill. The blooming mill has not been operated since the caster was installed and the bar mill has not been operated in several years.

The continuous caster is a 5 strand bloom caster with a design capacity rating of 840,000 tons per year. It is one of the most modern high capacity bloom machines installed in the United States and can make a critical quality product. It has a comprehensive computer control system for the operation of components such as the mold oscillators, secondary cooling water spray zones, bloom cut-off torches and product tracking through the machine.

The rail mill, brought into operation in 1981, is a modern high capacity universal mill rated at 30,000 tons per month. It is the first application of a universal mill for rails in the U.S., and was the first mill in the United States capable of producing 78 to 82 ft. finished rail lengths in all sections and grades. The mill has primarily rolled rail but has the potential to produce structural sections as well. Major components of the mill include a reversing edging mill and a universal non-reversing finishing mill. Other features include an automated hot stamper, hot saw, walking beam cooling bed, cooling boxes, vertical/horizontal straightener, finishing end hardening and final inspection facilities.

Although the rail mill is considered a world-class, state-of-the-art facility it is coupled with an aging, large capacity integrated facility with primary melting capacity far in excess of the rail mill capacity. In order to operate this facility on a mini mill basis, reduced melting capacities would have to be provided.

5.2 - Production Capabilities

There is no one facility of those surveyed that has all of the process step requirements to supply any finished steel product on a competitive basis. If the requirement is to supply a high technology, state-of-the-art product with thermomechanical enhancement, good shape and size tolerances and high surface quality; none of the rolling mills in the survey can meet these requirements. This is of particular importance as, in most cases of new product development, mill processing variables such as control of rolling and quenching temperatures have become increasingly more important. Of the existing area mills, the Wheeling-Pittsburgh Monessen universal mill is modern and well equipped. However, it is not a mill built for state-of-the-art thermomechanical processing or for product other than rail or structural shapes.

Tables 5.2.1 through 5.2.4 show the process and production capabilities of the four facilities examined in detail. Of these only the LTV-South Pittsburgh works is equipped with electric furnaces, Homestead has open hearths and Monessen and Aliquippa have BOF's. Since all four plants were initially blast furnace based with large scale production of ingots, the scale of operations was large, and the plants failed on economic efficiency grounds as more and more of the high cost units within the plants ceased operation. There is no feasible way for these plants to restart as fully integrated producers and compete effectively and economically. Although electric furnace steelmaking has been steadily expanding into new product areas, the size of the electric furnaces at South Pittsburgh, and hence the minimum batch size, precludes effective utilization in products where the order size is small, the grade mix varied and the development of a market hinges on a series of qualification trails by grade or application which utilize very small lots (on the order of a few tons).

FIGURE 5.2.1

	INSTALLATION DATE	CON		
COKE OVENS	P1: 1960 P2: 1961 P3-NORTH: 1961 P3-SOUTH: 1961 P4: 1963	IN OPE		
ELECTRIC ARC FURNACES	1979	IN GOOD ALL MA INTACT- SHUTDOW		
46" BLOOMING MILL		IN POOR C REQUIRES REBUILD C		
14" BAR / STRUCTURAL MILL	1931	- MILL AND N A STA AS THE - HAS N UPGRA - LACKS NOLOGY COMPET		
10" BAR / STRUCTURAL MILL	1953	• MILL AP GOOD RE BEEN MC SUFFICIEN A FUTUR • HAS NO UPGRAD • LACKS NOLOGY COMPE		

FIGURE 5.2.2

	INSTALLATION DATE				
COKE OVENS	A-1 : 1945 A-4 : 1948 A-5 : 1975	SHI SHL SHL			
BLAST FURNACES	A-1 : 1969 A-2 : 1970 A-4 : 1966	A-4 198 RE: A-1			
BASIC OXYGEN FURNACES	1968	SH			
LADLE METALLURGY	1983	NI			
CONTINUOUS CASTER	1969	SH CON FO			
44" HOT STRIP MILL	1957	THE TABLI TO BE BE PU REFUR			
48" COLD STRIP MILL	1962	"			
42" COLD STRIP MILL	1947	"			
45" BLOOMING MILL	1977	SHUT COULD MINO			
44" BLOOMING MILL	1912 (UPGRADED 1953)	MILL BE IN AND C A SH			
18"/21" BILLET / ROUND MILL	1912 - 1916	DUE TO BEARI BEING MILL, I TO OPE			
14" BAR/STRUCTURAL MILL	1924 (SOME UPGRADING)	MILL NEW E TOLER MAY BE A CON			
PIPE / TUBING MILL	CONT. WELD: ELECTRIC WELD: SEAMLESS:	SHUTD SHUTD			
TIN MILL		IN			
30" ROUND MILL		SHUT			
PICKLING					
ANNEALING					

FIGURE 5.2.3

	INSTALLATION DATE	C		
BLAST FURNACES		NO		
OPEN HEARTHS				
VACUUM DEGASSING				
45" SLAB MILL	1936	GE POC		
54" BLOOMING MILL	1926	GE POC		
44" BLOOMING MILL	1925	SOAKI CONDI COMPLI FINISH TO HA CANN		
160" PLATE MILL	1944	FURNA CONDI POOR BADL MACH EROD		
100" PLATE MILL	1936	GENE POOR PULPI LAID TO OF		
52" BAR STRUCTURAL MILL	1926			
28"/32" BAR STRUCTURAL MILL	1925			
FORGING PRESS				

FIGURE 5.2.4

FACILITY	INSTALLATION DATE		
SINTER PLANT			
COKE OVENS	№1 : 1942 №2 : 1956		
BLAST FURNACES	№1 : №2 : JANE :		
BASIC OXYGEN FURNACE	1964		
CONTINUOUS CASTER - 5 STRAND	1983		
46" BLOOMING MILL			
30" BILLET MILL			
18" BILLET MILL			
UNIVERSAL RAIL/STRUCTURAL MILL	1981		

The size of all the facilities leads to a search for a high volume product. The relatively low level of mill and front end steel treatment technological sophistication, leads, at least initially, to a product which has rather broad composition limits, is made in large quantities and is relatively straightforward to produce. As a possible future consideration, more difficult or sophisticated products could be produced by the addition of incremental technologies downstream.

When consideration is given to the general area of totally new high technology, or high value steel products, the scale at which these materials are produced, and the process control requirements associated with satisfactory manufacturing technology, precludes the use of any single process within the area surveyed. We, therefore, feel that a high technology, high knowledge-input manufacturing base which may have hopes of expanding into a significant employment factor with time, but which, of necessity, must start small, should probably be considered on a greenfield basis removed from any existing unutilized steel infrastructure.

A product line which has been mentioned and which could fall within the boundary of new technology is that of a merchant liquid of some special composition which could then be delivered to downstream customers for casting and processing. Unfortunately, there is no inherent differentiation of composition that can be made on melting in an electric furnace as compared to a BOF. The optimum composition of liquid metal that can be produced in an electric furnace would approximate that produced in the standard blast furnace BOF process with hot metal pretreatment, that is, a metal low in phosphorus and sulfur and containing low nitrogen and none of the undesirable scrap-based residuals such as copper and tin. Consequently, the possibility of achieving a super liquid in the electric furnace is rather low and the furnaces available preclude economic production of anything but a large scale commodity. For the high value, high technology, solid product, a super liquid, if it could be found and if a use could be developed, might fit as a greenfield technology and not within existing or optimized facility configurations.

5.3 - Conclusions

Of the facilities examined as shown in Table 5.3.1, the majority are very old, technically and economically obsolete, and given the excess of capacity in the market do not represent viable bases for new business opportunities. There are several facilities which are quite modern, in reasonably good condition and could be reusable under the right circumstances. The facility most readily reusable is the Monessen Rail Mill. It requires minimal investment and can operate as a stand-alone unit.

The other facilities which appear to offer some type of value to a new buyer are the Monessen bloom caster, the Aliquippa bloom/billet caster, the South Works arc furnaces and possibly the Monessen hot end coke plant, blast furnaces and BOF. Each of these is discussed below.

5.3.1 - South Works Arc Furnace

The arc furnace melt shop at the LTV South Pittsburgh plant is a relatively modern, high-production unit installed to produce semi-finished steel for use in other LTV plants. There is a demand for steel slabs for rolling into flat rolled products which these furnaces, with appropriate investments in continuous casting and furnace upgrading, could potentially supply. These furnaces appear to have a potential to be the basis for a viable business, providing the economics of production are favorable. Economics will depend largely on the size of the required up-front investments, the costs of power and scrap, the utilization of available capacity and the future role of imported semi-finished steel in the U.S. market. In the Pittsburgh area, this facility appears to offer the best potential opportunity for reactivation.

TABLE 5.3.1

IDLE FACILITIES EXAMINED FOR RESTRUCTURING POTENTIAL

Location/Equipment	Age/Condition	Capital Required To Make Competitive	Product
LTV South Works			
Arc Furnaces	9 yrs/good	furnaces alone <10MM continuous caster 150-200 MM	slabs
Bar Mills	35-57 yrs/fair	not feasible	bars
US Steel Homestead			
Iron & Steelmaking	--	not feasible	--
160" Plate Mill	44 yrs/poor	total reconstruction	wide plate
100" Plate Mill	52 yrs/poor	not feasible	narrow plate
Structural Mills	60 yrs/fair	not feasible	large shapes
Forge Presses	--	$50 million	large forgings
LTV Aliquippa			
Coke Ovens	13-43 yrs/poor	total reconstruction	coke
Iron & Steelmaking	20 yrs/fair	unknown	raw steel
Cont. Billet Caster	19 yrs/good	needs appropriate-size raw steel supply	billet
Hot Strip Mill	31 yrs/good	100+ million	hot rolled sheet
Wheeling-Pittsburgh Monessen			
Coke Ovens	30+ yrs/fair	small	coke
Iron & Steelmaking	20+ yrs/fair	unknown	raw steel
Bloom Caster	5 yrs/excel.	need appropriate steel supply	blooms
Rail Mill	7 yrs/excel.	none	rails

5.3.2 - Aliquippa Bloom/Billet Caster

This facility is in a similar position to the Monessen caster - it has no possible steel supply without a major investment in a melt shop. The facility is not as technically good as Monessen - it is older and has been revamped for production of different product types several times. The recent sale of the Aliquippa bar and structural mill would appear to offer a potential market for billets. However, there is an ample supply of billets available from other suppliers without the necessity of investment in a new melt shop. The likelihood of this facility being the basis for a viable facility is small.

5.3.3 - Monessen Rail Mill

The mill is now owned by the U.S. Economic Development Corporation. It is the newest rail production facility in the U.S., entering service in 1983. Its closure was the result of a severe (continuing) depression in the market and the financial problems of its owner. Bethlehem Steel has made an offer to purchase this facility and would integrate the operation with its existing rail production units in Steelton, Pennsylvania.

5.3.4 - Monessen Bloom Caster

This is an excellent facility but does not fit the current Monessen plant (steel capacity 1.8 million tons, bloom caster capacity 0.8 million tons). The bloom caster does not represent a business opportunity of itself. With investment in steelmaking (an arc furnace of appropriate size), it could be operated to produce blooms for a reactivated rail mill and for sale to others. Unfortunately, there is a large oversupply of blooms in the market today and Bethlehem Steel, the possible buyer of the rail mill, would prefer to use blooms from its own plant rather than invest in more capacity. A better plant for blooms also exists at the Beaver Falls facility of Babcock & Wilcox Steel which is also for sale. Therefore, even though this is a modern facility, the probability of the caster being the basis for a viable operation is very small.

5.3.5 - Monessen Hot End

The market for slabs which forms the basis for the LTV South Pittsburgh arc furnace plant could represent a potential market for the Monessen hot end. In fact, with inclusion of the bloom caster which could be converted to a slab caster at savings which could be significant relative to a new installation, this facility might have some advantage relative to the LTV plant. These could include: stability of raw material costs relative to scrap and a somewhat lower initial capital cost. On the negative side, the facility would have less ability to tolerate fluctuations in volume, be more sensitive to and have much higher labor costs and have a larger future capital investment requirement. It would appear that the Monessen hot end could represent a potential stand-alone business opportunity. There is probably not sufficient market needs in the areas which could be served from a Pittsburgh-area location for both the South Side and Monessen plants operating as producers of semi-finished steel.

5.3.6 - Other Possible Facility Configurations

Possible configurations considered are:

-- Utilization of electric furnace(s) at LTV-South Pittsburgh in combination with a new slab caster to provide trade slabs.

-- Utilization of electric furnace(s) at LTV-South Pittsburgh in combination with a large bloom caster to provide high quality trade blooms.

-- Utilization of the bloom caster at Wheeling-Pittsburgh Monessen in conjunction with a new 150 ton electric furnace to supply high quality trade blooms (possibility of supply to Monessen universal mill which is for sale, or to outside sources).

-- Utilization of LTV-Aliquippa caster in conjunction with a new 150 ton electric furnace to make trade billets or rounds or for possible utilization in existing Aliquippa mill.

These facilities were considered as potentially the most promising operations of those in the Allegheny County area. The Homestead mills were ruled out because of operability, economics and general mill condition. Moving the South Pittsburgh electric furnace to Monessen to service the bloom caster was ruled out because of the mismatch between furnace size and the limited casting rate for high quality blooms. Since the better parts of existing facilities are at the primary end, and because the various mills within the study are inadequate technologically, the emphasis, with the possible exception of LTV-Aliquippa, is on shipping semi-finished material to the trade.

6.0 - PRELIMINARY ANALYSIS OF THE SOUTH SIDE ELECTRIC FURNACE PLANT AS A SUPPLIER OF STEEL SLABS

6.1 - Potential Steel Slab Customers

Companies identified as potential purchasers of slab steel from outside sources, and within a transport-cost range which may make a Pittsburgh-area source feasible, are shown in Table 6.1.1.

Over the next year or two, we expect these firms to be looking to buy the quantities shown in the Short Term column, a total of about 3.15 million tons per year. Beyond this time frame there could be a rapid growth in slab requirements based on the potential start-up of a new, non-integrated sheet producer (Heidtmann), possible reduction in hot end capability of several plants (Gulf States, USS Fairless), and an increased reliance on purchased slabs by other firms as they recognize the benefits of this arrangement. Restrictions on imports and fluctuating currency relationships add elements of risk to purchasing slabs from offshore producers, and therefore make domestic slab availability, at competitive costs attractive to slab buyers.

For the majority of these firms, the thrust of purchasing of slabs is toward substantial quantities of products in relatively few grade/size combinations, and in mostly commercial quality types of steel.

We wish to emphasize that more detailed definitions of sizes and grade are very important for determining the required capital investment and operating economics of a plant serving this market and the prices one could expect to receive. However, from our contacts with potential slab buyers, we believe that problem of trying to service the various requirements is not an insurmountable one.

SEMIFINISHED STEEL SLABS

Company	Size	Grades	Potential Demand for for Purchased Semis Short Term (million tons/year)	Long Term	Ladle-Metallurgy Requirements/Other	Commitment	Freight Cost From Pittsburgh $/N.T
Gulf States	8-9" thick, 48" wide (few different widths) 200-218" long	Low carbon, drawing quality (3-4 different grades)	.25	up to 1.0	Basic ladle treatment (stirring, wire injection, etc.	One-year contract with quarterly adjustments to price/ volume	23
Heidtmann	8-10" thick, 30-49" wide (substantial no. of size/grade combinations) 396-408" long	Low, medium carbon, HSLA (5-10 grades-automotive focus, non-exposed)	--	up to 1.5	Basic ladle treatment	Long-term commitment with prices indexed to finished product market prices	14
Cyclops-Empire	7" max thickness, 48-52" wide. (Thickness limit could be increased with investment). 500 lbs per inch of width.	Low carbon (2-4 grades)	.20	up to .50	Basic ladle treatment	Long-term commitment with suitable price adjustment mechanism	11
Sharon Steel	7" max thickness, 42-48" wide. 360" long.	Low carbon (3-5 grades)	.20	up to .40	Basic ladle treatment	Long-term commitment to a "low cost producer," with appropriate price adjustment method	7
Lone Star	8-10" thick, 25-54" wide (about 5 sizes total) 204" to 306" long	Medium carbon pipe grades (3 grades)	1.50	up to 2.00	Basic ladle treatment Controlled slab cooling	Currently, short-term commitments based on firm price. Future possibilities for long-term commitments or joint venture.	38
Lukens Steel	8-9" thick, 80-85" wide 360-380" long	Carbon structural 3-5 grades	up to .10	up to .20	Basic ladle treatment	One-year contract	17
Weirton Steel	9-11" thk; 36-48" wide	Low carbon drawing, tinplate	.40	1.00	Possible need for full ladle met treatment	Long-term contract, possible jt. venture	7
LTV (Cleve.)	7-10" thick; 50-70" wide	Low carbon, auto. qual.	.50	.50	Unknown	Unknown	10
USS (Fairless)	7-10" thick; 40-60" wide	Low carbon, tin plate	--	1.00	Unknown	Unknown	20
			3.15	up to 8.10			

The production of slabs for sale by this proposed venture would not displace from the market slabs sold by other Pennsylvania steel mills, and would not affect the probability of the construction of a slab caster at US Steel's Mon Valley Works which would service the internal requirements of that complex.

The nominal capacity of the South Side arc furnace shop is about 1.7 million tons per year of steel, and it seems reasonable to anticipate that production of about 1.6 million tons per year would represent a high sustainable level of production. In the longer-term scenario, this volume could potentially be absorbed by as few as two buyers, but more likely four to six buyers might be served, with each obtaining a portion of its requirement elsewhere as well.

In addition to the direct users, firms involved in trading of steel commodities (scrap, raw materials, semi-finished and finished steel products) have expressed an interest in the potential of a commercial slab production facility. In addition to their capabilities in marketing, such firms could bring strong scrap acquisition and transportation management functions to such a venture.

6.2 - Preliminary Capital Cost Estimate

Hatch Associates has produced a Preliminary Capital Cost Estimate that is suitable for planning purposes. It should be appreciated that the facility layout can be further improved and refined after more detailed study and project definition.

6.2.1 - Type of Estimate

Table 6.2.1.1 lists the documentation required for various types of Capital Cost Estimates. The Capital Cost Estimate for this report can be considered a study estimate. Although the location has been defined, the process flow sheets required for an order-of-magnitude estimate have not

TABLE 6.2.1.1

DOCUMENTATION REQUIRED FOR ESTIMATE	TYPE OF ESTIMATE: STUDY	ORDER OF MAGNITUDE	PRELIMINARY BUDGET	DEFINITIVE (Project Control)
FACILITY DESCRIPTION / LAYOUT	●	●	●	●
PLANT CAPACITY	●	●	●	●
LOCATION		●	●	●
PRELIMINARY PROCESS FLOWSHEETS		●		
BUDGET PRICES FOR MAJOR EQUIPMENT			●	
FIRM PRICES FOR MAJOR EQUIPMENT				●
BUDGET PRICES FOR SECONDARY EQUIP'T			●	●
PRELIMINARY MASTER SCHEDULE			●	
PRELIMINARY EQUIPMENT LIST & SPECIFICATIONS			●	
PRELIMINARY PLANT LAYOUT			●	
PRELIMINARY LINE DIAGRAMS			●	
PRELIMINARY SITE SURVEY			●	
APPROVED PROCESS FLOWSHEETS			●	●
WORK DEFINITION			●	●
CONTRACT DEFINITION			●	●
CONTRACT CO-ORDINATION SCHEDULE			●	●
SPECIAL CONDITIONS			●	●
APPROVED PLOT PLANS & LAYOUTS				●
APPROVED LINE DIAGRAMS				●
FINAL EQUIPMENT LIST				●
APPROVED ENGINEERING SPECIFICATIONS				●
FINAL SITE SURVEY				●
ACCESS & LOGISTICS DATA				●
PRELIMINARY CONSTRUCTION DRAWINGS				●
PROJECT SCHEDULES				●
CONTRACT CONDITIONS				●

been developed. Within the accuracy range of a study estimate the capital cost estimate can increase by 15% or decrease by 30%.

6.2.2 - Basis of Estimate

Major equipment costs used assume that competitive bids for the equipment will be obtained on the international market.

Costs for foundations, structural steel and building additions were developed by applying appropriate costs per unit area. An allowance was made for site preparation. The construction costs were developed assuming a number of contracts will be let on a competitive basis for piling, concrete, structural steel, erection, buildings and mechanical-electrical installation.

The resulting cost estimate (Figure 6.2.2.1) was further cross checked against actual costs from other melt shop and mill projects designed by Hatch Associates.

Indirect costs such as engineering, project management and construction management were taken as a percentage of the total direct costs. An allowance was made for temporary facilities, insurance and vendor supplies, training and start-up based on similar projects of this scope.

6.2.3 - Items of Concern for Further Study and Definition

Most certainly, the broad brush conceptual outline needs further study from an engineering and cost estimate viewpoint. The interrelationships of the business plan, the potential market requirements, the facility, the electrical and the raw material supply and quality have to be examined in depth with a goal of arriving at a minimum cost facility capable of supplying high quality slabs to the market which can be upgraded incrementally based on a satisfactory profit picture and positive cash flow.

CAPITAL COST ESTIMATE – SLAB CASTER INSTALLATION

LTV STEEL CO. PITTSBURGH WORKS

HATCH ASSOCIATES

CURRENCY – U.S. (x $1,000)

NO.	DESCRIPTION	SITE PREP.	FOUNDATIONS	PILING	STRUCTURAL STEEL	ARCHITECTURAL	MECHANICAL	H.V.A.C.	PIPING	ELECTRICAL	INSTR'N.	CASTER SUPPLIER DIRECT COST	SUB TOTAL DIRECT COST
1	SITE PREPARATION	2,660	0	0	20	10	800	0	250	260	0	0	4,000
2	CASTING FACILITY BUILDINGS	0	1,200	1,100	5,400	1,700	0	150	400	850	0	0	10,800
3	CRANES & RUNWAYS	0	200	500	3,100	100	5,950	0	0	1,200	0	0	11,050
4	CASTING MACHINE	0	7,500	1,000	3,500	1,000	600	0	1,000	2,200	0	66,500	83,300
5	CASTING AUXILIARIES	230	1,300	600	1,250	700	5,300	10	250	1,400	0	2,400	13,440
6	INDUSTRIAL WATER	0	2,200	980	700	240	4,800	30	2,350	1,030	240	2,750	15,320
7	PIPING SYSTEMS	190	100	0	490	40	150	0	1,650	200	60	320	3,200
8	WELFARE FACILITY	0	0	0	0	270	10	0	0	80	0	0	360
9	MOBILE EQUIPMENT	0	0	0	0	0	140	0	0	0	0	0	140
10	COMPUTER & PROCESS CONTROL	0	0	0	0	20	0	70	0	4,100	0	150	4,340
11	ELECTRICAL SYSTEMS	270	450	0	200	100	60	200	0	9,900	0	20	11,200
12	CONDITIONING EQUIPMENT	0	200	0	50	50	2,500	0	100	300	0	0	3,200
13	SPARES	0	0	0	0	0	1,200	0	0	600	0	1,800	3,600
	TOTAL DIRECT COSTS	3,350	13,150	4,180	14,710	4,230	21,510	460	6,000	22,120	300	73,940	163,950
	INDIRECT COSTS												
	ENGINEERING & PROJECT MGMT.												16,400
	CONSTRUCTION MANAGEMENT												6,550
	TEMPORARY FACILITIES												2,400
	INSURANCE												1,100
	CASTER SUPPLIER TRAINING,START-UP												4,400
	INDIRECT SUB TOTAL												30,850
	TOTAL COST												194,800

FIGURE 6.2.2.1

Raw Materials

Most slab grades for automotive, appliance and tin applications require very low copper and tin residuals. The few electric furnace shops making this product have relied on either recycled home scrap from their companies' blast furnace based operations with their low residuals or on direct-reduced iron (DRI) for dilution in greater or lesser quantities, depending on scrap availability and price. Prompt returns, from the likes of automotive stamping plants are also desirable scrap qualities.

The potential markets for a slab caster will require high quality scrap and/or DRI. The quantity and quality requirements for scrap will have a substantial effect on local scrap prices. The possible effect of this on the project requires further definition and study.

The available scrap and its residual amounts must be considered with respect to the price of DRI to determine a satisfactory raw material supply and price. While a large DRI supply would guarantee low residuals, the costs may be great.

Another consideration is that at low percentages of DRI in the charge, furnace productivity may increase, but at the charge percentage expected to dilute scrap to make sheet steels, furnace productivity falls below that of an all scrap operation.

At either 1,056,000 or 1,632,000 tons/year of slabs, the requirement for high quality scrap may have a major effect on scrap prices. In recent months, the price of prime scrap has been very high and very volatile. Whether this has been caused by more people competing in the market for high quality scrap because of a shift in the market, or the disappearance of many scrap generating ingot shops in the last 10 years is unknown and should be established. (Many shops have replaced their ingot facilities with continuous casters for a 10-14% gain in yield and a subsequent decrease in internal scrap generation. Other ingot producing facilities have been closed because of low demand. As demand increases, and ingot production increases the need for high quality scrap to make rolled product can increase.

Electric Furnace Shop

The level of product sales and the electrical utility rates that can be obtained will have a major effect on electric furnace operating costs. Off peak power rates balanced against furnace capabilities might lead to a higher capital investment in furnace equipment and operation during off peak hours instead of low furnace investment and round-the-clock operation. If a substantial amount of DRI should be required then, depending on DRI sources, storage silos, unloading and conveying equipment must be included for the pellet feed. The silos and covered conveyors are required as DRI is susceptible to extensive oxidation when exposed to rain or snow.

Furnace upgrades on a high volume single furnace operation must be balanced against demand and capital cost.

The suitability of ladles for strand casting must be determined. New ladles or extensive modification to existing ladles may be necessary.

Transfer car(s) to move the ladles to the casting shop, and the optimum transfer method must be determined.

Whether it is possible to refurbish and utilize existing open hearth cranes in the caster shop must be determined.

Ladle Metallurgy Station

The size and capability of the ladle metallurgy/ladle furnace must be studied. The interaction of ladle hold times, amount and frequency of reheat requirements, product demand, and incomplete ladle returns from the caster operations have major effects on the stations costs.

If the holding times are very long because the shop productivity is low due to market or design considerations, a substantial ladle holding-reheating-metallurgy installation incorporating electric arc ladle heating furnaces will have to be included.

Provisions for the arc reheating can add substantially to the facility cost. If shop productivity is high and ladle holding times are moderate, then some form of chemical oxidation-reheating, at a much lower capital cost, might be incorporated.

Caster

The caster must be specified very carefully to minimize capital costs and maximize return. The technological items of Appendix H have to be assessed against the product mix to attain an optimized facility.

Business Plan

A detailed business plan incorporating markets, capital spending, possible joint ventures and overall feasibility must be developed.

6.3 - Preliminary Operating Cost Estimate

6.3.1 - Manpower Requirements

In order to arrive at wage and salary costs for the proposed facility, manning requirements were estimated for each department for both an upgraded one furnace operation producing up to 1,056,000 tons of slabs

Ladle Metallurgy Station

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6.3 - Preliminary Operating Cost Estimate

6.3.1 - Manpower Requirements

In order to arrive at wage and salary costs for the proposed facility, manning requirements were estimated for each department for both an upgraded one furnace operation producing up to 1,056,000 tons of slabs per year and an unmodified two-furnace operation producing up to 1,632,000 tons of slabs per year. The manning schedules were based on a 20 turn per week operation, 50 weeks per year. Manning is based on mini mill principles, where at times, when momentary extra labor is required, assistance is provided by mechanical and/or electrical maintenance personnel. Manpower costs are assumed to be fixed within the ranges of production achieved (i.e. up to 1.05 million tons; over 1.05 to 1.63 million tons). The summary of plant manpower requirements is given in Table 6.3.1.1.

6.3.2 - Labor Cost

In recent years, steel producers have been successfully negotiating concessions from the unions that have appreciably reduced labor costs. Mini mills, even those that employ members of the United Steel Workers Union, pay lower wages and salaries than do the larger integrated mills.

For purposes of this cost estimate, an average rate of $18.00 per hour was used. This rate includes a basic wage and fringe benefit package including holidays, vacation and medical coverage, but no profit sharing. It was assumed that the plant would be bought as a facility and not an operation and that there would be no pass through of LTV liabilities such as unfunded pensions. The labor rate was applied to all hourly employees, regardless of classification. Salaried employment costs were based on specific job levels as shown in Appendix G.

A summary of labor costs for both operating cases is given in Table 6.3.2.1.

TABLE 6.3.1.1

SUMMARY OF PLANT MANPOWER REQUIREMENTS

	1,056,000 tons/yr.		1,632,000 tons/yr.	
	Hourly	Salaried	Hourly	Salaried
	44	8	64	8
Melt Shop	32	7	56	7
Caster	51	5	51	5
Melt Shop/Caster Maintenance	28	6	44	6
Slab yard	28	4	44	4
Shipping	32	13	52	13
Central Maintenance	17	4	17	4
Quality Control	--	10	--	10
Sub Total	232	57	328	57
Production Planning	--	3	--	3
Administration	--	6	--	6
Plant Overhead	--	15	--	15
Sub Total	--	24	--	24
TOTAL	232	81	328	81

TABLE 6.3.2.1

SUMMARY OF PLANT MANPOWER COSTS

	1,056,000 tons/yr.		1,632,000 tons/yr.	
	Hourly	Salaried	Hourly	Salaried
Yard	1,584,000	239,200	2,304,000	9,200
Melt Shop	1,152,000	366,600	2,016,000	6,600
Caster	1,836,000	249,600	1,836,000	249,600
Melt Shop/Caster Maintenance	1,008,000	287,300	1,584,000	287,300
Slab Yard	1,008,000	176,800	1,584,000	176,800
Shipping	1,152,000	421,200	1,872,000	421,200
Central Maintenance	612,000	110,500	612,000	110,500
Quality Control	-----	295,100	-----	295,100
Subtotal	8,352,000	2,146,300	11,808,000	2,146,300
Production Planning	-----	92,300	-----	92,300
Administration	-----	237,900	-----	237,900
Plant Overhead	-----	529,100	-----	529,100
Sub Total	-----	859,300	-----	859,300
TOTAL	8,352,000	3,005,600	11,808,000	3,005,600
TOTAL PAYROLL COST	11,357,600		14,813,600	

6.3.3 - Scrap Cost

Scrap is the single largest element of cost in the production of steel slabs using the arc furnace route. The scrap iron and steel charged into the furnaces is made up of a combination of various types of purchased scrap and internal scrap which is returned to the furnaces.

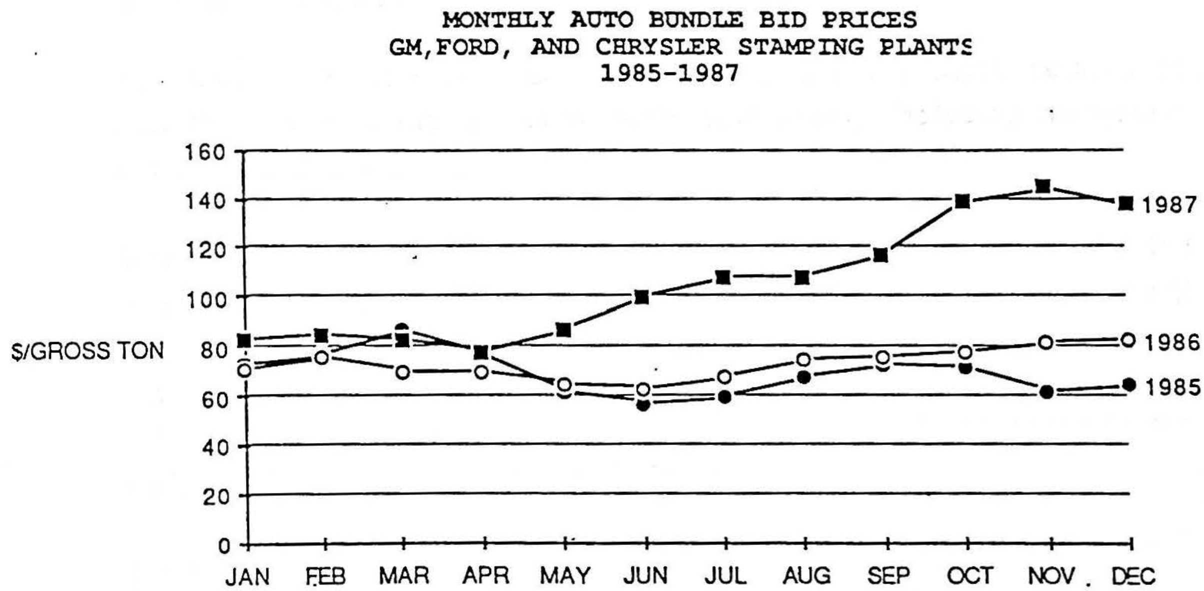
Each steel producer uses a mix of purchased scrap which enables it to make the steel chemistries required to meet the customer requirements at the lowest cost. Types of scrap available and their cost in each local area vary depending on the types of scrap produced by industry and recovery of obsolete metals.

The production of steel slabs for use in producing sheet and plate products requires a high degree of chemical control and a low level of impurities. Thus, the mix of scrap required for this operation will be weighted toward higher scrap grades, such as automotive stamping plant and other industrial scrap grades.

The details of the required mix of scrap grades, their availability from local or more distant locations, and the costs of the required scrap mix must be studied in depth in the feasibility study for this project. For this preliminary operating cost estimate an average scrap cost of $110 per gross ton has been assumed. As shown in Exhibit 6.3.3, this price is substantially above the average price of high quality scrap (new automotive bundles) over the past three years, but below the current price level.

According to the American Metal Market, the Pittsburgh area price for No. 1 Heavy Melting Steel Scrap (a reasonable proxy for a mix of higher and lower scrap qualities) averaged $91 per gross ton, delivered, during all of 1987, and $110 per gross ton, delivered, during the three months ending in January 1988. We have used this latter figure in this preliminary estimate of costs.

EXHIBIT 6.3.3


MONTHLY AUTO BUNDLE BID PRICES
GM,FORD, AND CHRYSLER STAMPING PLANTS
1985-1987
$/GROSS TON
160
140
120
100
80
60
40
20
0
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
1987
1986
1985

The following table summarizes the cost of metallics per net ton of slabs produced:

Type of Metallic	Usage	Price	Cost/nt Slabs
Purchased Scrap	0.992	$ 110	$ 109.10
Melt/Cast Revert	0.027	$ 100	$ 3.00
Metallics per net ton slabs	1.019		$ 112.10

6.3.4 Conversion Cost

The conversion cost per ton of slabs includes all costs related to converting solid scrap to continuously cast slabs, including management and production manpower.

When developing these cost figures, the project team assumed that the proposed facility would operate at a level producing approximately 1,056,000 or 1,632,000 tons per year of cast slabs. Certain materials and supplies will vary according to the specific number of tons produced, and, therefore, we have considered these cost elements as variable for analysis of intermediate production levels.

6.3.4.1 - Slab Production Costs

	$/ton of slab (all levels of output)
Variable Costs	
Ferroalloys and Additives	6.57
Charge Coke	0.60
Fluxes	1.50
Oxygen . . (250 ft^3/nt @ $0.30/100 $ft/^3$)	0.75

Nitrogen . (149 ft^3/nt @ $0.27/100 $ft/^3$)	0.40
Power . (25 kwh/ton @ $0.03/kwh)	15.75
Electrodes . (11.9 lbs/nt @ $1.25/lb)	14.88
Refractories	6.00
Natural Gas. (.55 mm Btu/nt @ $4.00)	2.20
Water (including treatment).	0.30
Supplies	2.50
Repair and Maintenance Materials	2.50
Solid Waste Disposal	2.58
Laboratory	1.00
Scrap Credit	(3.00)
TOTAL VARIABLE COST.	54.43

Fixed Costs	up to 1.056 million tpy	over 1.056 to 1.623 million tpy
Quality Control Expense.	0.28	0.18
Maintenance Labor and Supervision	1.91	1.59
Yard Expenses (fuel & utilities)	1.75	1.75
Direct Labor	5.28	5.71
Direct Supervision	0.95	0.95
G&A	0.82	0.53
TOTAL FIXED COSTS.	10.99	10.71
TOTAL CONVERSION COST/TON SLAB PRODUCED	65.52	65.24
METALLICS COST PER NET TON OF SLAB	112.10	112.10
TOTAL COST OF SLAB	177.62	177.34
Shipping		
Shipping Labor	1.09	1.15
Shipping Supervision	0.40	0.40
Shipping Supplies.	0.75	0.75
TOTAL SHIPPING COST.	2.24	2.30
TOTAL DIRECT COST OF SLAB PER TON	179.86	179.64

6.3.5 - Other Costs

Costs not included in direct cost of slabs include:

-- Depreciation
-- Selling Cost
-- Insurance and property taxes

These costs, plus interest on borrowed funds and the repayment of losses are treated in the following section.

6.4 - Preliminary Financial Analysis

6.4.1 - Financial Model Results

The financial characteristics and results, in terms of profitability, debt service capability, net present value of cash flows, and internal rate of return, have been analyzed for a steel slab venture using a computer financial model. The model and its results for one set of assumptions and inputs are shown in Exhibit 6.4.1. Assumptions are shown in detail on the first two pages of the exhibit, and include the following:

1. Investment of $230 million is made in 1988 and 1989. Ninety percent of the funds are borrowed at an interest rate, not including inflation (real interest) of 7%, and are paid back in equal annual installments over the project's life of 15 years. At todays inflation rate of approximately 4% p.a. a 7% real interest rate would be approximately equal to an active borrowing rate of 11%.

2. Operating costs are from the Hatch preliminary estimates, and are in constant 1988 dollars.

3. Additional fixed overheads of $5 million per year are assumed for insurance, local taxes, and selling expenses.

FINANCIAL/OPERATING MODEL, SOUTH WORKS SLAB VENTURE
BASE YEAR ASSUMPTIONS (1988$)

Financial Assumptions

- -

Debt Ratio
Interest Rate (Real)
Change in Fixed Assets
Tax Rate (34% Fed)

Production Assumptions
Mill Capacity (000 tons/year)
Production Yield
Commercial Startup

Cost Assumptions
Fixed:
GS&A
Insurance
Rent
Fixed Cost Inflation Factor
Variable:

Scrap
Labor *
Electricity
Gas
Electrodes
Additives and Alloys
Oxygen
Maintenance
Other
Scrap Credit
Revenue Assumptions

- -

1989 Weighted Average Slab Price ($/ton)
Slab Sales Price Inflation Factor

NOTE: Labor cost assumptions based on: number of m
annual cost
1995 employ

FINANCIAL/OPERATING MODEL,SOUTH SIDE SLAB VENTURE
PRODUCT MIX AND COST/PRICE ASSUMPTIONS (1986$)

	2002	2003	2004
Annual Capacity Utilization (%)	100%	100%	100%
Annual Production (000 tons)	1632	1632	1632
Mill Product Mix (000 tons)			
Low Carbon	1632	1632	1632
Specials	0	0	0
Slab Price per Ton fob Plant			
Low Carbon	$220	$220	$220
Specials	$250	$250	$250
Weighted Avg Slab Price	$220	$220	$220
Scrap Price, $ per net ton			
Low Carbon	$100	$100	$100
Specials	$110	$110	$110
Weighted Avg Scrap Cost	$100	$100	$100
Depreciation Schedule ($000)			
Mill Equipment: $220 million;15 years, straight line	4,667	$14,667	$14,667
Buildings, etc: $ 10 million; 30 years, straight line	$333	$333	$333
Total Depreciation	5,000	$15,000	$15,000
Debt Repayment Plan			
Interest Payment	2,898	$1,932	$966
Principal Payment	3,800	$13,800	$13,800
Total Payment	6,698	$15,732	$14,766

FINANCIAL/OPERATING MODEL, SOUTH WORKS SLAB VENTURE
PER TON OPERATING AND FIXED COSTS

	2002	2003	2004
Annual Sales	1583	1583	1583
Annual Production	1632	1632	1632
Sales Price ($/ton)	$220	$220	$220
Inflated Annual Costs ($/Ton)			
Scrap	112.00	112.00	112.00
Labor	9.36	9.36	9.36
Electricity	15.75	15.75	15.75
Gas	2.20	2.20	2.20
Electrodes	14.88	14.88	14.88
Additives and Alloys	6.57	6.57	6.57
Oxygen	0.75	0.75	0.75
Maintenance	2.50	2.50	2.50
Other	14.53	14.53	14.53
Scrap Credit	-3.00	-3.00	-3.00
Total Production Cost	175.53	175.53	175.53
Debt Repayment Plan			
Interest Payment	1.83	1.22	0.61
Principal Payment	8.72	8.72	8.72
Total Payment	10.55	9.94	9.33
Fixed Overheads	3.16	3.16	3.16
Total Interest, Principal, and Fixed Overhead	13.71	13.10	12.49

FINANCIAL/OPERATING MODEL, SOUTH SIDE SLAB VENTURE
INCOME STATEMENT (current $000)

	2002	2003	2004
Production (000 tons)	1632	1632	1632
Sales Price (Weighted Average $/ton)	$220	$220	$220
Sales Volume (000 tons)	1583	1583	1583
Sales ($000)	3,269	$348,269	$348,269
Less:Cost of Goods Sold			
Scrap	2,784	$182,784	$182,784
Other Variable Operating Costs:			
Labor	5,272	$15,272	$15,272
Electricity	5,704	$25,704	$25,704
Gas	3,590	$3,590	$3,590
Electrodes	,276	$24,276	$24,276
Additives and Alloys	),722	$10,722	$10,722
Oxygen	1,224	$1,224	$1,224
Maintenance	,080	$4,080	$4,080
Other	3,713	$23,713	$23,713
Scrap Credit	,896)	($4,896)	($4,896)
Total Plant Cost	,469	$286,469	$286,469
Plant Cost per Ton	$181	$181	$181
Contribution Margin	1,799	$61,799	$61,799
Fixed Operating Cost			
GS&A	$400	$400	$400
Insurance + Rent	,600	$4,600	$4,600
Total Cost Of Goods Sold	,469	$291,469	$291,469
Cash Flow From Operations	,799	$56,799	$56,799
Less:Depreciation	,000	$15,000	$15,000
Operating Profit	,800	$41,800	$41,800
Less:Interest on Debt	,898	$1,932	$966
Profit Before Tax	,902	$39,868	$40,834
Less:Income Tax	,227	$13,555	$13,883
Net Profit After Tax	,675	$26,313	$26,950

FINANCIAL/OPERATING MODEL, SOUTH SIDE SLAB VENTURE
CASH FLOW STATEMENT (000 $)

	01	2002	2003	2004
Net Profit After Tax	8	$25,675	$26,313	$26,950
Plus: Depreciation	0	$15,000	$15,000	$15,000
Operating Cash Flow	7	$40,675	$41,312	$41,950
Less: Working Capital Additions	$0	$0	$0	$0
Changes in Fixed Assets				
Debt Additions				
Debt Repayments (Principal Only)	0)	($13,800)	($13,800)	($13,800)
Net Cash Flow	7	$26,875	$27,512	$28,150
Cash Flow Before Financing	7	$26,875	$27,512	$28,150
Cash Flow From Operations	9	$56,799	$56,799	$56,799
Interest Coverage Ratio	70	19.60	29.40	58.80
Debt Service Coverage Ratio	22	3.40	3.61	3.85

Present Value of Discounted Cash Flows Dec. 1,

Internal Rate of Return on Total Capital
Internal rate of Return on Equity Capital

4. Sales volume represents 50% of capacity in 1990, 85% in 1991, 90% in 1992, and 100% from 1993 on. Selling price is $220 per ton, f.o.b. plant, in constant 1988 dollars.

5. After 1990, employment is fixed at the level estimated by Hatch Associates for a 100% of capacity operating level. (409 total employees.)

6. Working capital is assumed to be equal to 60 days of sales.

7. Income taxes are 34% of taxable income.

8. Depreciation is based on 15 years, straight line for plant and equipment ($220 million) and 30 year straight line for buildings ($10 million). (Note: Depreciation does not affect cash flow directly.)

9. Financial assumptions are strictly "proforma" and are believed to be conservative. Cash flows could possibly be enhanced through different forms of capital and ownership structures including Employee Stock Ownership Trusts.

6.4.2 - Financial Model Results

Results of this preliminary analysis are shown in detail on the last three pages of Exhibit 6.4.1. Highlights of the results are:

- Total slab costs, before interest and taxes, are under $180.00 per ton with scrap at $100 per net ton. This puts the venture in the lowest quartile of cost of slab production (BOF or arc furnace) in the eastern half of the U.S.

After four years of operation and debt payments, the level of sales necessary to break even, after all interest, debt, and fixed overhead costs, is approximately 50% of capacity, or 800,000 tons per year.

Cash flow from operations is more than double the amount required to service the interest and principal from the third year of operations on. (Debt service coverage ratio = 2.0 or higher).

The internal rate of return (IRR) of the total cash flow of the venture is 2.1% but the return to the equity owner would be 28%. (No residual value has been included for the period beyond the 15th year).

The preliminary financial analysis indicates that the proposed venture has a reasonable probability of success. Any specific investors will need to examine the venture under a set of assumptions on volumes, prices, costs, and investments with which they are comfortable, as well as to refine the estimates of the cost and investment parameters. In addition, potential investors would need to confirm that potential slab purchasers would be willing to commit to buying product from the venture.

6.4.3 - Risk and Sensitivity Analysis

Examination of the venture under a series of independent alternative assumptions on prices, scrap costs, power costs, manning, and financial cost on structure was undertaken to determine the sensitivity of the results to such changes. The alternative assumptions and their effects on five measures of the venture's viability are shown in Exhibit 6.4.3.

6.4.3.1 - Selling Prices

As might be expected, the venture's viability is most sensitive to changes in the slab selling price. At an average price of $250 per ton, the venture's annual profit and return on equity are increased 2 and a half times, and the venture's return on total capital increases to a very attractive 14.5%. Debt service coverage exceeds 4 times by the third year of operation. If the sales price averages $200 per ton, returns are negative on both total and equity capital, and positive earnings are not achieved until at least the fifth year of operation. Until the fourth year, cash flow from operations is insufficient to cover interest and debt requirements.

6.4.3.2 - Scrap Cost

The venture's results are also very sensitive to scrap costs (all else being equal). A reduction in average scrap cost to $85 per net ton makes the project very attractive from all measures. An increase to $115 per net ton, while causing negative returns on both total and equity investment, would permit the venture to be profitable and cover its debt service needs from the fourth year of operation on.

Traditionally, scrap prices and steel product selling prices have moved together; both are related to the strength of steel demand. This may make the concept of tying selling prices for slab to selling prices for steel product attractive to the venture, as well as to the slab buyers. Such contracts for semifinished steel have been discussed by several potential slab customers surveyed in this study.

6.4.3.3 - Production Cost Elements

Aside from scrap, two of the largest cost elements are electric power and employment costs. In the base assumptions, a power cost of $.03/Kwh has been used, based on the statements made by a representative of Duquesne Light Company. If the power rate were increased to $.05/Kwh, the project's return on equity reduced by more than a factor of 2. The venture would, however, continue to be profitable and able to cover its debt service requirements from the third year of operation on.

In certain power-intensive industries like primary aluminum, power suppliers in certain regions have accepted the concept of power rates tied to metal prices, thereby encouraging high levels of output throughout the business cycle. This could be a very interesting concept for this venture and Duquesne Power.

Employment has been assumed to be fixed after the first year of start-up at 409 total hourly and salaried workers. Should employment requirements be larger for the same output levels - 500 total, return on total capital would decline to 0.9 percent but all other financial results would continue to be nearly as attractive as in the base case assumptions.

Increasing the average employment cost for hourly workers from $18.00 to $22.00 per hour results in only a moderately less attractive result, while decreasing it to $15.00 per hour results in a moderately more attractive result. Labor cost, with a reasonable range is not a critical factor in the venture's viability.

<u>6.4.3.4 - Financing</u>

The base case assumed a real (no inflation) interest rate of 7%. Reducing or increasing this rate to 5% or 9% has relatively minor effects on the project's financial results. Even at 9%, the venture's debt service coverage ratio exceeds 2 by the fourth year of operation.

If the project were to rely less on borrowings and more on equity (75% debt versus 90% in the base case), it still earns an attractive 20.6% on equity, while increasing its debt service coverage ratio to nearly 3 in year 4.

Of course, this would require the project's owners to put up $57.5 million up front, instead of $23 million in the base case.

6.5 - Conclusions

The preliminary analysis of the South Works Slab Venture indicates that a viable operation may be possible based on the production of semifinished steel slabs in the existing electric arc furnace shop and a new continuous slab caster. The markets for such products are existing steel rolling mills which are expected to be seeking substantially larger volumes of semifinished slabs over the next several years. Production costs at this facility appear to be in the lower end of the existing industry capacity, and the venture should be able to be competitive, on a delivered basis, with foreign producers. The project is attractive as a highly leveraged venture, producing a high return for the equity investors while being able to service its debts with a reasonable margin of safety for its lenders.

Based on the preliminary findings, we recommend that this possible venture be pursued with a high degree of immediacy by those governmental and private groups concerned about retention of steel industry activity in the Allegheny County region.

EXHIBIT 6.4.3.

SENSITIVITY AND RISK

	Internal Rate of Return to: Total Capital %	Equity %	After Tax Profit 1994 Mill $	Slab Production Cost 1994 $/ton	Debt Service Coverage Ratio 1994
*Base Assumptions	2.1	28.0	20.575	181	2.33
SALES PRICES					
1. HIGHER SALES PRICE ($250/ton)	14.5	69.9	51.919	181	4.27
2. LOWER SALES PRICE ($200/ton)	neg.	neg.	-.487	181	1.03
SCRAP COST					
1. LOWER SCRAP COST ($85/NT)	10.1	55.3	38.670	164	3.59
2. HIGHER SCRAP COST ($115/NT)	neg.	neg.	2.479	198	1.20
PRODUCTION ELEMENTS					
1. HIGHER POWER (.05/Kwh)	neg.	11.4	9.265	192	1.62
2. HIGHER MANPOWER (500 people)	0.9	25.2	18.332	183	2.19
3. HIGHER LABOR COSTS ($22.00/hour)	1.1	25.1	18.789	183	2.19
4. LOWER LABOR COSTS ($15.00/hour)	2.8	30.2	21.914	180	2.41
FINANCING ELEMENTS					
1. LOWER INTEREST (5%)	3.0	32.1	22.578	181	2.66
2. HIGHER INTEREST (9%)	1.2	24.3	18.571	181	2.07
3. LOWER DEBT/EQUITY (75%)	3.8	20.6	21.743	181	2.79

* Sale price = $220/ton; scrap price = $100/net ton;
Power cost = $.03/kwh; manpower = 409 people;
Labor cost = $18.00/mh; interest = 7%; debt/equity = 90%ˆE

7.0 COMMENTS PROVIDED BY THE STEEL RETENTION STUDY ADVISORY COMMITTEE

United Steelworkers of America

District 20 -- Steel City Local Union No. 1272

2330-32 EAST CARSON STREET, SOUTH SIDE

Pittsburgh, Pa. 15203

9

381-2843, 2844

February 26, 1988

Advisory Committee
Phase I Steel Retention Study

Comment: South Side Works of LTV

The workforce at the South Side Works of LTV Steel, consisted of experienced, efficient, productive, and dedicated employees who continually refined and improved their steel making competencies as evident by the two records set in 1984 and 1985.

1984 - Set a World Record of 86.7% for primary direct shipments of steel slabs.

1985 - Set a new shop tap to tap time record of 3:21 per heat for the Electric Furnaces.

Vincent Mackewich
Vincent Mackewich
President

Charles R. Dumont
Charles R. Dumont
Electric Furnace Committee

Rich Cope
Electric Furnace Committee
Richard A. Cope

COMMENTS

(On Metals Retention Study's Findings and Analysis of the 160" Plate Mill - Homestead)

by

STEEL VALLEY AUTHORITY

The Steel Valley Authority wishes to respond to that portion of the Steel Retention Study dealing with the USX-USS plant at Homestead,Pa.; specificly the 160" Plate Mill. The Steel Retention study provides only a superficial analysis of the 160" plate mill. The limited information presented does not provide the basis for an adequate evaluation of the facility.

The lack of detail is reflected in the disregard for the equipment present in the facility. The 160" Plate Mill has four in & out or batch furnaces that contain slab charges that also "feed" the rolling mill and these furnaces are in reasonable condition as are the two continuous furnaces deemed by the report as needing relined. Furnace relining is a periodic requirement that does not reflect the necessity of reconstructing a furnace. Refractory,or brick work,like the metal,water cooled skids within the furnace,are a wear item needing periodic maintenance and periodic replacement. While this process is not without cost;the cost is not prohibitive and the process is not debilitating to a start-up of the 160" mill.

There is a piece of equipment not mentioned in the report and that is the Flash Furnace located just East of the four high mill stand. The furnace is a state-of-the-art quick reheating furnace and is in good, operable condition. The process requiring this furnace is the rolling of armor plate; a product line profitably rolled at the 160" mill.

A major portion of the 160" mill not mentioned in the report is the 160" Mill Plate Treating Line. This facility has two furnaces for plate hardening and two furnaces for the tempering of plate as well as a stainless furnace and quenching facilities. All of the equipment is in good condition.

Another major portion of the 160" Plate Mill ignored by the report is located at the Eastern portion of the Homestead plant and is referred to as the " New Stainless Facilities ". These facilities contain extensive ,relatively new,plate processing equipment. The facility has acid tanks,sand blasters (both vertical & Horizontal),plate shearing and shipping equipment. Extensive armor plate processes were performed in this structure, i.e. plate grinding,inspection,and painting. The New Stainless facility is in good condition.

The Scale Breaker Stand deemed in poor condition due to "deteriorated machine surfaces" was not evaluated as to its operation nor the equipment available at the 160" mill. It should be noted that during the course of rolling at the 160" mill the scale breaker was not routinely required but could be by-passed.. This method of rolling,while not advocated,does not place such an importance on the condition of the scale breaker and this device could be brought up to standards in a short period of time with reasonable costs. This repair would be carried out in the roll repair shop located within the 160" mill. Routine maintenance on the 160" four high mill stand and the scale breaker rolls was routinely performed in this shop. The Steel Retention Study also noted machine surface flaws on the rolls. These flaws can easily be corrected by routine maintenance using one of the lathes at the facility specifically designed to hande the 160" mill rolls.

Relative to the batch and continuous furnaces, comments stating they are not capable of heating slabs uniformally are grossly erroneous. The continuous furnaces did maintain zone heating of slabs within the furnace. Adequate automated controls were installed to maintain rolling temperatures of slabs and could be varied as to slab size. A narrow product line,such as used in mini mills, would be speedily handled through these furnaces. The batch furnaces were also heated by automated systems adding to their efficiency in terms of fuel costs and speed in achieving rolling temperatures.

Another process not mentioned in the report concerned the straightening of large, thick, plates produced on the 160" mill. A device known as the 10,000 ton press; formerly controlled by the Forgings Division of the Homestead plant and later controlled by the Slab & Plate Division, did routinely striaghten cold plates.

Report findings relative to manning of the 160" Plate Mill are without foundation. Production and maintenance crews are available that had worked the plate facility in all capacitys. These former employees have had extensive experience working in the 160" mill lessening any period of training for new employees. At least one operating turn could be manned totally at the outset of production.

The Steel Retention Study provides only a cursory evaluation of the 160" Plate Mill at Homestead. Statistics relative to former production levels at the 160" mill are not evident in the report and it is assumed were never considered as a measure of potential should the facility be properly evaluated.

Another very important consideration not dealt with in the report is the supplying of semi-finished steel slabs to the 160" Plate Mill from the highlight of the report; the re-start of the LTV electric furnaces. Slabs could be sent very cheaply to the Homestead site by available rail or river transportation. These slabs could be transported while still hot thus shortening the re-heat time. The coupling of the LTV furnace project to the 160" Plate Mill would provide a greater impetus to continue both facilities.

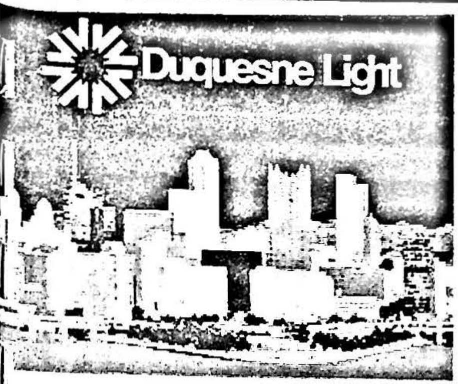
While the Steel Valley Authority agrees that the market for steel plate is currently depressed we do not agree that the market will continue at these depressed levels over the long term. Over the past seven years infrastructure repair in the United States has been at a very low level, a level much below what is needed to maintain our locks, dams, and bridges. If the Federal government initiates a major infrastructure repair program in the next administration there would be a substantially increased demand for steel plate. If the 160" plate mill is torn down or sold to foreign buyers then a restart would be impossible. In this situation our locks, dams, and bridges would have to be rebuilt with foreign steel. The Steel Valley Authority believes that the 160" plate mill should be mothballed until a final determination of the feasability of restarting the South Side furnaces is made. At that point a feasability study should be made to determine whether the plate mill can be economically linked to the South Side furnaces.

EDWARD SALAJ - *SVA OUTREACH COORDINATOR*

ROBERT ERICSON - *SVA PROJECT COORDINATOR/*
Advisory Board Member,-
Metal Retention Study

CHARLES MCCOLLESTER - *SVA BOARD MEMBER /*
Advisory Board Member,
Metal Retention Study

MICHAEL STOUT - *SVA BOARD MEMBER /*
Advisory Board Member,
Metal Retention Study



PITTSBURGH HAS THE
POWER TO SHAPE YOUR FUTURE

February 29, 1988
EDD:0901

Director Raymond L. Reaves, Chairman
Steel Retention Study Management Committee
County of Allegheny Planning Department
1300 Allegheny Building
429 Forbes Avenue
Pittsburgh, PA 15219

Dear Director Reaves:

In anticipation of the favorable outcome of Phase I of the STEEL RETENTION STUDY, Duquesne Light created a <u>High Voltage Power Supply</u> (HVPS) rate, effective December 21, 1987, which is favorable to the operation of a "state of the art" electric arc furnace installation such as that being studied for the LTV South Side furnace(s). It is applicable to customers whose Demands exceed 30,000 KW and purchase power from Duquesne Light at 69 KV or higher. It also contains an Off-Peak provision wherein electric energy is available at $.02 per KWH.

Because electric power is a prime ingredient in the production of electric arc furnace steel, I have enclosed copies of the HVPS Rate for insertion into the "STEEL RETENTION STUDY - FINAL REPORT" for the convenience of those wishing to become more familiar with the Rate's applicability.

Duquesne Light remains committed to maintaining a proactive approach to economic development. The Steel Retention Study's participants and the communities we serve, can continue to depend on our unyielding determination to enhance the strength of our region's economy.

Sincerely,

Leo J. Spaeder, Jr.
Manager
Economic Development Dept.

Attachment

Economic Development Department • Duquesne Light Company • 301 Grant Street • Pittsburgh, PA 15279 • (412) 393-6305 • 1-800-345-5567

Rate HVPS - High Voltage Power Service

Availability

Available to customers with Contract On-Peak Demands greater than 30,000 KW where service is supplied at 69,000 volts or higher.

Monthly Rate

Capacity Charge

First 30,000 Kilowatts or less of On-Peak Demand for	$222,000
Additional Kilowatts of On-Peak Demand at	$7.78 per Kilowatt

Energy Charge

On-Peak Energy Charge	3.700 cents/Kwh
Off-Peak Energy Charge	2.000 cents/Kwh

Where:

Monthly Kilowatt-hours billed at the Off-Peak Energy Charge cannot exceed 75% of the total Kilowatt-Hours.

NOR

Monthly Kilowatt-Hours billed at the Off-Peak Energy Charge cannot exceed 500 Kwh/KW of the Billing Demand

All excess Off-Peak Energy will be billed at 3.70 cents per Kilowatt-Hour.

Minimum Charge

The Minimum Charge shall be the Capacity Charge based on 70% of the Contract On-Peak Demand, but not less than $222,000.00.

Riders

Bills rendered under this schedule are subject to the charges in Rider Nos. 10 and 15. No other Riders apply.

Late Payment Charges

Bills will be calculated on the rates stated herein, and are due and payable on or before fifteen days from the date of mailing of the bill to the ratepayers. The bill

(C) INDICATES CHANGE

Rate HVPS - High Voltage Power Service

(Continued)

Late Payment Charges (Continued)

is overdue when not paid on or before the due date indicated on the bill. An overdue bill is subject to a Late Payment Charge of 1.25% interest per month on the full unpaid and overdue balance of the bill. The Charge shall be calculated on the overdue portions of the bill and shall not be charged against any sum that falls due during a current billing period.

Determination of Demand

Individual Demand, except in unusual cases, will be determined by measurement of the average kilowatts during the fifteen-minute period of greatest kilowatt-hour use during the billing period. Individual Demands will be adjusted for power factor by multiplying by

$\{0.8 + (0.6 \frac{\text{Reactive kilovolt-ampere hours}}{\text{Kilowatt-hours}})\}$, where such multiplier will be

not less than 1.00 or more than 2.00.

The Billing Demand will be the sum of the Individual Demands of each metered service adjusted for power factor as defined above, but not less than 30,000 kilowatts nor less than 70% of the Contract On-Peak Demand, nor less than 33 1/3% of the Contract Off-Peak Demand, whichever is the greater.

On-Peak - Off-Peak Contract Demand

The Contract On-Peak Demand is the maximum electrical capacity in kilowatts which the Company shall be required by the contract to make available during the On-Peak hours to the customer.

The Contract Off-Peak Demand is the maximum electrical capacity in kilowatts which the Company shall be required by the contract to make available during the Off-Peak hours to the customer.

The customer shall not establish a demand greater than 105 percent of the individual demands specified in the customer's contract unless written approval shall first have been obtained from the Company. If the customer establishes a repeated pattern of exceeding the Contract Demand, the Contract Demand may be raised to the highest Demand established for the remaining term of the contract.

Demands and Energies

The On-Peak Demand is the Demand during On-peak hours.

The Off-Peak Demand is the Demand during Off-Peak hours.

The Billing Demand is the On-Peak Demand except where the Off-Peak Demand is more than three times the On-Peak Demand. Then the Billing Demand will be one-third (33 1/3%) of the Off-Peak Demand.

Rate HVPS - High Voltage Power Service

(Continued)

Demands and Energies (Continued)

Demands and Energies will be determined on an Individual Demand basis and corresponding quantities will be combined to obtain Demands and Energies for billing purposes.

On-Peak and Off-Peak Hours

The following hours will be designated as On-Peak Hours:

Monday's Thru Thursday's	Friday's
10:00 a.m. to 9:00 p.m.	10:00 a.m. to 5:00 p.m.

The remaining hours including the generally observed holidays of New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, and Christmas Day shall be designated os Off-Peak hours. The Company may, upon written notice to customers taking service under this Rate and upon filing same with the Pennsylvania Public utility Commission, make such changes in the On-Peak hours as it may from time to time deem necessary.

Contract Provisions

Contracts shall be written for an original term of not less than five years for Contract Demand of 100,000 kilowatts or less, and not less than ten years for Contract Demands in excess of 100,000 kilowatts. Such contracts shall continue in force after the expiration of the original term until one year following the date of written notice of cancellation by either party. Such notice of cancellation may not be given earlier than one year before the expiration of the original term.

The Company reserves the right to refuse contracts hereunder if, in its judgement, its generating or transmission capacity is no more than adequate to meet the requirements of its existing customers.

Where the customer has established an energy management and conservation program and has demonstrated to the satisfaction of the Company that such program has resulted in a reduced Demand, the Company will, upon the customer's request, amend the contract to reflect such reduced Demand for the purpose of calculating the Minimum Charge, but in no case shall the Billing Demand be reduced to less than 30,000 kilowatts if the customer remains on this Rate.

Voltage Control Provision

The customer shall be required to operate his equipment in such a manner that the voltage fluctuations produced thereby on the Company's system shall not exceed the following limits, the measurements to be made at the Company's substation nearest (electrically) the customer.

Rate HVPS - High Voltage Power Service

(Continued)

Voltage Control Provision (Continued)

(1) Instantaneous voltage fluctuations, defined as a change in voltage consuming two seconds or less, shall not exceed 1-1/4% more than six times a day, of which not more than one such fluctuation shall occur between 6:00 p.m. and midnight, and in no case shall such fluctuations exceed 3%.

(2) Periodic voltage fluctuations, where the change in voltage consumes a period from 2 seconds to 1 minute, shall not exceed 1-1/4% more than five times an hour, and in no case shall such fluctuations exceed 3%.

Interruptible Service

Where a customer contracts for interruptible load and agrees to the "Special Terms and Conditions" listed below, the Capacity Charge of this rate will be reduced by a $2.00 per KW credit of contracted interruptible load.

Special Terms and Conditions

To be eligible for the Interruptible Service the customer must agree to the following terms and conditions:

1. The Company must have unilateral, irrevocable control of the customers equipment used to disconnect the interruptible load from its electric supply. The irrevocable control of the customers equipment used to disconnect the interruptible load applies to the period of the interruption.

2. The system would be designed to provide a warning to the customer of imminent interruptions. However, Duquesne Light would reserve the right to interrupt service to the interruptible load at any time without advance notice to the customer. Subject to this reservation, the Company will endeavor to make available to the customer capacity equal to the demand specified in the contract for at least 80% of the hours in any calendar month and 90% of the hours in any calendar year. In all cases it is the customers responsibility to restore the load following notification from Duquesne that the interruption period is over.

3. The Company shall not be liable for any loss, cost, damage, or expense to customer caused by the disconnection of the contracted-for interruptible load from its electric supply.

4. The interruptible portion must be load from facilities that the customer utilizes on a regular basis between 10:00 a.m. and 9:00 p.m. on each day throughout the year except Saturdays, Sundays, and generally observed holidays. If the customer ceases to utilize such facilities for more than 60 days, the customer must notify the Company.

Rate HVPS - High Voltage Power Service

(Continued)

Special Terms and Conditions (Continued)

5. Customers will be responsible for installing breakers, an interfacing relay, and for making any necessary wiring, structural, or equipment location changes to allow isolation of the interruptible portion of the load without affecting the remainder of the service.

6. The Company will install, own (or control the lease), and maintain the transmitter, communication channel, receiver, and relaying equipment utilized to operate the customer-owned and installed and customer-maintained circuit breaker utilized to interrupt the interruptible load. The Company will install appropriate monitoring equipment on the interruptible service or circuit breaker to enable the Company to determine at a later date that the interruptible load was interrupted. The customer is responsible for the safety and proper operation of the customer's circuit breaker and associated equipment.

7. Interruptible load will be interrupted as a result of overloads on the transmission, subtransmission, and distribution systems on exactly the same basis as firm load customers are interrupted.

8. Where the customer's entire load is under a load management device, the customer must make provision so that the load management device does not recognize the loss of the interruptible load.

9. The amount of interruptible load that is available will be determined solely by the Company and will be contracted for a first-come first-served basis.

Generation Avoidance

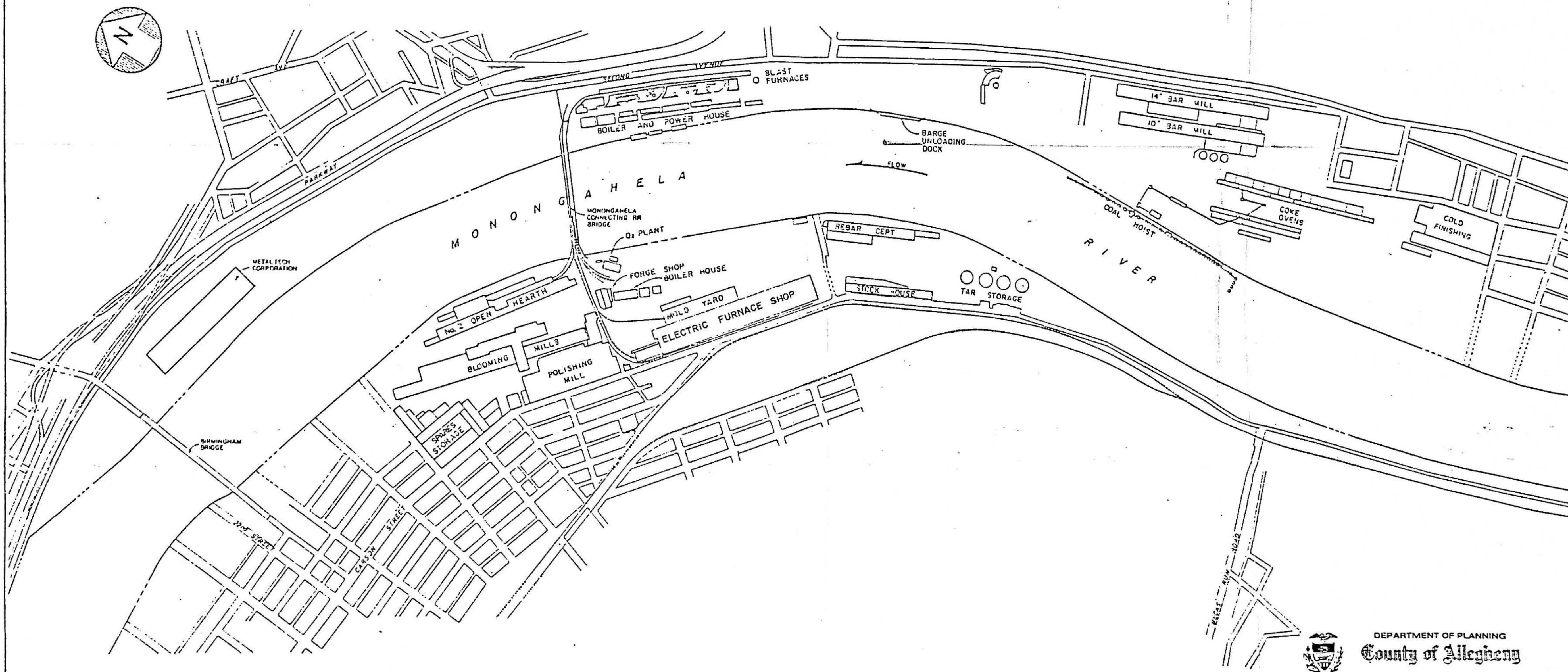
Generation Avoidance energy provides an option to customers who produce electricity for their own use by utilizing their own internal generating equipment. The customer may purchase energy in excess of that contracted for on this Rate and avoid the increased use of alternate energy sources.

Prior to the start of each billing month, the customer must inquire to the availability of generation avoidance energy for the billing month. When generation avoidance energy is available, the Company and the customer will mutually establish the demand threshold for generation avoidance energy. All kilowatt-hours in any 15 minute On-Peak metered period that exceed the monthly stipulated demand level will be considered generation avoidance energy. Generation Avoidance energy will be billed at the average base rate price resulting from the charges calculated for the demand and energy under this Rate.

Facilities Charge

Customer must pay for all new or additional facilities installed on the premises with the exception of meters and metering equipment.

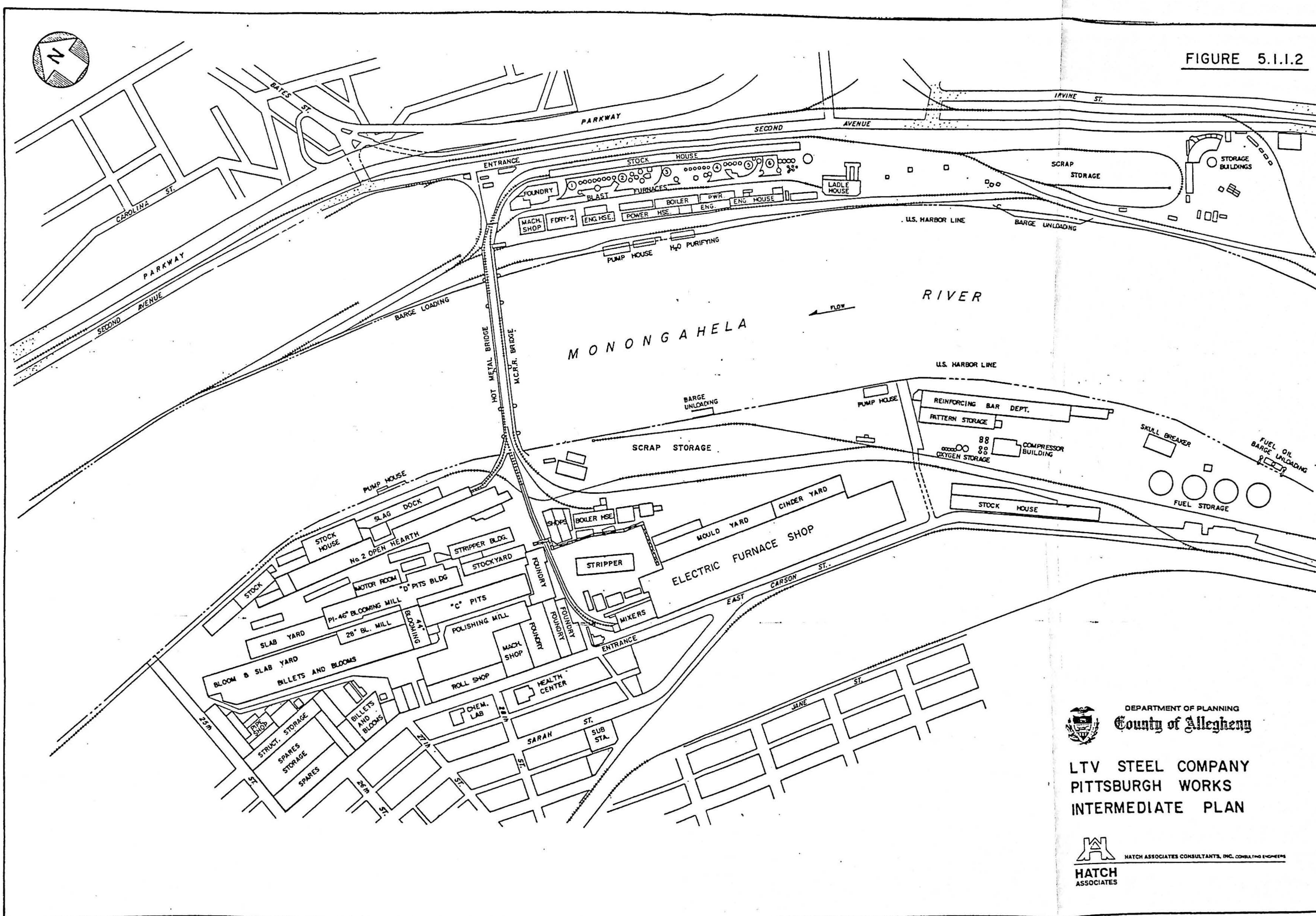
FIGURE 5.1.1.1



DEPARTMENT OF PLANNING
County of Allegheny

LTV STEEL COMPANY
PITTSBURGH WORKS

HATCH ASSOCIATES CONSULTANTS, INC.
HATCH
ASSOCIATES



DEPARTMENT OF PLANNING
County of Allegheny

LTV STEEL COMPANY
PITTSBURGH WORKS
INTERMEDIATE PLAN

HATCH ASSOCIATES CONSULTANTS, INC. CONSULTING ENGINEERS
HATCH ASSOCIATES

FIGURE 5.2.1

LTV Steel Company

SOUTH WORKS

Pittsburgh, PA

	INSTALLATION DATE	CONDITION	PRODUCT RANGE	PRODUCTION CAPACITY (ANNUAL)	PRODUCTION LIMITATIONS	CAPITAL COST TO STARTUP				
COKE OVENS	P1: 1960 P2: 1961 P3-NORTH: 1961 P3-SOUTH: 1961 P4: 1963	IN OPERATION		P1: 1020 TPD P2: 1020 TPD P3-NORTH: 1020 TPD P3-SOUTH: 1020 TPD P4: 1020 TPD		NONE				
ELECTRIC ARC FURNACES	1979	IN GOOD REPAIR WITH ALL MAJOR COMPONENTS INTACT- SHUTDOWN IN 1985	CARBON - 79% ALLOY - 21%	1,764,000 T	LAYOUT REQUIRES EXCESSIVE SCRAP HANDLING.	MINOR TO STARTUP - HOWEVER MAJOR INVESTMENT IN A CONTINUOUS CASTER IS NECESSARY TO MAKE SHOP VIABLE.				
46" BLOOMING MILL		IN POOR CONDITION- REQUIRES A COMPLETE REBUILD OF SOAKING PITS.	BLOOMS: 10"x10" TO 13"x13" SLABS: 3½" TO 14" THICK 22" TO 62½" WIDE	2,100,000 T	CANNOT COMPETE WITH MODERN CONTINUOUS CASTER OPERATIONS	MAJOR				
14" BAR / STRUCTURAL MILL	1931	- MILL IS VERY OLD AND NOT IN AS GOOD A STATE OF REPAIR AS THE 10" MILL. - HAS NOT BEEN UPGRADED. • LACKS NEWER TECHNOLOGY PRESENT ON COMPETITIVE MILLS	ROUNDS: 1 3/8" TO 4 9/16" SQUARES: 1 9/32" TO 2½" HEXAGONS: 1 5/16" TO 2 5/16" DIAMOND BARS: 1 1/8" TO 2" ROUND CORNERED: 1" TO 3½" SQUARES	360,000 T	Nº 1 THROUGH Nº 4 SAME AS 10" MILL. 5) COMMON DRIVE MAKES PRODUCT WITH GOOD DIMENSIONAL QUALITY DIFFICULT TO OBTAIN	SAME AS 10" MILL				
10" BAR / STRUCTURAL MILL	1953	• MILL APPEARS TO BE IN GOOD REPAIR AND HAS BEEN MOTHBALLED WITH SUFFICIENT CARE TO ENABLE A FUTURE STARTUP. • HAS NOT BEEN UPGRADED • LACKS NEWER TECHNOLOGY PRESENT ON COMPETITIVE MILLS	ROUNDS: ½" TO 1 3/8" SQUARES: 7/16" TO 7/8" HEXAGONS: 15/32" TO 1" DIAMOND BARS: ½" TO 1" FLATS: 3/16"x1" TO 9/16"x3½" NUT STEEL: 9/16"x1" TO 7/8"x1½" ROUND CORNERED: 7/16" TO 7/8" SQUARES	360,000 T	1.) LACK OF A DEDICATED BILLET CASTER TO SUPPLY MILL REQUIRES PURCHASE OF BILLETS ON OPEN MARKET OR CONVERSION OF BILLETS FROM OTHER LTV SITES (BOTH COST PROHIBITIVE) 2.) NON-RECUPERATIVE FURNACE ADDS FUEL COST. 3) POOR PRODUCT SURFACE QUALITY & DIMENSIONAL ACCURACY. 4.) LABOR INTENSIVE FINISHING END.	TO UPGRADE THIS FACILITY TO MAKE IT COMPETITIVE IN TODAYS MARKET WOULD BE EXTREMELY COSTLY AND STILL LEAVE A LAYOUT THAT IS OUTDATED AND INEFFICIENT.				

FIGURE 5.2.

LTV Steel Company

ALIQUIPPA WORKS

Aliquippa, PA

	INSTALLATION DATE	CONDITION	PRODUCT RANGE	ANNUAL PRODUCTION CAPACITY	PRODUCTION LIMITATIONS	CAPITAL COST TO STARTUP
COKE OVENS	A-1 : 1945 A-4 : 1948 A-5 : 1975	SHUTDOWN SEPT. 1979 SHUTDOWN SEPT. 1979 SHUTDOWN SEPT. 1984		A-1: 1568 TPD A-4: 1568 TPD A-5: 2400 TPD		MAJOR
BLAST FURNACES	A-1: 1969 A-2: 1970 A-4: 1966	A-4 SHUTDOWN IN OCTOBER 1981 AND RELINED BUT NEVER RESTARTED - NOW COLD A-1 & A-2 NEED RELINES	BASIC	A-1: 2200 TPD A-2: 3200 TPD A-4: 4200 TPD		MAJOR
BASIC OXYGEN FURNACES	1968	SHUTDOWN JULY 1985	CARBON STEEL, HIGH STRENGTH ALLOYS	3,500,000 T		MINOR
LADLE METALLURGY	1983	NEVER INSTALLED	ALL ALUMINA KILLED, CARBON, ALLOY, HSLA SHEET & PLATE			MAJOR
CONTINUOUS CASTER	1969	SHUTDOWN JULY 1985- CONDITION ACCEPTABLE FOR OPERATION	BILLETS: 4"x4" TO 7"x7" ROUNDS: 6"	500,000 T		MINOR
44" HOT STRIP MILL	1957	THE MILL STANDS, RUNOUT TABLE AND DOWN COILER APPEAR TO BE IN GOOD CONDITION. MILL CAN BE PUT IN OPERATION WITH SOME REFURBISHING OF EXIST. EQUIP.	5"-9½" THICK 9"-41½" WIDE	1,704,000 T	•STRIP IS NARROW - LIMITING MARKET •GAGE CONTROL IS NOT UP TO MODERN STANDARDS	MINOR
48" COLD STRIP MILL	1962	IN OPERATION	0.0055" MINIMUM FINISH GAGE	313,200 T		NONE
42" COLD STRIP MILL	1947	IN OPERATION	0.0061" MINIMUM FINISH GAGE	666,000 T		NONE
45" BLOOMING MILL	1977	SHUTDOWN NOVEMBER 1981 - COULD BE RESTARTED WITH MINOR MAINTENANCE.	8"x 8" BLOOMS 13" x 30" SLABS	2,400,000 T	CANNOT COMPETE WITH CONTINUOUS CASTERS FOR BLOOM & SLAB PRODUCTION.	MINOR
44" BLOOMING MILL	1912 (UPGRADED 1953)	MILL EQUIPMENT SEEMS TO BE IN OPERABLE CONDITION AND CAN BE RESTARTED IN A SHORT PERIOD.	9"x 9" BLOOMS 4" TO 9" x 42" SLABS	2,400,000 T	CANNOT COMPETE WITH CONTINUOUS CASTERS FOR BLOOM & SLAB PRODUCTION	MINOR
18"/21" BILLET / ROUND MILL	1912 - 1916	DUE TO THE TYPE OF DRIVE ARRG'T. BEARING DESIGN AND OPERATION BEING TIED TO THE 44" BLOOMING MILL, IT WOULD BE UNECONOMICAL TO OPERATE THIS MILL.	4" TO 7" BILLETS 5" TO 7⅛" ROUNDS 8" TO 15" FLATS	1,560,000 T	CANNOT COMPETE WITH MODERN MILLS	MINOR
14" BAR / STRUCTURAL MILL	1924 (SOME UPGRADING)	MILL HAS COMBINATION OF OLD & NEW EQUIP. STANDARD STRUCTURAL TOLERANCE ON ROLLED PRODUCT MAY BE DIFFICULT TO MAINTAIN ON A CONSISTENT BASIS.	BEAMS, ANGLES, CHANNELS AND SPECIAL FLATS.	418,800 T	-TOLERANCE LIMITED TO STANDARD -LABOR INTENSIVE -NO AUTOMATION	NONE (SOLD AND CURRENTLY OPERATING)
PIPE / TUBING MILL	CONT. WELD: ELECTRIC WELD: SEAMLESS:	SHUTDOWN JANUARY 1985 SHUTDOWN APRIL 1982	CONT. WELD: 0.50" TO 4.0" ELECT. WELD: 4.50" TO 12.75" SEAMLESS: 2.38" TO 6.63" 4.50" TO 14.0"			MINOR
TIN MILL		IN OPERATION				NONE
30" ROUND MILL		SHUTDOWN MARCH 1984	5" TO 12" ROUNDS	600,000 T	LABOR INTENSIVE	MINOR
PICKLING						NONE
ANNEALING						NONE

FIGURE 5.2.3

United States Steel

HOMESTEAD WORKS

Homestead, PA

	INSTALLATION DATE	CONDITION	PRODUCT RANGE	ANNUAL PRODUCTION CAPACITY	PRODUCTION LIMITATIONS	CAPITAL COST TO STARTUP
BLAST FURNACES		NOT OPERABLE.		2,375,000+		MAJOR
OPEN HEARTHS		—		—	OPEN HEARTH STEELMAKING IS OBSOLETE.	
VACUUM DEGASSING						
45" SLAB MILL	1936	GENERALLY POOR CONDITION.	SLAB FOR THE 100" AND 160" PLATE MILLS.	2,106,000 T	NOT COMPEITIVE WITH MODERN CONTINUOUS CASTING OPERATIONS.	MAJOR SOAKING PIT REBUILD.
54" BLOOMING MILL	1926	GENERALLY POOR CONDITION.	BLOOMS FOR THE 52" MILL AND OTHER DEPARTMENTS IN SQUARE, RECTANGULAR AND ROUND CROSS SECTIONS.	612,000 T	NOT COMPETITIVE WITH MODERN CONTINUOUS CASTING OPERATIONS.	MAJOR SOAKING PIT REBUILD.
44" BLOOMING MILL	1925	SOAKING PITS IN VERY POOR CONDITION. FURNACES NEARLY COMPLETLY BROKEN DOWN. FINISHING SAW APPEARS TO HAVE BEEN CANNABILIZED.	BLOOMS FOR THE 28" / 32" MILL.	392,000 T	NOT COMPETITIVE WITH MODERN CONTINUOUS CASTING OPERATIONS.	MAJOR SOAKING PIT REBUILD.
160" PLATE MILL	1944	FURNACES ARE IN POOR CONDITION. MILL IS IN POOR CONDITION - BADLY RUSTED AND MACHINED SURFACES ERODED.	42"-150" WIDE, 0.187" TO 15.0' THICK, 70' LONG.	837,000 T (HOT ROLLED)	BATCH TYPE FURNACES HAVE POOR FUEL CONSUMPTION AND LEAD TO POOR PRODUCT QUALITY.	25 CYCLE M.G. SETS REQUIRE REPLACEMENT.
100" PLATE MILL	1936	GENERALLY IN VERY POOR CONDITION. PULPITS ARE POORLY LAID OUT AND DIFFICULT TO OPERATE.	27"-96" WIDE, 0.187" TO 1.5" THICK, 100' LONG.	1,041,000 T (HOT ROLLED)	MILL IS SUBSTANTIALLY WIDER THAN MAXIMUM ALLOWABLE PRODUCT CAUSING POOR ROLL LIFE AND ROLL DEFLECTION.	MAJOR DUE TO SEVERAL COMPONENTS REMOVED FOR USE ON OTHER USS MILLS.
52" BAR STRUCTURAL MILL	1926	FAIR	8" TO 36" WF	345,000 T	LARGE PRODUCT RANGE REQUIRES EXCESS SET UP TIME AND LABOR INTENSIVE EFFORT. LACK OF AUTOMATED CONTROL REQUIRES HIGH SKILL LEVEL IN LABOR.	
28"/32" BAR STRUCTURAL MILL	1925	FAIR	STANDARD STRUCTURAL SHAPES AND SHEET PIPING.	207,000 T	LARGE PRODUCT RANGE REQUIRES EXCESS SET UP TIME AND LABOR INTENSIVE EFFORT. LACK OF AUTOMATION.	
FORGING PRESS		FAIR			SUITABLE FOR ONLY THE LARGEST FORGED PRODUCT ORDERS.	MODERATE

WHEELING PITTSBURGH
MONESSEN WORKS
MONESSEN, PENNSYLVANIA

FIGURE 5

FACILITY	INSTALLATION DATE	CONDITION	PRODUCT RANGE	PRODUCTION CAPACITY	PRODUCTION LIMITATIONS	CAPITAL COST TO START UP			
SINTER PLANT									
COKE OVENS	Nº1 : 1942 Nº2 : 1956	GOOD		350,000 T					
BLAST FURNACES	Nº1 : Nº2 : JANE :	FAIR	BASIC	1,200,000 T		-COMPLETE RELINE REQUIRED			
BASIC OXYGEN FURNACE	1964	FAIR	CARBON ALLOY	1,800,000 T					
CONTINUOUS CASTER - 5 STRAND	1983	EXCELLENT	12" TO 14" CROSS SECTIONS - 10' TO 17' LONG	840,000 T	COULD NOT CAST THE ENTIRE PRODUCTION OF THE BOF SHOP	NONE			
46" BLOOMING MILL		POOR		1,300,000 T		MAJOR			
30" BILLET MILL		POOR		500,000 T		MAJOR			
18" BILLET MILL		POOR		400,000 T		MAJOR			
UNIVERSAL RAIL/STRUCTURAL MILL	1981	EXCELLENT	FINISHED RAIL IN ALL SECTIONS AND GRADES UP TO 82 FEET LONG.	400,000 T		NONE			