IC bureau of mines information circular 8243

IRON AND STEEL SCRAP IN THE PACIFIC NORTHWEST

By Gary A. Kingston

UNITED STATES DEPARTMENT OF THE INTERIOR

BUREAU OF MINES

1964

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UNITED STATES DEPARTMENT OF THE INTERIOR
Stewart L. Udall, Secretary

BUREAU OF MINES
Marling J. Ankeny, Director

This publication has been cataloged as follows:

Kingston, Gary A

Iron and steel scrap in the Pacific Northwest. [Washington] U.S. Dept. of the Interior, Bureau of Mines [1964]

50 p. illus., tables. (U. S. Bureau of Mines. Information circular 8243)

Includes bibliography.

1. Scrap metal industry—Northwest, Pacific. 2. Iron industry and trade—Northwest, Pacific. I. Title. (Series)

TN23.U71 no. 8243 622.06173

U. S. Dept. of the Int. Library

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IRON AND STEEL SCRAP IN THE PACIFIC NORTHWEST

by

Gary A. Kingston[1]

ABSTRACT

This examination of Pacific Northwest (Idaho, Montana, Oregon, and Washington) ferrous scrap-industry operations, principally those in Oregon and Washington, points out factors influencing the supply and consumption of scrap materials, such as the complete dependence of steel ingot producers in these States on scrap as a metal raw material and the sizable quantity of scrap exported from Seattle and Portland to Japan.

The pattern of the industry is presented as a movement of materials from their diverse sources to the consuming market. The geographic locations of the consuming industries in relation to the areas generating scrap materials and the movement pattern of the supply from source to destination strongly influences the cost of the commodity. The best measure of the scrap supply available in an area is experience in terms of how much scrap was withdrawn at a given price. Scrap availability is not finite, because the return of materials as scrap is secular and influenced by constantly varying market conditions.

Steel ingot producers use 75 percent of the approximate 500,000 tons of scrap consumed in Oregon and Washington; steel foundries take 15 percent of the total; and iron foundries, ferroalloy plants, and other miscellaneous consumers utilize the remainder. Also, from 1955 to 1960 an average of about 200,000 tons has been exported annually from Oregon and Washington. The foreign exports are supplemented by lesser shipments to other steel producing States, principally in the western United States. From 1955 to 1960 the preferred and higher value heavy melting scrap grades accounted for about 60 percent of total withdrawals which varied between 600,000 and 950,000 tons annually.

Total scrap withdrawals from Oregon and Washington are projected to 1.8 million tons by 1985, 60 percent (1.1 million tons) of which will be heavy melting grades.

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Work on manuscript completed June 1962.

No. 1 heavy melting scrap is most attractive to scrap consumers at $35 per ton or less. Price-supply relationships compared with projected scrap requirements indicate future prices possibly over $35 per ton. High prices over a long period could motivate the Pacific Northwest scrap consumers to produce steel from iron ore. However, technologic changes taking place at integrated steel plants could reduce scrap withdrawals from the Pacific Northwest, which might keep the scrap price sufficiently attractive to obviate production of competitive iron products by the Pacific Northwest scrap consumers.

INTRODUCTION

This report surveys the supply and consumption of iron and steel scrap in the Pacific Northwest, with emphasis on Oregon and Washington--Pacific Northwest is defined here as being inclusive of Idaho and Montana.

Iron and steel scrap is treated as a resource subject to similar extraction, processing, and marketing factors that confront any other primary resource. Patterns and economics of supply and consumption for this commodity are described regionally. A similar report has been published by the Bureau of Mines covering the States of California and Nevada (4).[2]

Information contained in this report was obtained in part through discussions of the subject with regional suppliers and consumers of ferrous scrap. A previous Bureau of Mines publication (17) has described the major scrap-consuming industry in the Pacific Northwest.

ACKNOWLEDGMENTS

The cooperation and assistance of industry and various Government agencies greatly facilitated the preparation of this report. Kenneth D. Baber, former Commodity-industry analyst at the Albany Office of Mineral Resources, began the work on this study. The author is grateful to Frank Norton, Bethlehem Steel Company; K. L. Miller, and W. E. Jameson, Oregon Steel Mills; B. E. Etcheverry, Kaiser Steel Corp.; Walter M. Cagen, Luria Bros. and Co.; and David M. Sidell, Seattle Iron and Metals Corp. for reviewing the manuscript. Freight rates were supplied by Government Services Administration, Auburn, Washington.

CLASSIFICATION OF IRON AND STEEL SCRAP

The standards for classifying scrap are set by the consumer and vary with company metallurgical requirements. Purchase specifications of two Pacific Northwest steel mills are given in Appendix A. Other purchase specifications include an industry-wide set established during World War II, when the Federal Government adopted a classification system in conjunction with price controls. Another set is that of the Association of American Railroads. Both classifications are described in other publications (4, 15).

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[2] Underlined numbers in parentheses refer to items in the list of references at the end of this report.

There are three recognized categories of scrap describing the material source--purchased, home, and prompt industrial scrap. Purchased scrap, which this study principally concerns, is material passing through the dealer-broker cycle and originating usually from obsolete materials. Home scrap is generated within a steel producing plant. Prompt industrial scrap is material resulting from the fabrication of new steel, that returns promptly to the melting furnace.

The diversity of steel types is a major problem in the scrapyard--each piece must be identified, segregated, and prepared. Because of the diversity of materials, identification can be time consuming and costly. As the cost of preparing scrap has gone up, the unit profit margin to the scrap dealer has diminished with the result that effort has been made to increase volume. Increased volume requires a large operation and a greater capital investment in yard facilities, labor force, and inventory, forcing many small dealers to close. Nevertheless, much of the scrap industry remains dependent upon the small scrap yards which are the basic collection machinery of the industry because of the dispersion of scrap.

For the purpose of describing scrap consumption and markets in the Pacific Northwest, the categories heavy melting, bundles, cast iron, turnings and borings, and all other are used. Heavy melting scrap is composed of large pieces having a high density. Bundled scrap is mostly sheet material that has been compressed to form a bundle of high density. However, the bundle's density does not equal that of heavy melting scrap. Other scrap includes a miscellaneous group of scrap materials such as turnings, alloy steel, low-phosphorus scrap, cast iron, scrap for rerolling, and other types available in more limited quantities.

FUNCTIONAL PATTERN OF THE INDUSTRY

The scrap industry serves three broad functions: (1) collection of scrap; (2) segregation and preparation of scrap; and (3) inventory and delivery of scrap. A company or individual engaged in the scrap business can carry out one or all of these functions.

The scrap yard serves as a point of concentration, preparation, distribution, and quality control for the marketed resource. The facilities and functions of yard operations regulate the quantity and quality of iron and steel scrap moving to the consumer. The scrap yard also can be the entrepreneur stage of the scrap cycle, the point where scrap is handled between the collector or source and the consumer. The functions and economics of the industry and detailed description of two California scrap yards are given in a Bureau of Mines Information Circular 7973 (4).

The functions of the scrap industry are handled by the scrap dealer who operates a scrap-preparation yard, the broker (having no yard), or a combination dealer-broker. A dealer purchases scrap that moves into the scrap yard, a broker purchases scrap from a yard or other source and sells it directly from the source for transport to a consumer without handling the material, and a dealer-broker does both. Collectors can sell directly to consumers.

However, with the exception of Northwest Steel Rolling Mills in Seattle, major consumers (steel mills) in Oregon and Washington do not purchase small lots from the collector level of the scrap cycle. In Seattle, in addition to purchases from dealers and brokers, scrap has been purchased over the scale from peddlers. Thus the mill functions as a dealer, segregating and preparing the purchased material. The greater the consumption of scrap, the less inclined is the consumer to enter the province of the scrap dealer.

The scrap brokerage business is most frequently a volume operation. The broker depends on the purchase and sale of large tonnages of material and for his service is paid a brokerage fee.

Dealer purchases from collectors are made with no guarantee that the market will justify the purchase price, since there will be a time lapse for segregation and preparation between the moment of purchase and the time of sale. The dealer first can judge his cost of handling, segregation, and preparation from experience. Then it is necessary to speculate on the market. He knows the current and past market quotation, and must use judgement in deciding what his sale price will be. The price paid to the collector is one which allows the dealer costs and a margin of profit. Although considerable speculation exists in the system, a careful dealer can usually realize a fair profit. A more stable price pattern, although not existent, would seem to be an advantage, but there appears to be no unaminous agreement on the part of dealers in the Pacific Northwest for such a stabilized condition. The feeling has been expressed by some sizable dealers that speculation is necessary to keep the industry alive and active, while others have the viewpoint that business would be preferable with a more dependable price pattern.

A dealer needs a sizable area of land on which to conduct his operation--this land might be leased, but if purchased it would represent an initial investment in excess of $150,000 for a moderate size yard in a metropolitan area such as Seattle. Some of the basic facilities that may be used in a yard, the size of the yard determining what is used, are listed below:

	Remarks
Equipment:	
Scale.............................	For weighing scrap-bearing vehicles.
Locomotive crane..................	Scrap handling and car movement--has grapple or magnet.
Truck crane.......................	Fitted with grapple or magnet.
Yard trackage.....................	Extensive in large yards.
Oxyacetylene or propane cutting equipment.	Propane is cheaper than acetylene, but less efficient.
Alligator shear...................	Small single-item cutting.
Guillotine shear..................	Volume shearing of No. 2 heavy melting and lighter material.
Bailing press.....................	For bundling auto bodies and other "tin" scrap.

A sizable labor force is required to carry out the tasks of handling, sorting, and preparation. It was estimated by one dealer in Seattle that labor costs are 65 percent of the cost of operation.

Finally, the dealer mainly finances the scrap industry. Collectors are paid upon delivery to the yard, but consumers generally pay 30 days or more after delivery, pending verification of weights and acceptance. The dealer has money invested in his yard inventory as well as in the consumer's yard inventory and at the same time continues to make purchases to maintain his inventory.

The inventory must usually be on hand before a sale can be made, and purchases have to be maintained to retain the good will and continuing business of the collector, who delivers when he has the material and not necessarily at the request of the dealer. Dealers purchase from numerous one-time or infrequent peddlers, who will sell elsewhere if turned away, rather than waiting for a given dealer to accept his material.

Larger dealers in Oregon and Washington and other coastal areas have scrapped surplus naval vessels. Such ships yield considerable scrap for remelting in addition to scrap plate that can be sold for rerolling. They also contain sizable quantities of usable machinery and fittings that the dealer may sell.

Automobile wreckers are in business primarily for the resale of auto parts. The automobile wrecker delivers scrap to a dealer when sufficient quantities of non-saleable parts and chassis materials are collected. An auto wrecker can normally afford to hold parts for several years for the higher value sale price before delivering his inventory for scrap.

Part-time collectors gather materials to supplement other incomes. This group includes social or community organizations conducting drives for fund raising and farmers delivering odd scrap metal collected on the farm. The sales are often uneconomic in themselves.

Because scrap is widely distributed, the machinery for collecting the metal is also widespread and diverse. The loose, although apparently efficient, collection system is one of the most difficult factors to analyze. Scrap collection is a business that most any man can independently engage in without contract to the corporate and organized function of the industry.

GEOGRAPHIC PATTERN OF THE INDUSTRY

Scrap as a resource differs from other metallic resources in that its location is determined by man: Ores are deposited by nature whereas man deposits scrap. Nature follows identifiable geologic patterns in the deposition of ore minerals and, similarly, the dispersion of scrap follows the economic patterns of human activity. Population concentrations result in a diversity of scrap products; most obvious is that from obsolete automobiles Industrial areas produce volumes of scrap as a result of manufacture wastage or obsolescence of equipment. Other economic activities such as construction, mining, lumbering, and transportation, and national defense programs, scatter scrap materials. These materials represent a resource of reusable iron and steel, which in the interest of sound economics and conservation must be reclaimed.

There is an identifiable pattern of scrap resource generation and consumption that is arterial in nature. Scrap moves from dispersed areas to concentrate in small scrap yards and then in greater volume moves on to collect in larger scrap yards that feed the consuming industries. Frequently scrap materials find more direct routes to reuse, depending upon the geographic relationship of generation to consumption. Conversely, scrap may follow a circuitous and lengthy path back to the melting furnace.

There are three elements in the geographic pattern: (1) areas of consumption, (2) areas of generation, and (3) the interstitial movement or flow of scrap between these two areas.

Areas of Consumption

Four areas of consumption are open to the Pacific Northwest ferrous-scrap industry: (1) steel ingot producers and rolling mills, (2) foundries, (3) ferroalloy plants, and (4) foreign and domestic export. Pacific Northwest steel foundries and steel rolling mills, and Pacific Northwest ferroalloy plants are the subjects of two Bureau of Mines reports (17, 18). There are two steel mills in the Seattle, Wash., area and one in Portland, Oreg. Other Western steel plants not within the region are located in the San Francisco, Calif., bay area, at Fontana, Calif., Geneva, Utah, and Pueblo, Colo. Although these latter plants do not strongly adhere to the regional pattern, they are within the sphere of regional market influence. Foundries are ubiquitous; in the four States of Idaho, Montana, Oregon, and Washington there are 93 (19). The majority of the steel foundries are located in Seattle and Portland, while the iron foundries tend to be scattered throughout the four States. Less important in terms of the quantities of scrap consumed are other metallurgical plants such as ferrosilicon producers and copper precipitation operations, that utilize shredded turnings and detinned-can scrap, respectively.

The export market has been a strong stimulus to the Pacific Northwest scrap industry with Japan being the major export buyer and consumer. Also, small amounts of scrap have been shipped to plants in western Canada. Domestic exports of scrap from the Pacific Northwest (to States outside the region) fluctuate with the market demand and resultant price.

Portland, Oreg., and Seattle, (Puget Sound area) Wash., both coastal ports, are geographically logical areas for economic growth. They are hubs for the movement of commerce to and from the eastern interior, concentrating and dispersing products as well as producing and supplying the industrial and basic subsistence needs for productive growth and expansion within the interior economic areas.

In this setting, the growth of the three steel mills has been based wholly on the remelting of steel scrap derived largely from materials shipped to the West from the East. For a short period in the second half of the 19th century Oregon and Washington iron ores were smelted in the area. However, economic factors brought a close to these operations. One of these operations in Washington apparently survived by remelting steel scrap. This company was purchased in 1930 by Bethlehem Steel Co., which operates the plant today.

The other two plants, Northwest Steel Rolling Mills, Inc., Seattle, Wash., and Oregon Steel Mills, Portland, Oreg., were principally outgrowths of World War II steel demands and remained in operation because of an expansion in the regional economy and a growth in population following the war. Northwest Steel got its start during the 1920's.

Geographically, the Portland and Seattle areas are linked by the Willamette-Cowlitz-Puget Lowland. Within this physiographic province economic activity and population have concentrated. To the east, population is dispersed except for the points of distribution, such as Spokane, Walla Walla, Yakima, and Wenatchee, Wash., Pendleton, Oreg., and similar points further east (Boise, Lewiston, and Pocatello, Idaho, and Butte, Great Falls, Billings, and Missoula, Mont.).

Areas of Generation

Virtually the entirety of the four-State region can be considered the area of generation. However, the locations of scrap dealers and automobile

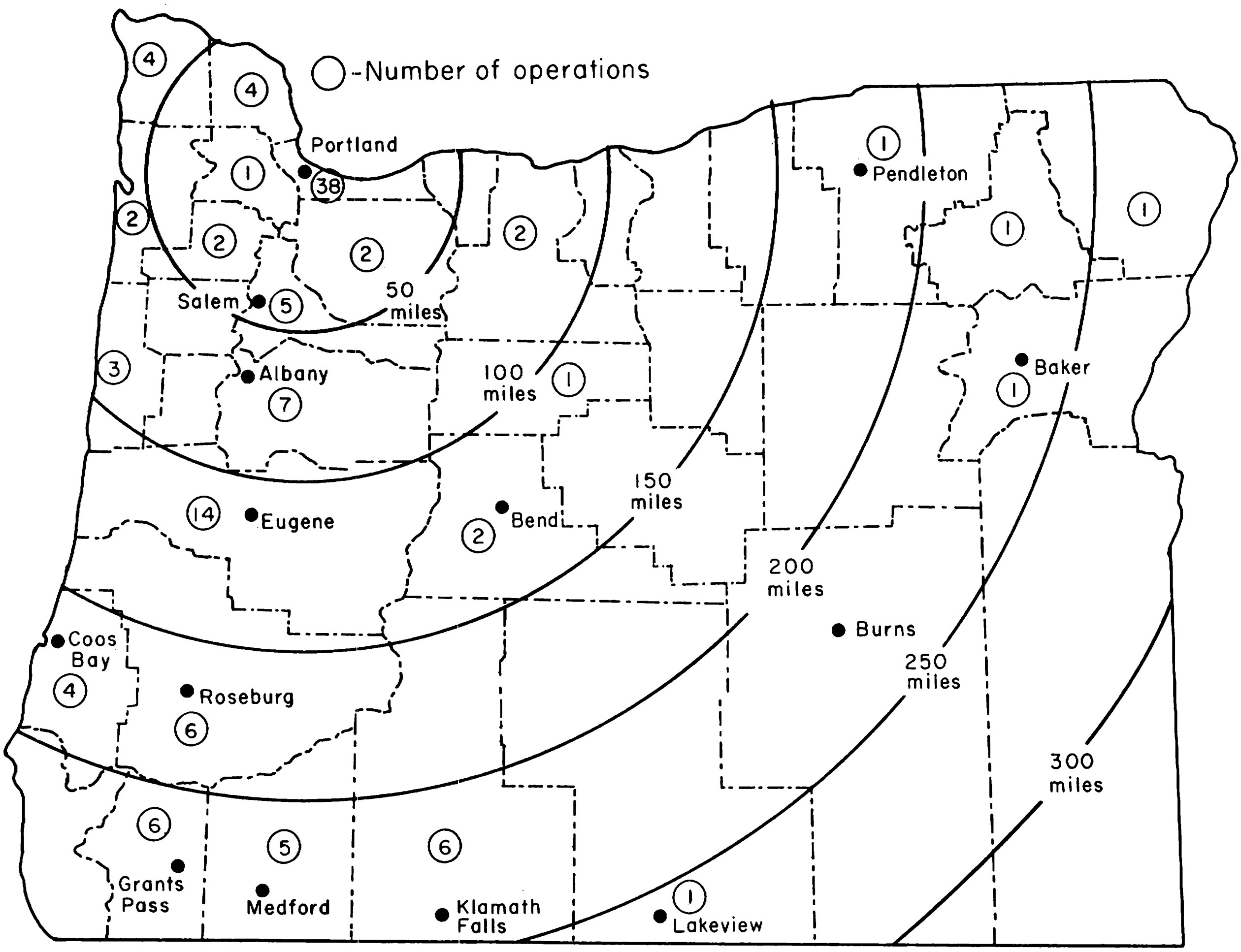

FIGURE 1. - County Distribution of Oregon Iron and Steel Scrap Dealers and Auto Wreckers With Mileage Radii From Portland.

wreckers indicate the nucleus of the resource collection areas. County distribution of scrap dealers and auto wreckers is shown in figures 1 and 2. Economic activities of the region, such as lumbering and farming, generate quantities of preferred heavy melting scrap throughout the four States, but economic concentration points (some of which are indicated by the location of scrap dealers) tend to locate along the main transport routes. Population centers yield scrap from automobiles, construction, manufacturing, and other miscellaneous items.

Two other significant sources of scrap are the military and the railroads. War surplus naval vessels have provided large tonnage of metal to scrapping operations in the Seattle-Portland areas. In addition, military bases in the Northwest generate sizable scrap tonnages, examples being the Bremerton Naval Yard, Bremerton, Wash., and the Mount Rainier Army Ordnance Depot, near Tacoma, Wash. The railroads offer scrap for bid periodically. The principal lines operating in Oregon, Washington, Idaho, and Montana, are the Northern Pacific, Great Northern, Southern Pacific, Union Pacific, and Chicago Milwaukee and St. Paul railroads.

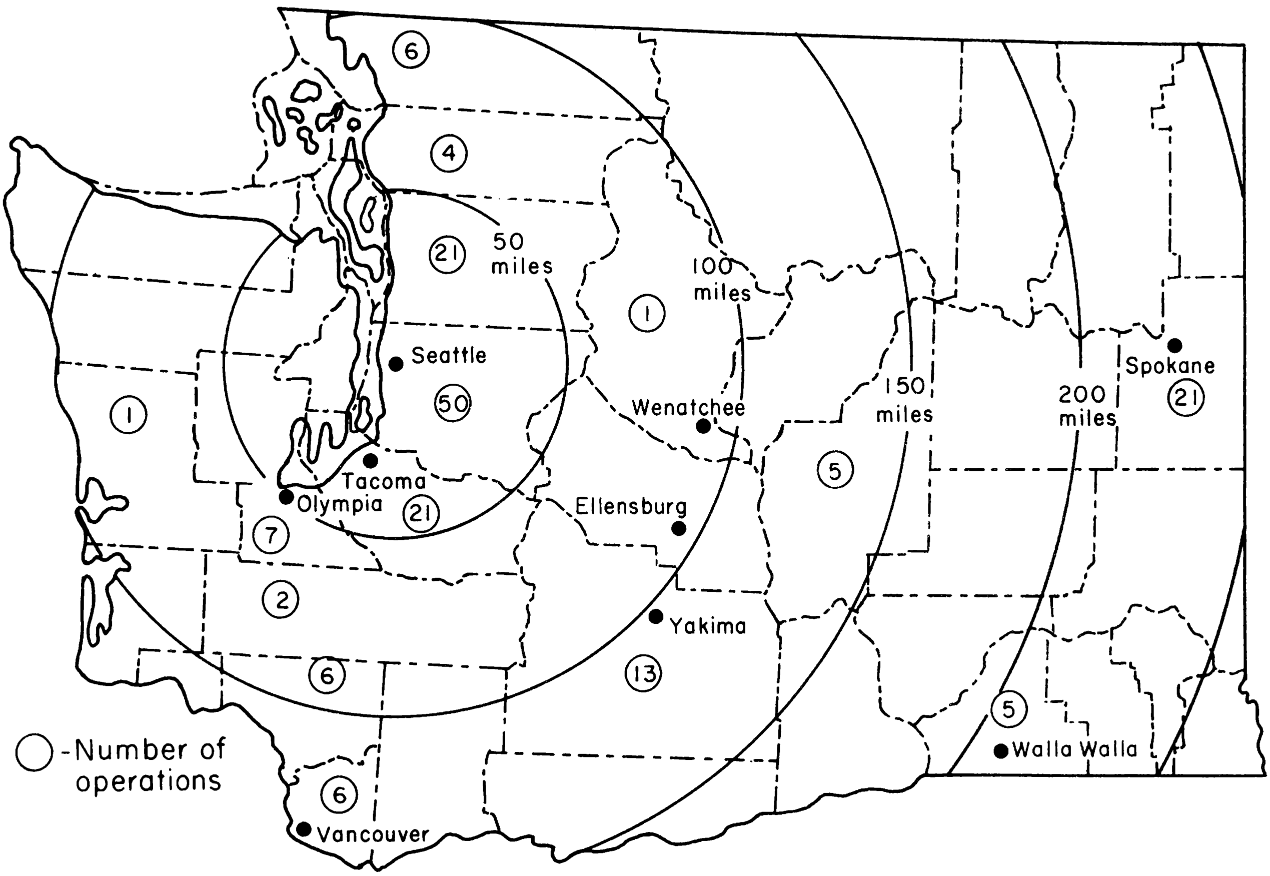

FIGURE 2. - County Distribution of Washington Iron and Steel Scrap Dealers and Auto Wreckers With Mileage Radii From Seattle.

Alaska supplies scrap to the Pacific Northwest and to the foreign export market.

The steel plants generate substantial quantities of scrap, called home scrap, that is recycled to the melting furnace. Also, steel fabricators generate what is called prompt industrial scrap, but there is comparatively little of the latter produced in the Pacific Northwest. Table 1 gives the number and location, by county, of structural steel fabrication plants. A fairly accurate rule for estimating the generation of prompt industrial scrap is to take 15 percent of the steel products received for fabrication as the portion that will be lost to scrap (2). Using this rule, a regional prompt industrial scrap yield of 125,000 to 150,000 tons annually is estimated for recent years. Turnings are a grade of prompt industrial scrap in demand in the region (used for ferroalloy production), but the quantity available is limited, making it necessary to ship from other States. The Seattle area is the primary regional source of this scrap type.

TABLE 1. - Oregon and Washington structural steel fabrication plants, 1958[1]

State and County	Total plants	Manufacturing plants with employment of--						
		1 to 19	20 to 49	50 to 99	100 to 249	250 to 499	500 to 999	1,000
Washington:								
Chelan....	1	-	1	-	-	-	-	-
Cowlitz...	1	1	-	-	-	-	-	-
Grant.....	1	1	-	-	-	-	-	-
King......	23	12	7	1	2	-	1	-
Pierce....	4	4	-	-	-	-	-	-
Skagit....	2	2	-	-	-	-	-	-
Snohomish.	2	1	1	-	-	-	-	-
Spokane...	3	1	2	-	-	-	-	-
Thurston..	1	1	-	-	-	-	-	-
Whatcom...	3	3	-	-	-	-	-	-
Yakima....	1	1	-	-	-	-	-	-
Oregon:								
Jackson...	1	-	-	1	-	-	-	-
Lane......	2	2	-	-	-	-	-	-
Marion....	2	-	2	-	-	-	-	-
Multnomah.	16	8	3	3	1	1	-	-
Washington	1	1	-	-	-	-	-	-

[1] Bureau of The Census, 1958 Census of Manufactures.

Interstitial Flow Pattern

The flow of scrap depends upon the spatial relationship of the supply to the consumer and the market price. A generalized flow and collection pattern is shown in figure 3. Dealers located in the Puget-Cowlitz-Willamette Lowland ship their scrap to Portland and Seattle. Similarly, eastern Oregon and Washington scrap moves westward to these cities. The pattern in southern Idaho and western Montana is mixed. Shipments from these areas are attracted south to Geneva, Utah, and a quantity moves to the Seattle-Portland consumers, depending upon market conditions. Far eastern Montana scrap occasionally is shipped to eastern mills.

The volume of scrap movement and the distance which it travels are functions of the market price--the higher the price the more scrap that is available to move, because it can be shipped further. During periods of high prices, scrap movements

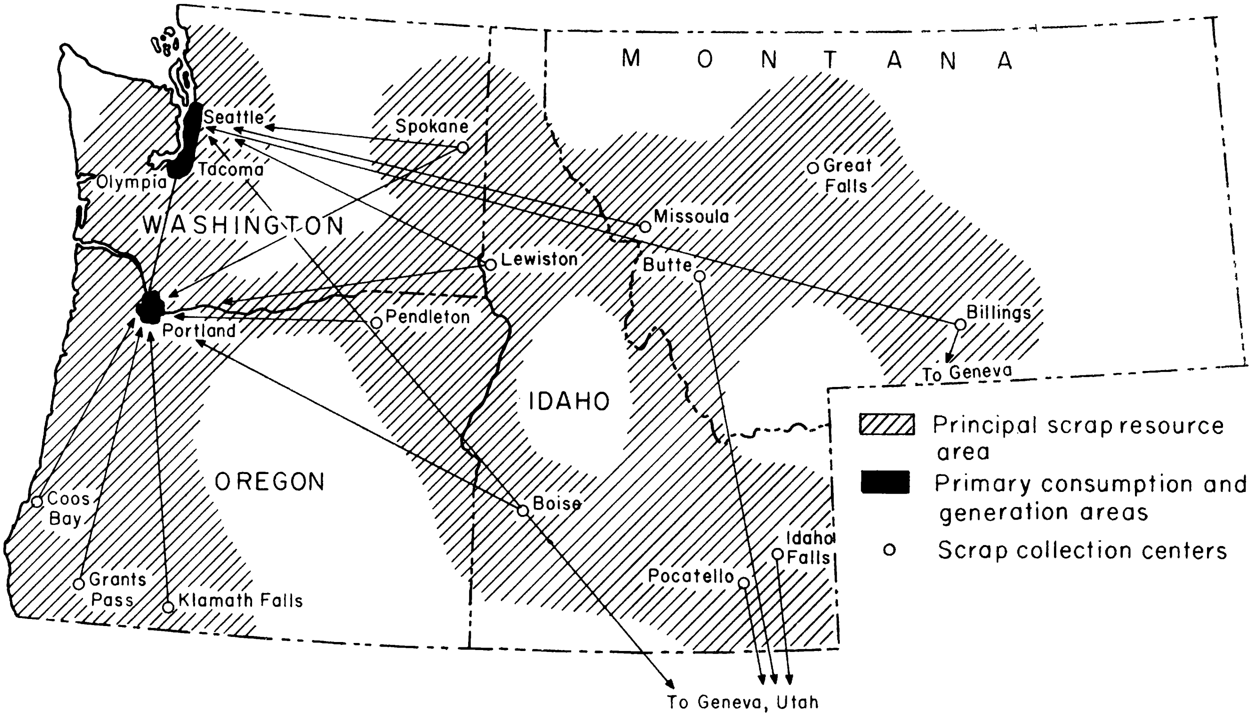

FIGURE 3. - Generalized Pacific Northwest Ferrous Scrap Flow and Collection Pattern.

increase from eastern Oregon and Washington, southern Idaho, and western Montana. It is during these periods of strong market demand that increased shipments can go to California, Utah, Colorado, and the eastern States because of the favorable price. High-alloy steel scrap (stainless steel) is less affected by this movement because the value is greater, and generally the product can support distance haulage to specialized consumers during most market periods. However, the segregation and sale of alloy steels are insignificant in the Pacific Northwest. Most regionally produced alloy steels are used in castings, and often when replacements are needed, the worn article is returned to the foundry by the user, thus not entering the dealer cycle. Quantities of alloy steel result from the scrapping of military war and cargo ships. Such steel has gone largely to the export market.

AVAILABILITY OF OBSOLETE SCRAP

By observing the materials being brought into the scrap yard or into the steel mill, dealers and consumers obtain an empirical impression of the age cycle of materials, particularly automobiles, being scrapped. Such observation has led one Pacific Northwest scrap consumer to express the view that the cycle of materials return in the area is approximately 25 years. However, such cyclical definitions have little meaning other than possibly to rationalize the conditions of scrap availability existing in a given period. For example, periods of short supply and high scrap prices in the 1950's and early 1960's could be attributed to the low steel-products output of the 1930's--to meet consumer demand, availability could be increased by accelerating obsolescence of more recently produced materials. To do this scrap purchase prices have to be increased. Certainly this explanation could be true for some items such as automobiles, which provide the observer a discernible birthdate.

The entire problem of dating the life of steel products, which determines the present or future availability of scrap, cannot likely be reconciled easily by a cyclical interpretation, because the return of steel as scrap is secular rather than cyclical. If every steel product made could be given a usage life span, then these products could be earmarked for return so many years hence, and by a detailed bookkeeping arrangement the availability of scrap at any future time could be determined. However, if this alone was possible, the approach would be frustrated if not voided by economic influences on the secular life spans of all steel products--economic prosperity and expanding technology would accelerate obsolescence and lows in economic growth would be conducive to frugality and making do with what should have long since been replaced. These are factors that cannot be forecasted accurately enough so that significant meaning can be given to the secular analysis of steel products return.

The potential availability or presence of scrap iron and steel in the Pacific Northwest, based on a study of United States scrap availability by the Battelle Memorial Institute (3), is extrapolated to be about 13 million tons, but only a fraction of this is economically useable. The difference between the quantity of scrap that possibly is available for use and the quantity that might profitably be returned is explained by the dispersion of scrap, the cost of collection and transporting it to the market, and the price offered for the material. Consideration of these factors eliminates, economically, much of the available tonnage returnable at any given moment--that is, if it should be suddenly decided to bring in all available scrap at a given price, most of that potentially available scrap would remain economically unavailable and uncollected. If, however, price was no consideration, all steel materials in use could be returned.

It seems obvious that the economic availability of iron and steel scrap is not finite. Therefore, the most reliable measure of what can be expected in the future is experience. In the case of heavy melting scrap, experience has demonstrated that the regional scrap consumer and scrap dealer have had difficulty on occasion in obtaining and supplying heavy melting scrap grades during periods of increased export. During 1960, scrap exports were nearly 75 percent greater than in 1959, and domestic consumers required slightly more scrap. An Oregon consumer has indicated that the withdrawal of heavy melting scrap reached its annual limit during 1960. To speak of a limit with reference to the available supply of scrap can be misleading in that there is no certainty that the complete reservoir is being tapped or that the limit could be sustained. By taking a closer look at the 1960 demand for heavy melting scrap in Oregon and Washington it might be said that this was a maximum yield of this grade in the area at a price of so many dollars. But the statement would apply only to 1960. The following year, should demand and price be comparable, the reservoir might not be able to supply an equivalent quantity under the same conditions, or it might possibly yield greater quantities because the scrap "collection army" has expanded, and because of the sustained high price, people holding obsolete materials became more scrap conscious and decided to sell. Experience has shown that a high demand year generally will be followed by a year of scrap shortage if the demand remains high. The collection activity probably expands, but the result only keeps the available supply from being more difficult to maintain.

IRON AND STEEL SCRAP MOVEMENT

Railroad and water transport statistics are given to illustrate the quantities of material moved from State-to-State and exported, as well as the sources and destinations of scrap moving to and from the Pacific Northwest.

Railroad Movement

Movement of iron and steel scrap by rail to and from the Pacific Northwest from 1953 to 1960 is given in table 2. Total movement reached a high in 1956; the extension of market areas during high demand, due to competition for the available supply, is pointed up by this year. Montana shipments extended to Oregon, North Dakota, Illinois, and Washington. Oregon scrap went to Colorado, and Washington shipments terminated in Indiana, Maryland, Pennsylvania, and Utah. The movement change also is noticeable preceding and following 1956, not only in market areas, but in tonnage shifts as well. Increasing exports to Japan from Seattle and Portland prevented out-of-State movements to some extent in 1959-60. Railroad scrap-shipment terminations for 1959-60 are presented in table 3, and broadly indicate the volume, destination, and origination of ferrous scrap (excluding turnings and borings) moved by railroad in Oregon and Washington. Also shown are originations and terminations in and between the two States.

Table 4 shows Idaho and Montana terminations and originations for 1959-60. The one 1959 termination shown for Montana in table 4 is assumed to be detinned tin-can scrap going to The Anaconda Company for use in precipitating copper from mine water. The 1960 terminations possibly represent the same movement. A majority (61 percent) of Idaho and 100 percent of Montana 1959 scrap originations terminated in Utah. Idaho and Montana shipments in 1960 increased over those of 1959, but only 48 percent of the total shipments were to Utah, 22 percent went to California, and the remainder (except for 9 percent originating and terminating in Montana) to Oregon and Washington.

Tables 3 and 4 show the shifts in movement resulting from increased scrap demand. Both domestic consumption and foreign exports increased in 1960, creating greater competition for materials than existed during 1959.

Iron and steel borings and turnings originations and terminations in Oregon and Washington are shown in table 5. These materials were used at ferroalloy plants.

TABLE 2. - Railroad movement of iron and steel scrap to and from Idaho, Montana, Oregon, and Washington, 1953-60 (short tons)[1] [2]

From-	To-	1953	1954	1955	1956	1957	1958	1959	1960
California.......	Montana..........	4,300	-	2,200	-	-	6,800	3,000	-
Do........	Washington.......	12,000	-	-	12,300	-	-	-	-
Idaho............	Idaho............	6,900	3,000	-	-	-	2,600	-	-
Do........	Oregon...........	-	4,600	5,800	8,200	18,300	-	13,300	6,000
Do........	Utah.............	32,700	25,100	49,100	38,600	32,600	52,000	26,600	31,000
Do........	Washington.......	13,800	8,000	2,400	17,000	4,600	9,000	3,400	5,600
Montana..........	Colorado.........	3,800	-	-	-	-	-	-	-
Do........	Illinois.........	-	-	-	5,200	-	3,800	-	-
Do........	Minnesota........	5,000	5,600	4,600	3,800	-	-	-	-
Do........	Montana..........	-	-	6,000	3,800	-	-	-	7,800
Do........	North Dakota.....	-	-	-	1,600	-	-	-	-
Do........	Oregon...........	-	-	-	21,400	-	4,000	-	5,500
Do........	Utah.............	3,700	3,900	-	3,600	4,800	9,500	17,300	9,000
Do........	Washington.......	-	-	-	27,300	7,300	-	-	-
Oregon...........	California.......	29,500	11,400	25,900	13,200	15,300	24,600	30,400	-
Do........	Colorado.........	-	-	-	5,100	-	-	-	-
Do........	Oregon...........	32,100	27,100	74,200	76,100	117,000	55,500	88,600	94,700
Do........	Idaho............	-	-	-	-	-	10,000	-	-
Do........	Utah.............	-	-	3,500	-	-	-	16,400	-
Do........	Washington.......	40,300	20,200	25,800	25,400	6,300	-	16,300	11,600
Washington.......	California.......	9,700	4,600	21,900	4,600	24,200	15,900	37,500	12,300
Do........	Indiana..........	-	3,700	-	6,900	-	3,800	-	-
Do........	Maryland.........	-	-	-	3,000	-	5,500	-	-
Do........	Oregon...........	29,300	16,600	50,700	62,400	42,800	48,200	20,600	26,200
Do........	Pennsylvania.....	-	-	-	7,400	3,000	-	-	-
Do........	Utah.............	-	-	-	3,600	21,800	-	10,000	12,200
Do........	Washington.......	88,900	42,900	55,400	78,800	80,700	42,600	49,800	80,300
Do........	Montana..........	-	-	-	-	-	2,100	-	4,100
Do........	Illinois.........	-	-	-	-	-	-	3,300	4,200
Total....................		312,000	176,700	327,500	429,300	378,700	295,900	336,500	310,500

[1] Interstate Commerce Commission 1 percent waybill samples.
[2] Excludes turnings and borings.

TABLE 3. - Ferrous scrap (excluding turnings and borings) carload terminations and originations on railroads in Oregon and Washington, 1959-60[1]

	Short tons	
	1959	1960
Terminations in Oregon and Washington:[2]		
Washington from Idaho	3,400	5,600
Oregon from California	8,000	-
Oregon from Idaho	13,300	6,000
Oregon from Montana	-	5,500
Total	24,700	17,100
Originations in Oregon and Washington:[2]		
California from Oregon	30,400	-
Utah from Oregon	16,400	-
California from Washington	37,500	12,300
Illinois from Washington[3]	3,300	4,200
Utah from Washington	10,000	12,200
Montana from Washington	-	4,100
Total	97,600	32,800
Intra- and inter-Oregon-Washington movements:		
Oregon from Oregon	88,600	94,700
Washington from Oregon	16,300	11,600
Oregon from Washington	20,600	26,200
Washington from Washington	49,800	80,300
Total	175,300	212,800

[1] Interstate Commerce Commission 1 percent waybill samples.
[2] Excluding intra- and inter-Oregon-Washington originations and terminations.
[3] An improbable shipment.

TABLE 4. - Idaho and Montana ferrous scrap (excluding turnings and borings) carload railroad terminations and originations, 1959-60[1]

	Short tons	
	1959	1960
Terminations in Montana:		
Montana from California	3,000	-
Montana from Colorado	-	2,600
Montana from Montana	-	7,800
Montana from Washington	-	4,100
Total	3,000	14,500
Originations in Idaho and Montana:		
California from Idaho	-	18,000
Utah from Idaho	26,600	31,000
Oregon from Idaho	13,300	6,000
Washington from Idaho	3,400	5,600
Utah from Montana	17,300	9,000
Oregon from Montana	-	5,500
Montana from Montana	-	7,800
Total	60,600	82,900

[1] Interstate Commerce Commission 1 percent waybill samples.

TABLE 5. - Oregon-Washington originations and terminations of iron and steel borings and turnings, 1959-60[1]

	Short tons	
	1959	1960
California to Oregon	4,200	4,000
Oregon to Oregon	6,400	-
Washington to Washington	4,600	([2])
Total[3]	15,200	4,000

[1]Interstate Commerce Commission 1 percent waybill samples.
[2]Omitted because of confidentiality.
[3]Not indicated by these data are shipments from Washington to southern Oregon.

Exports

Exports of scrap moving from Pacific Northwest ports are shown in table 6. Portland, Oreg., was the leading scrap export city, accounting for 62 and 69 percent of the movement, respectively, in the peak years of 1956 and 1957. Exports from the State of Washington have been below those of Oregon. In 1956, exports from Washington and Oregon reached a high and declined the following year. Exports from both States fell sharply in 1958, recovering partially in 1959, and were at a high rate again in 1960.[3]

The totals shown in table 6 do not correspond to tables shown in Appendix D, mainly because scrap for rerolling was omitted in the Appendix data. Much of the steel plate derived from ship wrecking is shipped for rerolling.

TABLE 6. - Waterborne foreign exports of iron and steel scrap from Pacific Northwest ports, 1953-60 (short tons)[1] [2]

Ports	1953	1954	1955	1956	1957	1958	1959	1960
Washington:								
Seattle	3,561	8,040	27,915	40,174	13,342	2,678	2,990	44,175
Tacoma	216	-	11,004	60,656	62,087	6,012	34,516	50,332
Vancouver	-	-	-	1,624	130	-	-	-
Longview	-	-	-	-	5,439	2,464	-	-
Olympia[3]	-	-	-	7,890	-	-	3,200	3,584
Bellingham	-	-	811	-	-	-	-	-
Port Angeles	-	6,394	1,210	-	-	-	-	-
Total	3,777	14,434	40,940	110,344	80,998	11,154	40,706	98,091
Oregon:								
Astoria	-	-	-	-	-	-	6,400	-
Portland	54	2,542	92,142	178,097	178,676	72,425	96,740	151,524
Coos Bay	-	-	-	266	-	-	-	-
Total	54	2,542	92,142	178,363	178,676	72,425	103,140	151,524
Grand total	3,831	16,976	133,082	288,707	259,674	83,579	143,846	249,615

[1]U.S. Army Corps of Engineers.
[2]Includes steel for rerolling.
[3]This is a questionable movement.

[3]Total 1961 Oregon-Washington exports to Japan exceeded 400,000 tons.

Alaskan Export Receipts

From 1956 to 1960, a total of 46,781 tons of ferrous scrap was exported from Alaska, the majority (86 percent) of which went to Japan. The balance (6,552 tons) entered the ports of Seattle and Tacoma, Wash., where it was marketed for consumption or reexported to Japan. Scrap may move from one port area to another before export, depending on where the cargo orders are placed and the economics of movement. Shippers of ferrous scrap from Alaska have been as follows:

Alaska Junk Co., Seattle, Wash.
The Alaska Railroad, Anchorage, Alaska
Dulien Steel Products, Inc., of Washington, Anchorage, Alaska
Alaska Juneau Gold Mining Co., Juneau, Alaska
General Metals of the Aleutians, Inc., Tacoma, Wash.

CONSUMPTION AND MARKETS

From 1956 to 1960 over 2.7 million short tons of ferrous scrap was consumed in Oregon and Washington, or 0.8 percent of the total United States consumption for the same period. The 1960 Oregon-Washington share of the United States total was 0.8 percent; of this total, these two States accounted for 1.2 percent of the total national consumption of the heavy melting grades of scrap, 0.7 percent of the bundled scrap, 0.6 percent of the low-phosphorus scrap, 0.4 percent of the cast-iron scrap (other than borings), and 0.4 percent of all other scrap grades.

Figure 4 shows the percentage relative comparison of Oregon and Washington ferrous-scrap consumption to that of the United States. Annual Oregon and Washington iron and steel scrap consumption-statistics are given in table 7 from 1939 to 1960; monthly consumption by grades is given in Appendix C from 1955 to 1960.

Generally, Oregon-Washington total scrap consumption has followed the United States pattern. The sharper fluctuations of Oregon-Washington consumption, such as in 1948 and 1949 (see figure 4), were due to the region's smaller consumption base and the resultant more rapid reaction to economic conditions. However, the 1950 recovery was slow, and Oregon-Washington consumption did not return to its proportionate level of United States consumption until 1951. From 1953 to 1956 scrap consumption in Oregon and Washington failed to follow the national trend. Consumption increased, opposed to a decrease for the country as a whole. Regional and national consumption fell in 1958 to the lowest point since 1949 and recovered moderately in 1959 and 1960.

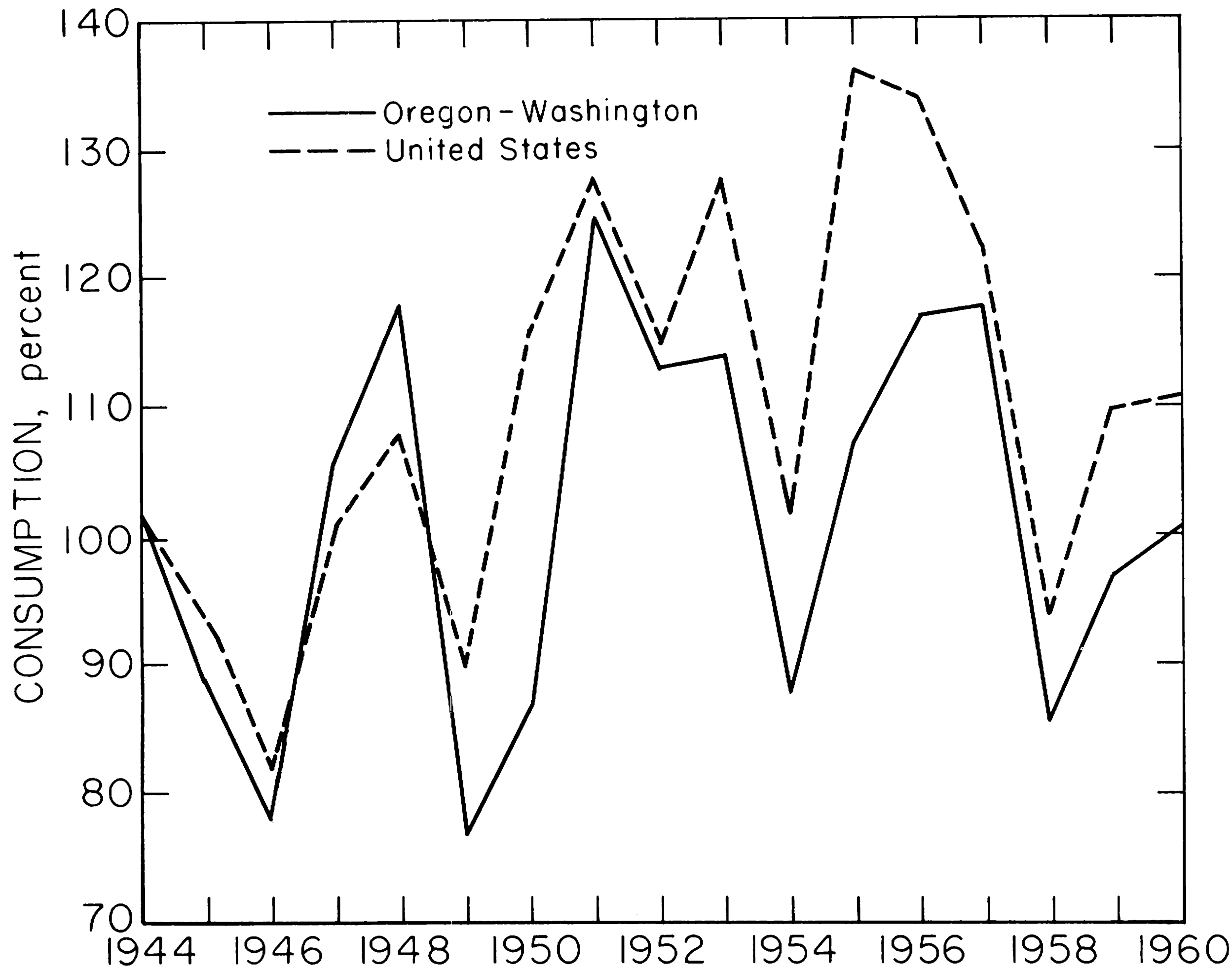

FIGURE 4. - Percentage Relative Comparison of Oregon-Washington and U. S. Ferrous Scrap Consumption, 1947-49 = 100.

TABLE 7. - Consumption of iron and steel scrap in Oregon and Washington, 1939-60

Year	Consumption, short tons	Year	Consumption, short tons
1939..........	117,116	1950.........	453,302
1940..........	205,021	1951.........	653,053
1941..........	325,433	1952.........	591,009
1942..........	391,081	1953.........	593,106
1943..........	488,450	1954.........	457,655
1944..........	530,357	1955.........	558,868
1945..........	458,719	1956.........	608,422
1946..........	405,363	1957.........	615,452
1947..........	550,176	1958.........	449,417
1948..........	612,906	1959.........	507,929
1949..........	400,803	1960.........	526,370

Examining ferrous-scrap consumption in electric furnaces for the individual States of Oregon and Washington (figure 5), strong fluctuations for Washington are readily apparent, whereas Oregon shows a smoother advance. The principal Washington consumer of scrap is omitted from this figure, except for 1959 and 1960, because open-hearth furnaces were in use at the plant until 1959, when conversion was made to electric furnaces. However, when the open hearths were in operation, more than 80 percent of the metallics used were iron and steel scrap, whereas a plant with a molten pig iron source utilizes about 40 percent scrap. Those electric furnaces operating in Washington prior to 1959 attained high output during the periods of abundant national defense contracts. The period from 1954 to 1957 is indicative of previous Washington

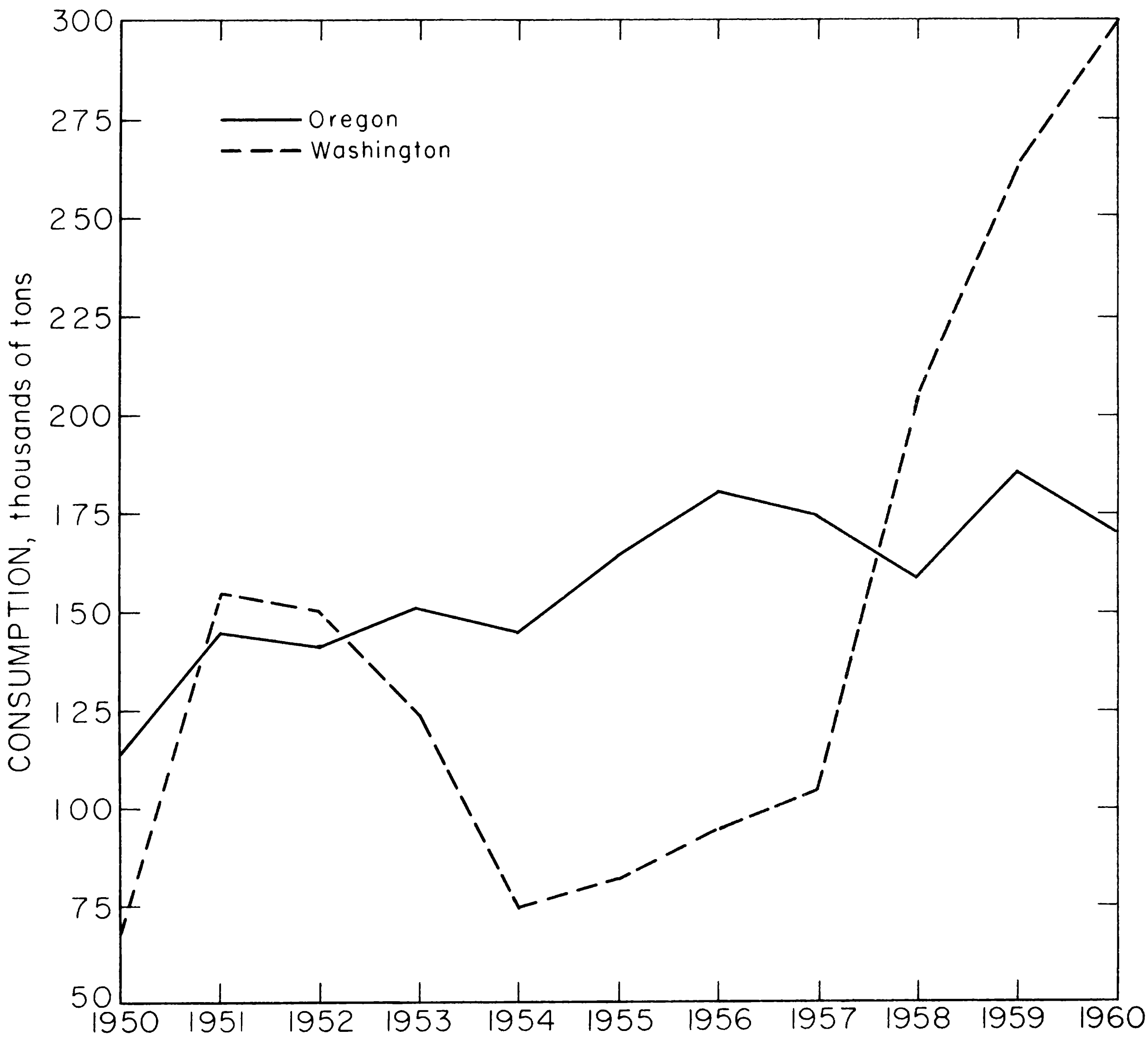

FIGURE 5. - Oregon and Washington Consumption of Iron and Steel Scrap in Electric Furnaces, 1950-60.

scrap consumption in the electric furnace. Now, with the largest regional consumer (located in Washington) converted to electric furnaces, the electric furnace consumption trend line for Washington will be above that of Oregon (as indicated by 1959-60).

As described previously, the consumers of scrap are (1) steel ingot producers, (2) iron foundries, (3) ferroalloy plants, and (4) export markets, including both foreign countries and States outside the Pacific Northwest area. Total market figures from 1955 to 1960 are given in table 8.

TABLE 8. - Total Oregon-Washington iron and steel scrap markets, 1955-60 (tons)

Year	Oregon-Washington consumption	Foreign exports	Shipments to other States	Total markets
1955............	559,000	133,000	51,000	743,000
1956............	608,000	289,000	44,000	941,000
1957............	615,000	260,000	64,000	939,000
1958............	449,000	84,000	62,000	595,000
1959............	508,000	144,000	98,000	750,000
1960............	526,000	250,000	33,000	809,000

Steel ingot producers remelt about 75 percent of the ferrous scrap consumed in the Pacific Northwest. The good correlation, $R^2 = .85$ (R^2 is the statistical coefficient of determination), of steel ingot production to scrap consumption is shown in figure 6.

Ferrous scrap consumption by grades at Pacific Northwest ingot-producing plants is shown for 1959 and 1960 in table 9. Apparent in this table is the preference for heavy melting grades, the modest use of bundles, and the insignificant consumption of cast iron. In table 10, scrap produced (home scrap) and scrap received (purchased scrap) are compared by grades for 1959. The percentages shown are given as an estimate of the proportion of heavy melting, bundles, and other scrap consumed during 1959 (table 9) that was obtained from purchased scrap, and that obtained as home scrap.

TABLE 9. - Consumption by grades of ferrous scrap at Pacific Northwest steel ingot-producing plants, 1959-60 (tons)

	Heavy melting	Bundles	Cast iron	Turnings and boring	Other	Total
1959:						
Consumption......	211,367	51,149	2,156	703	37,094	302,469
Percent of total.	70	17	(1)	(1)	12	100
1960:						
Consumption......	237,285	52,330	2,241	1,037	32,715	325,608
Percent of total.	73	16	(1)	(1)	10	100

[1] Less than 1 percent.

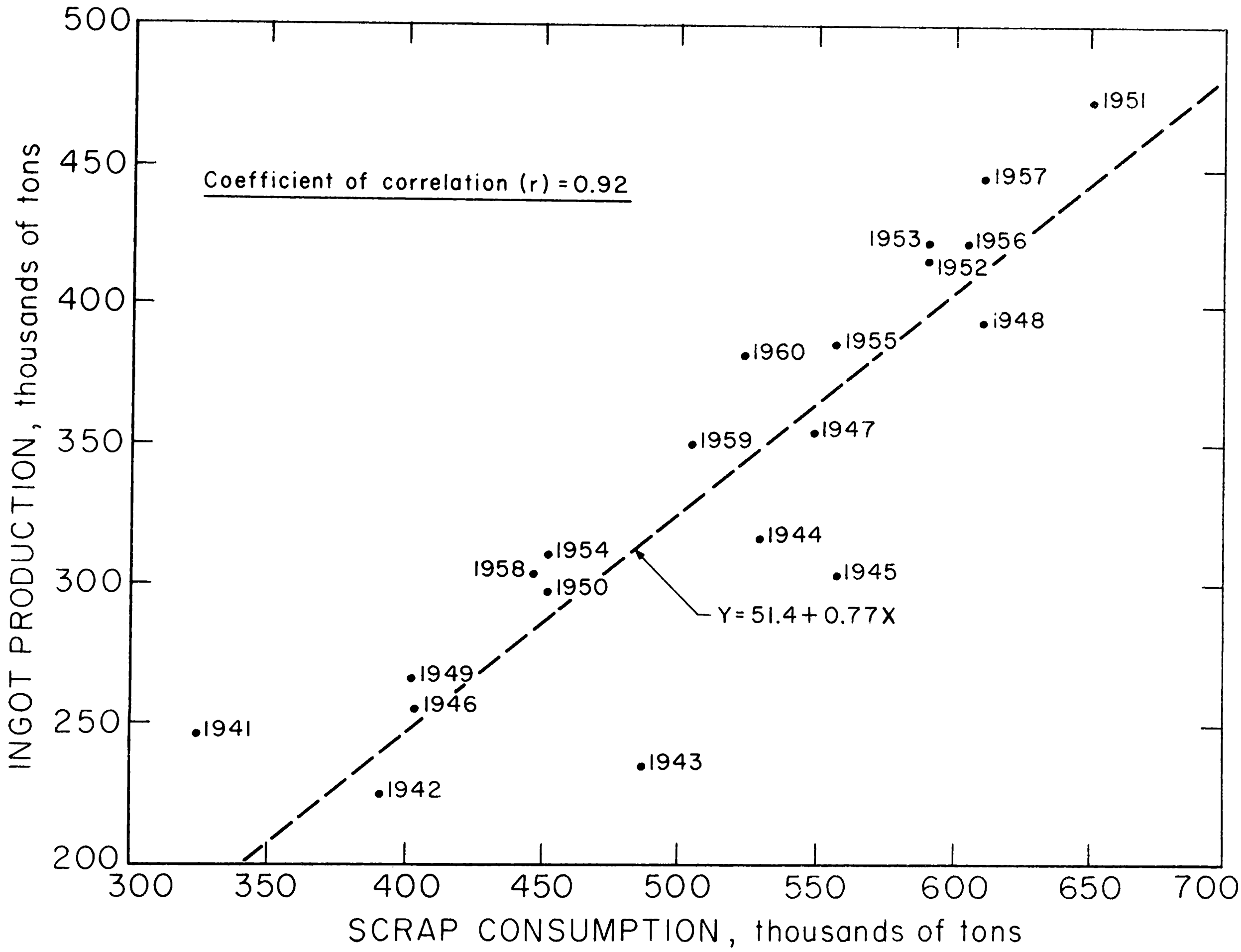

FIGURE 6. - Correlation of Oregon-Washington Ferrous Scrap Consumption to Steel Ingot Production, 1941-60.

TABLE 10. - Home and purchased scrap produced and received at Pacific Northwest ingot plants, 1959

Classification	Heavy melting		Bundles		All other		Total scrap	
	Tons	Percent	Tons	Percent	Tons	Percent	Tons	Percent
Home scrap......	46,271	19	-	-	10,157	26	56,429	17
Purchased scrap.	193,074	81	50,246	100	28,566	74	271,886	83
Total......	239,345	73	50,246	15	38,723	12	328,315	100

Individual-plant scrap specifications for the Bethlehem and Oregon Steel plants are given in Appendix A.

Steel-casting producers use approximately 15 percent of the ferrous scrap consumed in the Pacific Northwest. Scrap consumption by grades for 1959 and 1960 at steel-casting plants is shown in table 11. These figures are not exact because numerous steel foundries also produce iron castings, but total scrap consumed is credited to steel castings. Possibly, about 8 percent (total cast-iron scrap used) of the total went into iron castings.

TABLE 11. - Ferrous scrap consumption at Oregon and Washington steel foundries, 1959-60 (tons)

	Heavy melting	Low phosphorus	Cast iron	Alloy	Bundles	All other	Total
1959:							
Consumption......	29,463	15,610	4,985	3,390	5,942	1,635	61,025
Percent of total.	48	26	8	6	9	3	100
1960:							
Consumption......	26,008	16,359	4,568	2,922	605	5,379	55,841
Percent of total.	47	29	8	5	1	10	100

As is the case with ingot producers, table 11 shows that steel-casting plants consume greater quantities of heavy melting scrap than any of the other grades. A comparison of home scrap with purchased scrap is given in table 12 that shows a substantially greater portion of the steel foundry scrap derived from home scrap, as compared with the portion of home scrap used by steel ingot producers. Home and purchased scrap are given as a percent of the total, by grade, in table 13. The high percentage of alloy scrap indicated as home scrap is possibly explained by the practice of customers returning worn parts to the foundry making a replacement.

TABLE 12. - Home and purchased scrap produced and received at Pacific Northwest steel foundries, 1959 (tons)

	Heavy melting	Low phos-phorus	Cast iron	Alloy	Bundles	All other	Total	Percent of total
Home scrap.....	10,995	7,649	1,313	2,954	133	2,032	25,076	43
Purchased scrap	18,392	5,797	2,858	156	2,096	4,246	33,545	57
Total.....	29,387	13,446	4,171	3,110	2,229	6,278	58,621	100

TABLE 13. - Percent of home and purchased scrap produced and received, by grades, at steel foundries, 1959

	Heavy melting	Low phosphorus	Cast iron	Alloy	Bundles	All other	Total
Home scrap...........	37	57	31	95	6	32	43
Purchased scrap......	63	43	69	5	94	68	57
Total...........	50	23	7	5	4	11	100

Nine percent of the Oregon-Washington ferrous scrap consumption goes to iron foundries. These iron foundries are more widespread than steel foundries and ingot plants, but the larger iron foundries generally are located in the major metropolitan areas. Total scrap consumed in 1959 at iron foundries in the region was 46,400 tons, consisting mostly of cast iron and minor amounts of turnings and borings, low-phosphorus scrap, and other prepared scrap. A total of 42,300 tons of scrap was received or produced during 1959 at Oregon and Washington iron foundries; of the total, 30,200 tons (71 percent) was purchased scrap, and 12,100 tons (29 percent) was home scrap. Consumption during 1960 is combined with ferroalloys.

About 1 percent of the Oregon-Washington scrap consumption is at ferroalloy plants, where a total of 5,530 tons of scrap, consisting principally of alloy-free turnings and borings, and a small amount of unprepared scrap, was used during 1959. During 1960 iron foundries and ferroalloy plants consumed a total of 47,880 tons of scrap.

From 1950 to 1960, approximately one million short tons of ferrous scrap (excluding steel for rerolling) was exported from Seattle and Portland to foreign markets--almost wholly to Japan except for a comparatively small tonnage to western Canada. Approximately half of the total exports were heavy melting grades. Counting scrap for rerolling as heavy melting scrap, the heavy grades accounted for an estimated 63 percent of 1960 exports from Oregon and Washington, bundles comprised 13 percent, and cast iron accounted for 20 percent. Table 14 gives Corps of Engineers statistics on waterborne foreign exports.

TABLE 14. - Waterborne foreign exports of iron and steel scrap from Oregon and Washington, 1953-60[1]

	Tons
Year:	
1953	3,800
1954	17,000
1955	133,100
1956	288,700
1957	259,700
1958	83,600
1959	143,800
1960	249,600

[1] U.S. Corps of Engineers. Waterborne Commerce of the United States. Pt. 4, 1960.

SCRAP INDUSTRY ECONOMICS

Prices and costs, as with all commodities, are major determinants in the economics of the scrap industry. The following relates some of the regional factors of prices and cost of product, preparation, and transport.

Prices and Costs

Iron and steel scrap prices fluctuate widely with changes in demand and availability. Increased demand creates competition for the available supply, thus bringing the prices upward. Also increased demand brings scrap in from areas outside the normal collection radius of the market--this movement requires a higher scrap price to pay the added freight. In the latter case, what probably takes place is that scrap-purchase contracts, particularly sizable export purchases, must be filled within a specified period, and the competition forces the price up, making it attractive for outlying dealers to ship greater distances to the market. The point is that there is a time element involved--given sufficient time, the normal scrapping radius of a market area might well be able to supply demands, but the collection machinery must begin to function first. Therefore, in a sense, purchases from outlying areas during high-demand periods do not necessarily indicate depletion of available scrap at a given price quotation within a given mileage-to-market radius, although at times this may have been the case. Sustained scrap drives during war periods, subject to price controls, are good examples of maximum scrap availability at a given price.

The quantity of scrap available to consumers for purchase is directly proportional to the price being paid. Higher prices cause dealers to collect more, dealers and collectors are more active, and a broader area is covered. Under conditions of sustained high consumption, high or increasing scrap prices might represent an inverse proportion to the availability of scrap--there is a diminishing point in the price-availability relationship where the price can continue to go up, but the supply of scrap will continue to go down. The cutoff may be somewhere near the cost of pig iron, or at a point where the withdrawal of scrap is taking place at a higher rate than the generation of scrap in an area.

The price of No. 1 heavy melting scrap is the pace-setter for the pricing of other iron and steel scrap grades. In table 15, the monthly quotations of No. 1 heavy melting scrap at Seattle, Wash., as quoted in Iron Age, are given for the years 1951 to 1960. Prices for No. 2 heavy melting and No. 2 bundles are shown in Appendix B. Prices paid by consumers at Portland frequently are not reflected by the published Seattle figures, but they often are higher by many dollars. The apparent explanation of this difference is that scrap shipments out of the Portland port have been greater in recent years than out of the Seattle area, and the greater withdrawal has created a higher price.

TABLE 15. - Iron Age monthly quotations of No. 1 heavy melting steel scrap, Seattle, Wash., 1951-60, dollars per long ton

Month	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960
January.........	$28	$34	$33	$27	$27	$44	$54	$34	$30	$35
February........	28	34	33	27	29	42	56	30	30	35
March...........	35	34	34	25	31	42	53	28	34	35
April...........	35	34	30	23	31	38	53	30	35	35
May.............	35	34	33	23	33	44	48	27	35	35
June............	35	34	33	23	33	42	48	27	35	35
July............	35	34	31	23	33	43-44	45	31	35	35
August..........	35	34	31	25	33	43-44	49	30	35	35
September.......	35	34	33	25	35	46	42	30	35	35
October.........	35	34	31-33	25	40	50	38	30	35	33
November........	34	34	29	25	44	54-55	34	30	35	33
December........	34	34	31	27	44	54	34	30	35	33
Average....	34	34	32	25	34	45	46	30	34	35

A result of defense demands during the Korean conflict was that iron and steel scrap prices were under Federal controls from Feb. 7, 1951, until Feb. 13, 1953. Prices dropped to a low in the last half of 1954, but recovered in 1955 and 1956, reaching a high in early 1957. The recovery is attributed to heavy exports to Japan and a favorable domestic market. Exports declined in 1958, and so did the price. During 1959 and 1960, exports again increased as did the price. However, the 1960 prices did not reflect the increase in tonnage.

Scrap Pricing

Published scrap prices represent the price being paid by major consumers (steel mills) during the previous months or weeks. In some areas (not in the Pacific Northwest) brokers' prices are quoted when consumer prices are not available. The current quoted selling price does not necessarily represent the actual selling price at a given moment, but it does give an idea of the price trend and provides a basis to the dealer for planning his sales.

Scrap prices are established essentially by the consumer. A dealer or broker calls the potential purchaser (which might be a broker or consumer) to see if he is in the market--also, the consumer or broker might call the dealer to see what type and quantity are available. The purchasing agent for the consumer indicates the current company scrap need and the price he is willing to pay. The seller considers the purchase offer and possibly after checking with other consumers and/or bargaining, an order is agreed upon. If the offer to buy is too low, the seller might decline. This is often possible when the export market is good, and the dealer can sell to that market. If the consumer finds that there are no offers to sell at the price offered, he must increase his offer.

The export price paid by the Japanese until May 1962 was a composite price derived from the price of No. 1 heavy melting scrap paid at major consumption centers (Los Angeles, San Francisco, and Seattle) on the West Coast. This was done by averaging the price, at each of these cities, for a five week period prior to loading. A minimum floor price of $39.00 per ton was paid for No. 1 heavy melting; No. 2 heavy melting and No. 2 bundles were priced $3 and $13.50 per ton, respectively, less than No. 1 heavy melting. In addition, premiums were paid. A $5.80 per ton loading premium was paid when the composite price was below $42. For a price $42 to $45, a loading fee of $5.50 per ton was paid, and when the composite exceeded $45 per ton, $5 per ton was paid for loading expenses. Additional profit over costs was probably derived from this loading premium.

A premium of $3.90 per ton was always added to the composite price of No. 1 heavy melting. For examples, the following two price cases are given to show payment on a 4/4/2 cargo (40 percent No. 1 heavy melting, 40 percent No. 2 heavy melting, and 20 percent bundles):

Case 1.--Base price minimum payment when the composite price was below $39 per ton:

Minimum base price (composite at or below $39)	$39.00
Loading premium	5.80
Price premium	3.90
Total	$48.70

Prices paid:

No. 1 heavy melting	$48.70
No. 2 heavy melting	$45.70
No. 2 bundles	$35.20

Case 2.--Payment when the composite price was above the $39 minimum:

Composite prices	$43.00
Loading premium	5.50
Price premium	3.90
Total	$52.40

Prices paid:

No. 1 heavy melting	$52.40
No. 2 heavy melting	$49.40
No. 2 bundles	$38.90

A further premium of $1.75 per ton was paid when the cargo was half No. 1 and half No. 2 heavy melting scrap (the premium being added to the No. 1 price), and a $3 per ton premium was paid for an all No. 1 heavy melting steel cargo.

From this example it appears that as long as the composite price, used in establishing the export price, truly reflected the domestic consumer's average purchase price or exceeded it, domestic consumers would be outbid in scrap purchases by a sizable margin.

Cost Examples

There are two principal variables in marketing scrap: (1) the market price of scrap and (2) the cost of transport to the market. For the examples to follow, a yard operation cost of $8.00 per ton is used. This figure includes total cost of handling, preparation, and overhead. A dealer profit margin of $4.00 per ton and a brokerage fee of $1.00 per ton are arbitrarily selected. These are totaled ($13.00) and listed as a "Profit Cost" item in each case. The $13.00 figure is hypothetical since each yard operation has varying costs and efficiencies, as well as individual profit requirements (determined somewhat by yard investment and volume of material handled). Market prices determine the price that the dealer can pay to the scrap collector or peddler and auto wreckers, which is the market price minus the sum of the price-cost and transport cost totals.

Examples are given as follows (the total represents the dealer charges against the scrap, and the difference obtained by subtracting this figure from the market price is what the dealer might be able to pay the collector):

	Profit margin and costs[1]	Transport cost		Total
		Minimum tons	Rate per ton	
To Seattle from--				
Spokane, Wash	$13	20	$9.10	$22.10
Do	13	40	7.90	20.90
Boise, Idaho	13	20	14.40	27.40
Do	13	30	14.20	27.20
Do	13	40	10.10	23.10
Lewiston, Idaho	13	20	9.10	22.10
Do	13	40	7.90	20.90
Missoula, Mont	13	20	17.00	30.00
Do	13	40	15.00	28.00
Butte, Mont	13	20	17.00	30.00
Do	13	40	15.00	28.00
Billings, Mont	13	25	26.00	39.00
Do	13	40	20.20	33.20
To Portland from--				
Spokane, Wash	13	20	9.10	22.10
Do	13	40	7.90	20.90
Lewiston, Idaho	13	20	9.10	22.10
Do	13	40	7.90	20.90
Pendleton, Oreg	13	20	7.90	20.90
Do	13	40	7.30	20.30
Boise, Idaho	13	20	12.30	25.30
Do	13	40	9.30	22.30
Grants Pass, Oreg	13	30	11.50	24.50
Do	13	50	10.90	23.90
Klamath Falls, Oreg	13	30	11.50	24.50
Do	13	50	10.90	23.90
Coos Bay, Oreg	13	15	12.50	25.50
Do	13	40	9.30	22.30
Seattle, Wash.[2]	13	20	5.50	18.50
Do	13	30	4.70	17.70
Do	13	40	4.30	17.30
To Geneva, Utah, from--				
Pocatello, Idaho	13	40	5.30	18.30
Idaho Falls, Idaho	13	40	6.30	19.30
Boise, Idaho	13	20	14.60	27.60
Do	13	40	8.90	21.90
Butte, Mont	13	20	17.00	30.00
Do	13	40	9.30	22.30

[1] Based on a yard operation having a volume of 100,000 tons per year.
[2] Also applies from Portland to Seattle.

Using the above total figures, the following scale indicates the price payable to peddlers, collectors, and auto wreckers at different market prices of scrap.

Scrap market price	$60	$55	$50	$45	$40	$35	$30	$25	$20
	Price payable to peddlers, collectors, and auto wreckers								
Dealer profit and costs, total:									
$17.30.......	$42.70	$37.70	$32.70	$27.70	$22.70	$17.70	$12.70	$7.70	$2.70
17.70.......	42.30	37.30	32.30	27.30	22.30	17.30	12.30	7.30	2.30
18.30.......	41.70	36.70	31.70	26.70	21.70	16.70	11.70	6.70	1.70
18.50.......	41.50	36.50	31.50	26.50	21.50	16.50	11.50	6.50	1.50
19.30.......	40.70	35.70	30.70	25.70	20.70	15.70	10.70	5.70	.70
20.00.......	40.00	35.00	30.00	25.00	20.00	15.00	10.00	5.00	-
20.30.......	39.70	34.70	29.70	24.70	19.70	14.70	9.70	4.70	-
20.90.......	39.10	34.10	29.10	24.10	19.10	14.10	9.10	4.10	-
21.90.......	38.10	33.10	28.10	23.10	18.10	13.10	8.10	3.10	-
22.10.......	37.90	32.90	27.90	22.90	17.90	12.90	7.90	2.90	-
22.30.......	37.70	32.70	27.70	22.70	17.70	12.70	7.70	2.70	-
23.10.......	36.90	31.90	26.90	21.90	16.90	11.90	6.90	1.90	-
23.90.......	36.10	31.10	26.10	21.10	16.10	11.10	6.10	1.10	-
24.50.......	35.50	30.50	25.50	20.50	15.50	10.50	5.50	.50	-
25.30.......	34.70	29.70	24.70	19.70	14.70	9.70	4.70	-	-
25.50.......	34.50	29.50	24.50	19.50	14.50	9.50	4.50	-	-
27.20.......	32.80	27.80	22.80	17.80	12.80	7.80	2.80	-	-
27.40.......	32.60	27.60	22.60	17.60	12.60	7.60	2.60	-	-
27.60.......	32.40	27.40	22.40	17.40	12.40	7.40	2.40	-	-
28.00.......	32.00	27.00	22.00	17.00	12.00	7.00	2.00	-	-
30.00.......	30.00	25.00	20.00	15.00	10.00	5.00	-	-	-
32.20.......	26.80	21.80	16.80	11.80	6.80	1.80	-	-	-
39.00.......	21.00	16.00	11.00	6.00	1.00	-	-	-	-

An attempt to determine peddler and collector costs and profits would be difficult in that the sale of scrap by this group is not necessarily a principal occupation or source of livelihood. People engage in the collection business as the market and economic conditions dictate, or, as is the case with auto wrecking yards, their livelihood is obtained primarily from the sale of usable parts. The scrap generated is a minor additional profit. Therefore, no attempt to estimate such costs is made.

Price-Supply Relationship

Table 16 shows the unweighted trends of average haul and revenue per ton of scrap shipped by rail for Oregon, Washington, Utah, California, and Colorado from 1955 to 1960. Steel scrap was in increasing demand from 1955 to 1957, but fell off sharply in 1958, then increasing again in 1959 and 1960. Scrap prices followed the same pattern by first rising and then declining from 1955 to 1960. There was a similar increase in the average haul and revenue for the rail transport of scrap during the period of high demand and price--indicating the necessity to go further from the consuming area to increase the supply during the high demand periods.

The elasticity of supply is shown in figure 7, which correlates the Seattle price of No. 1 heavy melting scrap with total Oregon-Washington scrap withdrawals (Oregon-Washington consumption plus foreign exports). The trend line shows a relationship and a good correlation of $R^2 = 0.79$, which tests significant (for $R = 0.89$) at the one-percent level using Student's t-test. However, 1957, judged to be an abnormal year, was omitted from the 1951 to 1960 correlation. Nineteen-fifty-seven

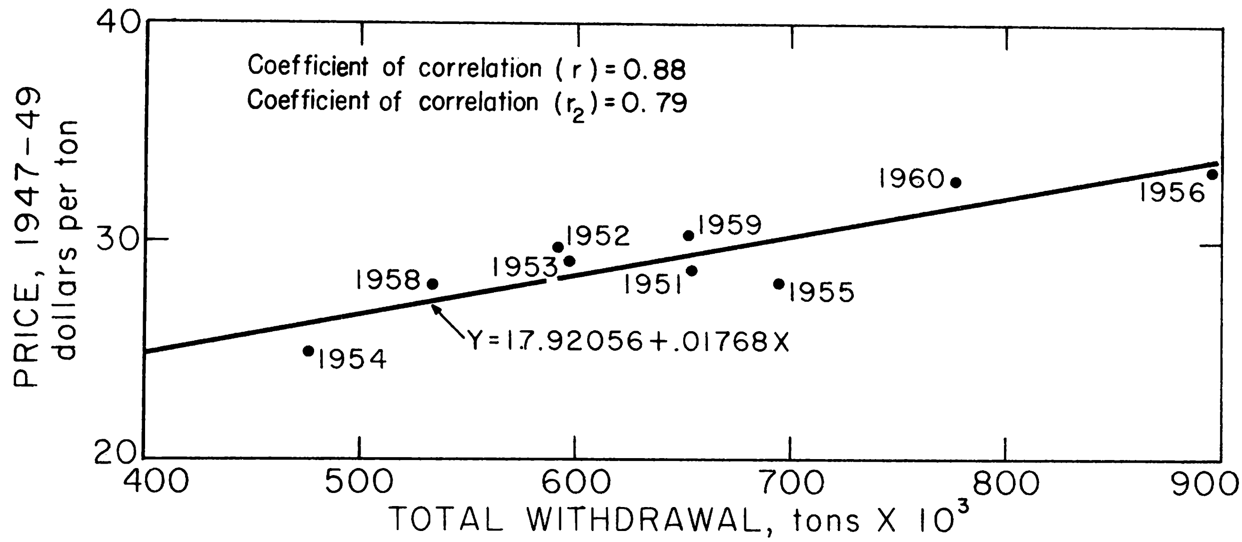

FIGURE 7. - Oregon and Washington Iron and Steel Scrap Elasticity of Supply, 1951-60.

did not fall in the pattern of the other nine years due to inelasticity in the price-supply relationship, brought on in part by the heavy withdrawals in 1956 that momentarily depleted the available supply. Although the price in 1957 reached a high, the quantity of scrap supplied failed to reach the quantities previously and subsequently delivered at lower prices.

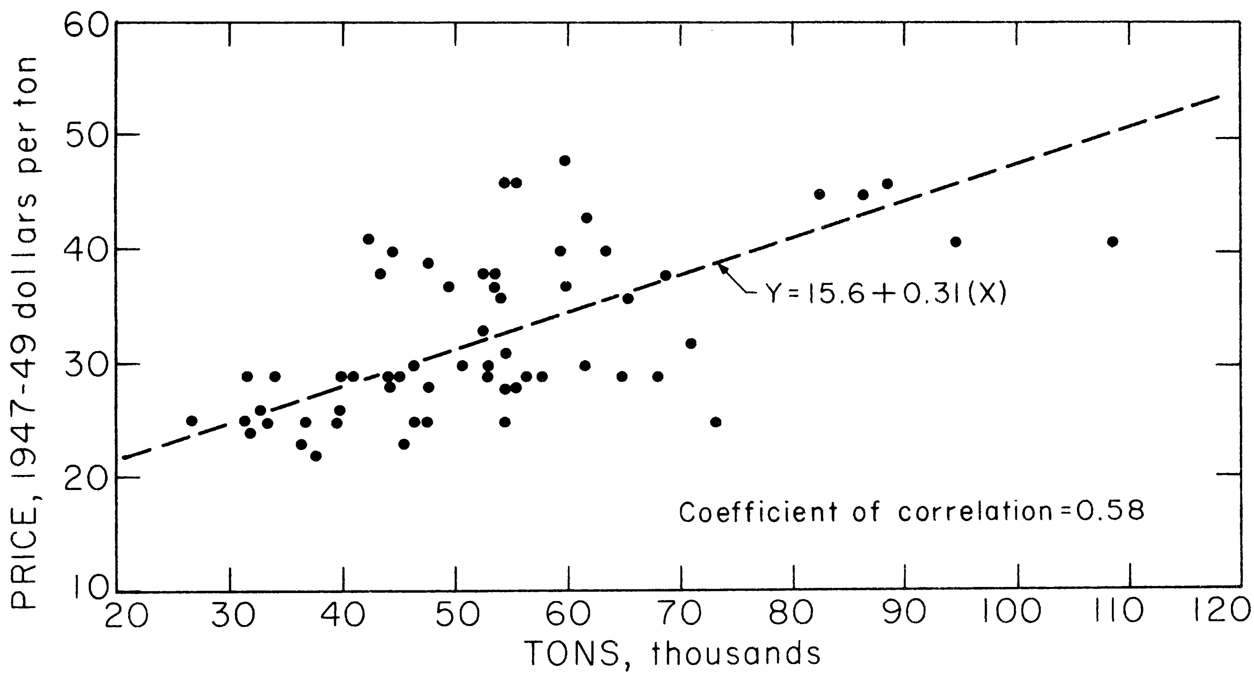

FIGURE 8. - Monthly Oregon-Washington Consumption and Foreign Exports of Iron and Steel Scrap, 1955-59, Correlated With the Seattle Scrap Price Quotation in 1947-49 Dollars.

TABLE 16. - Comparison of ferrous scrap terminations in western steel-producing States, 1955-60[1] [2]

Year	Oregon		Washington		Utah		California		Colorado	
	Average haul per ton, miles	Average revenue per ton	Average haul per ton, miles	Average revenue per ton	Average haul per ton, miles	Average revenue per ton	Average haul per ton, miles	Average revenue per ton	Average haul per ton, miles	Average revenue per ton
1955	235	$5.50	240	$5.48	232	$4.13	145	$3.39	243	$5.12
1956	251	6.09	376	7.15	258	6.15	119	3.24	214	5.19
1957	291	6.80	375	8.80	474	9.40	603	11.00	321	7.40
1958	204	5.74	196	5.50	280	6.31	131	3.72	248	6.33
1959	195	5.67	207	6.36	481	8.50	138	3.95	242	6.05
1960	394	8.60	275	7.40	497	9.20	807	14.20	422	8.84

[1] Average unweighted figures; therefore, the data do not represent true ton miles and costs, but do indicate trends.
[2] Interstate Commerce Commission 1 percent waybill samples.

Figure 8 presents monthly Oregon-Washington scrap withdrawals in relation to price from 1955 to 1959. Although the coefficient of correlation is low (0.58), it tests significant using Student's t-test. The scattering of the observations indicates possible diverse trends other than that shown by the regression line. A number of the observations above the regression line represent months when the scrap supply was inelastic to price increases.

Freight Rates

Railroad shipping rates from selected points to Seattle, Wash., Portland, Oreg., and Geneva, Utah, are given in tables 17 to 19. It is interesting to note the Boise, Idaho, rate to the three destinations in the tables. Movements of 20 tons minimum weight go cheapest to Portland ($2.30 per ton below Geneva and $2.10 per ton below Seattle), but 40-ton minimum shipments move cheapest to Geneva, 40 cents per ton under Portland and $1.20 per ton under Seattle. Rates from southern Oregon points to Portland are noticeably high, particularly when compared with the Spokane to Portland rates.

In tables 20 to 22, mileage commodity rates are given for motor truck movements of iron and steel scrap from point to point within the States of Idaho, Oregon, Washington, and Montana. These figures are given to provide a basis for estimating the cost of small-lot ferrous scrap movements from its origin to centers of concentration and market areas; they should represent maximum costs.

Effect of the Export Market

For the scrap dealer, the export market has played an important role in creating favorable domestic marketing conditions. Export contracts generally are signed for shipload quantities to be delivered within a given period. This results in a drive to accumulate sufficient quantities, which necessitates a price increase to draw out scrap at distance and to speed up the flow of locally-available (within a usual 50 to 100 mile scrap-purchase radius) ferrous scrap. Domestic consumers are caught by the upward price trend and have to pay higher prices to maintain their inventories. The periodic scrap-price fluctuations, created in part by the export market, offer opportunity for speculative buying and selling on the part of the consumer and dealer. However, many consumers and dealers continue normal purchases, avoiding speculation, holding the opinion that the highs and lows balance out in the long run.

TABLE 17. - Carload rail freight rates for iron and steel scrap from selected points to Seattle, Wash.

To Seattle, Wash., from--	Rate, dollars per ton	Minimum weight, short tons
Spokane, Wash	$9.10	20
Do	7.90	[1]25
Do	7.90	40
Boise, Idaho	14.40	20
Do	14.20	30
Do	10.10	40
Lewiston, Idaho	9.10	20
Do	7.90	[1]25
Do	7.90	40
Missoula, Mont	17.00	20
Do	15.00	40
Butte, Mont	17.00	20
Do	15.00	40
Great Falls, Mont	17.00	20
Do	15.00	40
Billings, Mont	26.00	25
Do	20.20	40

[1]When car is loaded to full visible capacity.

TABLE 18. - Carload rail freight rates for iron and steel scrap from selected points to Portland, Oreg.

To Portland, Oreg., from--	Rate, dollars per ton	Minimum weight, short tons
Spokane, Wash	$9.10	20
Do	7.90	[1]25
Do	7.90	40
Lewiston, Idaho	9.10	20
Do	7.90	[1]25
Do	7.90	40
Pendleton, Oreg	7.90	20
Do	7.30	40
Boise, Idaho	12.30	20
Do	9.30	40
Grants Pass, Oreg	11.50	30
Do	10.90	50
Klamath Falls, Oreg	11.50	30
Do	10.90	50
Coos Bay, Oreg	12.50	15
Do	9.30	40
Seattle, Wash.[2]	5.50	20
Do	4.70	30
Do	4.30	40

[1]When car is loaded to full visible capacity.
[2]Also applies from Portland to Seattle.

TABLE 19. - Carload rail freight rates for iron and steel scrap from selected points to Geneva, Utah

To Geneva, Utah, from--	Rate, dollars per ton	Minimum weight, short tons
Pocatello, Idaho.................	$5.30	40
Idaho Falls, Idaho...............	6.30	40
Boise, Idaho.....................	14.60	20
Do...................	8.90	40
Butte, Mont......................	17.00	20
Do...................	9.30	40

TABLE 20. - Distance mileage commodity rates for motor transport of iron and steel scrap within Washington and Idaho, 5-ton minimum shipment[1]

Mileage		Rate,	Mileage		Rate,	Mileage		Rate,
From--	To--	cents per cwt	From--	To--	cents per cwt	From--	To--	cents per cwt
0	5	20	150	160	105	330	340	179
5	10	25	160	170	111	340	350	181
10	15	35	170	180	113	350	360	185
15	20	35	180	190	118	360	370	193
20	25	40	190	200	123	370	380	198
25	30	40	200	210	128	380	390	203
30	40	43	210	220	130	390	400	204
40	50	50	220	230	136	400	410	206
50	60	58	230	240	138	410	420	214
60	70	62	240	250	142	420	430	216
70	80	68	250	260	147	430	440	221
80	90	75	260	270	152	440	450	223
90	100	80	270	280	155	450	460	225
100	110	86	280	290	160	460	470	231
110	120	92	290	300	162	470	480	235
120	130	93	300	310	164	480	490	240
130	140	95	310	320	172	490	500	243
140	150	103	320	330	175	500	-	([2])

[1] Tariff authority PITB 11-C.
[2] Add 6½ cents per 100 pounds to rate for 500 miles for each 20 miles or fraction thereof.

TABLE 21. - Distance mileage commodity rates for motor transport of iron and steel scrap within Oregon, 8-ton minimum shipment[1] [2]

Mileage From--	Mileage To--	Rate, cents per cwt	Mileage From--	Mileage To--	Rate, cents per cwt	Mileage From--	Mileage To--	Rate, cents per cwt
0	5	[3]16	140	150	98	320	330	206
5	10	[3]20	150	160	104	330	340	212
10	15	[3]24	160	170	110	340	350	218
0	15	[4]28	170	180	116	350	360	224
15	20	28	180	190	122	360	370	230
20	25	32	190	200	128	370	380	236
25	30	36	200	210	134	380	390	242
30	40	40	210	220	140	390	400	248
40	50	43	220	230	146	400	410	254
50	60	46	230	240	152	410	420	260
60	70	52	240	250	158	420	430	266
70	80	57	250	260	164	430	440	272
80	90	63	260	270	170	440	450	278
90	100	68	270	280	176	450	460	284
100	110	74	280	290	182	460	470	290
110	120	80	290	300	188	470	480	296
120	130	86	300	310	194	480	490	302
130	140	92	310	320	200	490	500	308
						500	-	([5])

[1]Tariff authority PITB 11-C.

[2]Rates do not apply on traffic moving between points in the following counties: Douglas, Coos, Curry, Josephine, Jackson, Klamath, and Lake.

[3]Applies only on single articles or a single part of an article, and moved on a single vehicle.

[4]Does not apply on a single article or a single part of an article, and moved on a single vehicle.

[5]Add 6 cents per 100 pounds to rate for 500 miles for each 10 miles or fraction thereof.

TABLE 22. - Distance mileage commodity rates for motor transport of iron and steel scrap within Montana, 5-ton minimum shipment[1] [2]

Mileage From--	Mileage To--	Rate, cents per cwt	Mileage From--	Mileage To--	Rate, cents per cwt	Mileage From--	Mileage To--	Rate cents per cwt
0	5	15	70	75	57	135	140	81
5	10	20	75	80	59	140	145	86
10	15	24	80	85	64	145	150	86
15	20	26	85	90	67	150	155	87
20	25	32	90	95	68	155	160	87
25	30	34	95	100	72	160	165	89
30	35	39	100	105	72	165	170	89
35	40	43	105	110	72	170	175	89
40	45	43	110	115	77	175	180	95
45	50	44	115	120	78	180	185	95
50	55	48	120	125	78	185	190	95
55	60	50	125	130	79	190	195	96
60	65	52	130	135	79	195	200	96
65	70	56						

[1]Tariff authority PITB 20-A.

[2]Maximum measurement 500 cubic feet per 10,000 pounds.

Dealers have speculated themselves into negative financial situations, on occasion, by overanticipating their capabilities to fulfill export contracts. In cases where the Japanese have signed large tonnage contracts in California, Oregon, and Washington, the dealers will compete strongly for the available scrap supply. Where a dealer normally could expect to accumulate adequate tonnage, at a favorable price, within the allotted period, the heavy drain on the resources forces the existing collection machinery to capacity, but adequate quantities of scrap do not result. The immediate reaction is to pay a higher price resulting in a competitive price spiral, thus diminishing the anticipated return, and in extreme cases resulting in a net loss in fulfilling export contracts.

Shipwrecking

Surplus ships for scrapping have been made available from the Astoria Maritime Reserve fleet and the Olympia Reserve fleet in Oregon and Washington, respectively. Liberty ships are sold at a minimum bid of $70,000 for domestic scrapping, while those for scrapping overseas require a minimum bid of $95,000. Metallic ballast remains the property of the U.S. Government, and it has to be returned to the Government. By the time a Liberty ship is purchased and transported to Japan, the cost approaches $160,000. The quantity of scrap salvageable is estimated in excess of 3,000 tons. If a Liberty ship were purchased at $75,000 for domestic scrapping and 3,000 tons of ferrous scrap were recovered, the cost of purchase alone would be $25 per ton. Useables, nonferrous materials, and the sale of ship plate for re-rolling help to make the wrecking operation profitable. Based on the initial cost of purchasing a ship, this scrap is generally unattractive except during periods when the market is particularly good (when the price of heavy melting steel approaches $40 to $50 a ton). Also, the domestic market for much of the ship scrap (particularly combat vessels) is limited because of the metals' alloy content.

The scrapping of ships requires certain facilities, which are costly to maintain. Such facilities are maintained and operated at Seattle, Tacoma, and Portland.

OUTLOOK

The demand for scrap in Oregon and Washington is dependent principally on iron and steel output in these States. Foreign exports and, less importantly, the shipments to other consuming States add to the total scrap removed from available sources in the two-State area. Consumption in Oregon and Washington is projected through 1985 by a multiple-regression equation using steel ingot and iron and steel casting production as independent variables and Oregon-Washington scrap consumption as the dependent variable. Available figures on iron and steel casting production (steel casting shipments used as production) limited the data to seven observations. However, the equation has a coefficient of determination of 0.99 (R^2). Variable data and the equation are shown in table 23. Consumption of iron and steel scrap by ingot and casting producers can be estimated for any future year by inserting the consuming industries projected metal production into the equation. Actual data are given in the table for 1961 and 1962. Also shown are projected dependent variable values for these years for a test of the equation.

TABLE 23. - Multiple regression equation for Oregon-Washington scrap consumption

[tons X 10^3]

Year	X_1	X_2	X_3	X_4
1954	458	310	31	54
1955	559	388	37	59
1956	608	422	39	62
1957	615	447	34	55
1958	449	304	32	37
1959	508	354	41	35
1960	526	381	37	31
1961	[1]470	337	36	21
1962	[2]448	315	38	24

[1]470 projected by the equation.
[2]453 projected by the equation.

Note.--X_1 = Scrap consumption.
X_2 = Steel ingot production.
X_3 = Steel casting production (shipments).
X_4 = Iron casting production.

Equation: $X_1 = 48.5201 - 1.0355X_2 + 1.4100X_3 + 1.0218X_4$.
$R^2 = .9983$

Intercorrelations: $r_{12}^2 = .97$
$r_{13}^2 = .21$
$r_{14}^2 = .31$
$r_{23}^2 = .21$
$r_{24}^2 = .18$
$r_{34}^2 = .02$

Foreign exports are more difficult to assess, partly because present and projected expansion of Japanese steel capacity will be in oxygen converters utilizing a charge with more pig iron and less scrap than previously used. The Japanese have indicated possible doubling of steel production from about 30 million tons in 1960 to 60 million tons by 1985. This would indicate a doubling of scrap requirements from the West Coast of the United States over what was taken in the late 1950's. However, the apparent shift in Japanese technology makes any significant expansion in scrap demand unlikely. There is no statistical correlation between Oregon-Washington scrap exports to Japan and Japanese steel production. Therefore, based on the previous information and estimates of the Bureau of Mines, it is judged that the Japanese will withdraw scrap from Oregon and Washington at the same approximate average rate as from 1955 to 1960, which was nearly 200,000 tons annually. It is estimated that about half of this annual total was heavy melting scrap, whereas future exports likely will be more predominantly, if not entirely, heavy melting grades. Although there may be no expansion in total average export tonnage to Japan in the future, an increased percentage draw on heavy melting grades would have the same affect on the Pacific State's scrap market as an increase in the overall withdrawal tonnage. This is because heavy melting grades are in greatest demand by domestic consumers and are the least available.

To project Oregon and Washington iron and steel scrap demand, steel ingot projections from a previous Bureau of Mines publication (17) were used. The low projection of a range was taken and extended from 1980 to 1985. Judgement projections were made for steel and iron castings. Projected totals for steel-ingot, iron-casting, and steel-casting production, used in the equation listed in table 23 are given in table 24.

Adding the average of 200,000 tons per year estimated to be exported to Japan to the scrap consumption in table 25 and adding an estimated 10 percent (based on 1955 to 1960 average) of the projected Oregon-Washington consumption to be shipped to other States to the Oregon-Washington consumption gives the total projected withdrawal or demand for iron and steel scrap from Oregon and Washington as shown in table 25.

TABLE 24. - Projected Oregon-Washington iron and steel production, 1965-85[1]

	1965	1970	1975	1980	1985
Steel ingot production[2]......	550,000	700,000	825,000	1,000,000	1,250,000
Steel casting production[3]....	40,000	45,000	50,000	55,000	60,000
Iron casting production[3].....	25,000	30,000	35,000	40,000	45,000

[1] Used in multiple-correlation equation, table 23, to give totals in line 1, table 25.
[2] Based on reference 17.
[3] Based on judgments.

TABLE 25. - Projected total demand for iron and steel scrap from Oregon and Washington, 1965-85 (tons)

	1965	1970	1975	1980	1985
Oregon-Washington consumers	700,000	870,000	1,000,000	1,200,000	1,500,000
Foreign export............	200,000	200,000	200,000	200,000	200,000
Shipments to other States..	70,000	90,000	100,000	120,000	150,000
Total demand.........	970,000	1,160,000	1,300,000	1,520,000	1,850,000

Based on estimated withdrawals from 1955 to 1960, estimated and projected heavy melting scrap withdrawals from Oregon and Washington are given in table 26. Assuming that there is a relationship between population and the quantity of scrap available in an area, the per capita withdrawal of heavy-melting scrap by 1975 will reach 233 pounds, exceeding the withdrawal experienced from 1955 to 1960; per capita withdrawal is estimated to reach 275 pounds by 1985.

TABLE 26. - Oregon-Washington heavy melting scrap withdrawals, 1955-85

Year	Total Oregon-Washington scrap demand, thousand tons	Total heavy melting demand, thousand tons	Heavy melting as percent of total, percent	Oregon-Washington population,[1] thousands	Per capita heavy melting withdrawal, pounds
1955	740	390	53	4,300	181
1956	940	380	40	4,400	173
1957	940	520	55	4,500	231
1958	595	360	61	4,550	158
1959	750	440	59	4,600	191
1960	810	440	54	4,600	191
1965	970	550	57	5,200	212
1970	1,160	670	58	5,800	231
1975	1,300	750	58	6,450	233
1980	1,520	890	59	7,200	247
1985	1,850	1,100	60	8,000	275

[1]Department of Commerce, Bureau of the Census.

When the price of scrap is $35 per ton or under for the No. 1 heavy melting grade, it is attractively priced to the steel producers. However, based on the supply-price relationship previously described (figures 7 and 8) and the projected demand for scrap, assuming the indicated supply-price relationship should hold true in the future, prices could be substantially over $35 per ton. Any long-term price pattern over $35 per ton likely will bring about production of steel from iron ore in the Pacific Northwest.

The steel industry as a whole has been rapidly installing the oxygen-process furnace, which replaces the open-hearth furnace and yields refined steel up to eight times faster. The oxygen process requires much less scrap. Because of this new technology, scrap markets will be reduced in integrated steel producing areas, such as southern California, Utah, and Colorado. Although the oxygen-process furnace will not affect the scrap demand at cold-melt steel plants (using a 100 percent scrap charge), such as are present in the Pacific Northwest, a general decline in national scrap demand could lessen Pacific Northwest exports, to foreign nations and to domestic steel producers outside of the Pacific Northwest.

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APPENDIX A.--INDIVIDUAL CONSUMER STEEL SCRAP SPECIFICATIONS

Bethlehem Steel Company, Seattle, Wash.

1. Material is subject to the company's inspection and acceptance at destination.

2. Shipments are to be made in solid-bottom gondola cars only in not less than minimum carload lots.

3. Report car numbers, name of original shipper, and point of shipment on the company's form Bh 1570a, one copy to the Purchasing Department at the point of delivery.

4. If cars arrive in advance of shipping notices, any demurrage which may occur will be charged to the shipper's account.

No. 1 Heavy Melting Steel Scrap.--No. 1 heavy melting steel scrap consists of steel free of alloys, ¼ in and over in thickness, not over 18 in in width, and not over 5 ft long. Individual pieces must be cut into such shape that they will be free from attachments and will lie flat in a charging box. Cut boiler plate must be cleaned of lime, free from staybolts, and not over 3 ft long. Rods, bars and flats, 1½ in and under in the smallest dimensions, must be sheared to lengths of not over 24 in.

This classification may include wrought iron, structural shapes, bars and plates, steel castings, heavy chain, carbon tool steel, heavy forgings, forge butts and similar heavy material, sheet bars, billets, blooms, rail ends, railroad steel scrap such as angles, splices, couplers, knuckles, short rails, draw bars, cut cast steel bolsters, coil and leaf springs (all coil springs to be 3/8 in or larger in diameter), heavy punchings, horse shoes, bolts, nuts, rivets, and heavy steel pipe 4 in and over in diameter if thoroughly flattened.

No needle or light skeleton plate scrap, box sections, welding rods of any description, annealing pots, automobile or truck parts, pipe, tubing, grate bars, car sides, cast iron, malleable iron, curly or unwieldy pieces will be accepted. This classification must be free from closed containers, cylinders and gas tanks of any description, dirt, excessive rust or scale, alloy scrap, and galvanized stock, all nonferrous material, potentially explosive material of any kind, shells, and foreign material of any kind.

Association of American Railroads Classification Nos. 6, 17, 24, 28, 34, 34A, and 44, Revised June 1934, will be acceptable.

No. 2 Heavy Melting Steel Scrap.--Steel (or wrought iron) scrap, 1/8 in minimum thickness, maximum size 18 in wide by 3 ft or 5 ft in length as specified on our purchase order, unless otherwise specified as follows:

Acceptable Items

1. Auto and truck frames, front axles, and bumpers. All projections to be cut off.

2. Auto and truck rear ends, consisting of the differential housing, axles with or without brake drums. All such material must be cut into two pieces.

3. Auto and truck crank shafts, connection rods, steel brake drums, transmissions with handle cut off, uncut leaf springs, and wheels.

4. Steel plates (including railroad car sides with ribs attached) must be cut to not larger than 15 in x 15 in.

5. Clean wrought iron and steel pipe and fittings, free from dirt and excessive corrosion, 4 in and under in diameter.

6. Wire rope (not to exceed 5 percent).

Unacceptable Items

Top frames, fender material, body sheets, cast or malleable iron parts of automobiles, mufflers, exhaust pipes, fans, metal running boards, headlights, radiators, hoods, cast iron pipe, welding rods of any description, tinned pipe, bedsteads material, tubing, gas tanks, hot water heaters, and closed cylinders and containers of any kind including unopened master brake cylinders and unopened shocks and knee action units.

All scrap must be free from dirt and excessive corrosion, nonferrous metals, and alloy scrap of any description.

<u>No. 1 Bundles</u>.--New black steel sheet scrap, clippings, or skeleton scrap, which must be hydraulically compressed or hand bundled to charging box size (18 in x 18 in x 24 in) and weigh not less than 75 pounds per cubic foot. (Hand bundles must also be tightly secured and stand handling with a magnet.) Scrap must be free of paint or protective coating of any kind. It may include Stanley Balls, or mandrel wound bundles or skeleton reels, tightly secured. It may not include alloy material, electrical sheets, or any material containing over 0.5 percent of silicon. Chemically detinned material must be shipped separately. No tin can will be deemed to be detinned unless it has undergone the chemical process for the removal and recovery of tin.

<u>No. 2 Black Bundles</u>.--Body and fender scrap or similar black sheet scrap, which must be hydraulically compressed to charging box size (18 in x 18 in x 24 in) and weigh not less than 75 pounds per cubic foot. Scrap may include chemically detinned material. No tin can or tinned stock will be deemed to be detinned unless it has undergone the chemical process for the removal and recovery of tin. It may not include the following items: Nonferrous metals,

fabric, glass, rubber, wood, dirt, galvanized material, vitreous enameled stock, tin plate, terneplate or other metal coated material. Painted or lacquered material shall not be considered as coated material. It may include hydraulically compressed uncoated fence wire and light coil springs.

Hydraulic Bundles--Galvanized No. 3.--Specifications call for tightly hydraulically compressed bundles not exceeding 18 in x 18 in x 24 in and weigh not less than 75 pounds per cubic foot of new and old galvanized steel scrap consisting of light sheets, water heaters, drums and other containers, wire and similar material. Scrap must be free of turnings, tin cans, tinned stock, terneplate, enameled scrap, dirt, wood, rubber, grease, oil, tar and other nonferrous material. Drums and other containers must be carefully inspected before compression and thoroughly cleaned, inside and outside. The inclusion of closed cylinders will be cause for outright rejection.

Any bundles which, after drilling and analysis, show the inclusion of unacceptable material will cause outright rejection.

Covering Machine Shop Turnings.--Specifications call for clean steel or wrought iron turnings, free of cast or malleable iron borings, nonferrous metals in a free state, scale, or excessive oil. Scrap may not contain badly rusted or corroded stock.

Oregon Steel Mills

No. 1 Prepared Heavy Melting Steel Scrap.--Requirements call for cleaned wrought iron or carbon steel scrap ¼ in and over in thickness, not over 18 in. in width, and not over 5 ft long.

Individual pieces must be cut into such shape that they will be free from attachments and will lie flat in a charging box. Scrap rail must be cut to 5 ft or less in length. Tractor tracks must be cut to sections not over 5 ft in length. Boiler plate must be cleaned of lime, free from stay bolts and be cut to not over 5 ft in length by 18 in in width. Scrap may include pipe 4 in. in diameter or over, wall thickness ¼ in or over, if split or cut in half, and not over 5 ft in length. Heavy steel gears or such over 18 in. in diameter must be cut so any measurement is no greater than 18 in by 5 ft. Listed below are some items which are not acceptable, and which will be cause for rejection:

- Automobile or truck wheels
- Automobile frames
- Automobile or truck rear end housings
- Motor blocks
- Transmissions
- Pot or box shapes
- Tanks
- Cylinders
- Closed containers
- Unopened shock absorbers
- Pipe or fittings
- Welding rod
- Tubing
- Grate bars
- Cast iron
- Wire
- Cable
- Galvanized material
- Vitreous enameled material
- Household appliances
- Nonferrous or contaminating material of any kind

No. 2 Prepared Heavy Melting Steel Scrap.--Specifications call for clean black or galvanized wrought iron or carbon steel scrap 1/8 in and over in thickness, not over 18 in in width, and not over 5 ft long.

All auto or truck frames must be cut free from crossmembers or projections. Bumpers over 5 ft must be cut and all to be free from braces or brackets, and auto and truck rear axle housing must be cut in 2 pieces. Drive shafts must be under 5 ft in length. Wheels must be separate from axles. Auto front axle sections must be cut in half. Wire rope or cable will be accepted only if cut to maximum 3 ft lengths. Clean steel pipe and fittings under 4 in diameter cut to 3 ft maximum lengths and free from contamination and excessive corrosion are acceptable. Listed are some items which are not acceptable, and which will be cause for rejection:

Conduit
Water tanks, cut, flattened or whole
Wire, cut or coiled
Auto body or fender stock
Tin or material under 1/8 in thick
Cast iron
Auto mufflers
Exhaust pipes
Fans
Auto or truck running boards
Head lights
Radiators
Welding rods
Bedstead material
Gas tanks
Unopened shock absorbers
Cylinders
Closed containers
Pot or box like shapes
Vitreous enameled material
Household appliances
Nonferrous or contaminating material of any kind.

APPENDIX B.--IRON AGE MONTHLY QUOTATIONS OF NO. 2 HEAVY MELTING AND NO. 2 BUNDLED STEEL SCRAP, 1951-60

(Dollars per long ton)

Month	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960
No. 2 Heavy Melting										
January...........	28	34	-	23	23	40	51	32	28	33
February..........	28	34	-	23	25	38	53	28	28	33
March.............	33	34	29	21	27	38	51	26	33	33
April.............	33	34	26	19	27	34	48	28	33	33
May...............	33	34	29	19	29	40	45	25	33	33
June..............	33	34	29	19	29	37	45	25	33	33
July..............	33	34	27	19	29	40	42	29	33	33
August............	33	34	27	21	29	40	44	28	33	33
September.........	33	34	29	21	31	42	40	28	33	33
October...........	33	34	30	21	36	46	36	28	33	31
November..........	34	34	25	21	40	52	32	28	33	31
December..........	34	34	27	23	40	51	32	28	33	31
No. 2 Bundles										
January...........	22	34	-	19	17	34	31	25	22	22
February..........	22	34	-	19	18	32	34	21	22	22
March.............	32	34	27	16	20	27	33	21	22	22
April.............	32	34	24	16	23	26	31	23	22	22
May...............	32	34	26	16	25	30	28	20	22	22
June..............	32	34	26	16	25	27	27	20	22	22
July..............	32	29	24	16	25	31	26	20	22	22
August............	32	29	23	16	25	31	32	20	22	22
September.........	32	29	23	16	28	31	29	22	22	22
October...........	32	29	23	17	36	31	25	20	22	21
November..........	34	29	19	17	40	32	21	20	22	21
December..........	34	29	19	17	40	31	25	20	22	21

APPENDIX C.--OREGON AND WASHINGTON IRON AND STEEL SCRAP CONSUMPTION BY GRADES, 1955-60

Yearly Consumption, 1955-60, Short Tons

Grade	1955	1956	1957	1958	1959	1960	Total
No. 1 heavy melting steel	197,047	187,643	201,464	153,910	193,522	224,243	1,157,829
No. 2 heavy melting steel	104,522	103,039	140,180	97,219	108,545	106,032	659,537
Bundles	31,996	40,260	49,305	48,416	66,212	66,401	302,590
Low-phosphorus scrap	21,116	23,170	19,995	18,180	19,644	21,186	123,291
Cast iron scrap, other than borings	106,670	101,719	89,990	51,641	48,929	41,694	440,643
Turnings and/or borings (alloy-free)	10,508	10,596	9,581	8,784	6,249	8,539	54,257
Rerolling rails	-	-	-	-	-	-	-
Scrap rails	10,022	9,851	6,717	2,770	3,361	1,719	34,440
High-speed steel	-	-	-	-	-	-	-
Stainless steel	1,035	5,869	3,588	3,508	3,810	3,420	21,230
All other alloy iron and steel	9,109	9,066	8,105	7,256	7,626	11,508	52,670
All other prepared scrap	26,695	26,589	28,457	17,589	16,831	25,465	141,626
Unprepared scrap	40,147	90,624	58,069	40,143	33,169	16,162	278,314
Total (all grades)	558,867	608,426	615,451	449,416	507,898	526,369	3,266,427

Monthly Consumption, 1955-59, Long Tons

Grade	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Oregon--1955													
No. 1 heavy melting steel	4,624	2,846	3,683	4,285	5,357	5,293	6,155	6,083	5,896	8,111	4,356	6,882	63,571
No. 2 heavy melting steel	5,384	4,590	5,402	5,551	3,333	3,486	1,021	5,402	2,590	1,052	3,865	2,321	43,997
Bundles..................	1,216	1,339	1,402	1,174	1,369	1,021	894	1,275	1,731	1,087	1,674	838	15,020
Low-phosphorus scrap.....	120	138	210	170	198	230	184	190	183	180	175	183	2,161
Cast iron scrap, other than boring............	2,139	2,130	2,702	2,163	2,303	2,707	1,805	1,665	2,353	2,516	2,230	2,256	26,969
Turnings and/or borings (alloy free)...........	412	427	128	-	187	87	344	451	561	345	354	733	4,029
Rerolling rails..........	-	-	-	-	-	-	-	-	-	-	-	-	-
Scrap rails.............	-	1,902	-	22	-	28	182	19	93	338	14	340	2,938
High-speed steel.........	-	-	-	-	-	-	-	-	-	-	-	-	-
Stainless steel..........	1	3	7	4	6	2	-	140	129	197	203	210	902
All other alloy iron and steel..................	8	4	12	8	4	5	13	15	5	10	10	22	116
All other prepared scrap.	454	508	511	544	690	720	685	736	676	757	701	721	7,703
Unprepared scrap.........	491	675	1,457	1,138	2,239	1,159	700	229	1,111	1,697	1,728	229	12,853
Total (all grades)..	14,849	14,562	15,514	15,059	15,686	14,738	11,983	16,205	15,328	16,290	15,310	14,735	180,259
Washington--1955													
No. 1 heavy melting steel	5,261	5,579	8,189	8,806	10,283	12,015	10,795	9,844	11,730	9,327	11,131	9,403	112,363
No. 2 heavy melting steel	1,582	2,255	5,497	5,053	3,677	4,663	4,739	5,819	4,810	5,037	2,886	3,308	49,326
Bundles..................	938	844	1,055	1,464	1,487	1,310	377	1,711	583	1,234	1,439	1,106	13,548
Low-phosphorus scrap.....	1,288	1,327	1,351	1,310	1,389	1,442	1,449	1,359	1,457	1,450	1,451	1,420	16,693
Cast iron scrap, other than boring............	3,830	4,285	5,880	6,827	6,831	6,698	5,032	6,265	5,835	4,788	6,193	5,808	68,272
Turnings and/or borings (alloy free)...........	506	425	473	297	400	603	367	467	338	441	435	602	5,354
Rerolling rails..........	-	-	-	-	-	-	-	-	-	-	-	-	-
Scrap rails.............	399	362	363	671	477	341	42	385	367	688	794	1,181	6,010
High-speed steel.........	-	-	-	-	-	-	-	-	-	-	-	-	-
Stainless steel..........	-	-	-	-	5	5	1	-	-	2	4	5	22
All other alloy iron and steel..................	526	747	672	690	582	842	479	675	641	646	789	728	8,017
All other prepared scrap.	1,305	1,155	1,788	1,354	1,288	1,345	1,750	1,283	1,366	1,188	1,147	1,163	16,132
Unprepared scrap.........	1,223	1,024	1,578	1,378	2,795	2,262	876	1,971	1,653	2,525	2,369	3,339	22,993
Total (all grades)..	16,798	18,003	26,846	27,850	29,214	31,526	25,907	29,779	28,780	27,326	28,638	28,063	318,730

Grade	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Oregon--1956													
No. 1 heavy melting steel	5,509	4,379	5,400	4,933	6,050	4,051	5,395	3,437	1,944	5,603	3,826	5,211	55,738
No. 2 heavy melting steel	2,769	801	2,261	1,233	707	1,454	1,062	2,342	2,756	2,321	913	356	18,975
Bundles..................	997	1,233	1,004	1,517	1,577	764	1,072	1,933	1,761	1,772	1,076	1,749	16,455
Low-phosphorus scrap.....	225	210	229	222	250	267	223	236	175	194	164	157	2,552
Cast iron scrap, other than boring............	2,133	2,498	2,404	2,534	2,855	2,694	1,776	2,555	2,008	2,592	2,066	1,716	27,831
Turnings and/or borings (alloy free)...........	465	623	245	181	226	330	451	374	389	157	98	-	3,539
Rerolling rails..........	-	-	-	-	-	-	-	-	-	-	-	-	-
Scrap rails..............	308	56	163	152	2,454	526	407	99	-	-	-	-	4,165
High-speed steel.........	-	-	-	-	-	-	-	-	-	-	-	-	-
Stainless steel..........	210	357	407	383	566	506	489	586	408	493	436	335	5,176
All other alloy iron and steel.................	22	9	14	9	10	9	8	6	7	8	9	19	130
All other prepared scrap.	726	755	757	615	773	341	664	769	663	733	586	573	7,955
Unprepared scrap.........	1,168	5,243	5,295	6,092	2,871	5,751	2,879	6,253	6,552	3,823	4,553	4,369	54,849
Total (all grades)..	14,532	16,164	18,179	17,871	18,339	16,693	14,426	18,590	16,663	17,696	13,727	14,485	197,365
Washington--1956													
No. 1 heavy melting steel	10,715	7,584	10,125	9,640	10,827	10,429	1,564	8,698	9,410	11,614	11,406	9,788	111,800
No. 2 heavy melting steel	4,072	6,168	6,912	6,630	5,923	7,480	1,600	5,805	7,020	7,463	7,774	6,177	73,024
Bundles..................	1,387	1,185	844	2,577	2,486	2,198	-	2,401	1,559	1,850	1,459	1,545	19,491
Low-phosphorus scrap.....	1,391	1,628	1,493	1,532	1,602	1,575	1,642	1,328	1,439	1,572	1,484	1,450	18,136
Cast iron scrap, other than boring............	5,841	4,874	5,975	6,070	5,880	5,911	3,268	5,544	6,275	5,717	4,112	3,522	62,989
Turnings and/or borings (alloy free)...........	320	403	489	430	401	416	357	593	581	671	610	650	5,921
Rerolling rails..........	-	-	-	-	-	-	-	-	-	-	-	-	-
Scrap rails..............	1,146	880	317	222	359	536	-	-	189	297	74	610	4,630
High-speed steel.........	-	-	-	-	-	-	-	-	-	-	-	-	-
Stainless steel..........	3	2	9	5	14	7	5	3	6	5	3	2	64
All other alloy iron and steel.................	788	537	684	745	746	657	551	598	746	786	725	401	7,964
All other prepared scrap.	750	1,419	1,396	848	1,282	1,080	693	912	2,064	1,698	1,759	1,884	15,785
Unprepared scrap.........	2,536	3,202	2,196	1,962	1,934	1,936	690	1,333	3,363	2,534	2,371	2,008	26,065
Total (all grades)..	28,949	27,882	30,440	30,661	31,454	32,225	10,370	27,215	32,652	34,207	31,777	28,037	345,869

Grade	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Oregon--1957													
No. 1 heavy melting steel	3,994	4,073	5,084	4,732	4,363	3,530	5,579	3,193	3,269	5,904	7,269	5,696	56,686
No. 2 heavy melting steel	4,021	2,103	2,528	3,532	3,192	2,883	2,156	3,037	5,543	5,595	3,350	4,336	42,276
Bundles..................	1,535	1,565	1,838	1,912	2,052	1,394	2,404	1,407	2,469	1,806	1,703	1,905	21,990
Low-phosphorus scrap.....	175	175	202	167	158	147	137	144	137	136	124	140	1,842
Cast iron scrap, other than boring.............	2,375	2,092	1,982	2,344	2,775	2,370	1,668	2,258	2,129	2,566	2,625	1,970	27,154
Turnings and/or borings (alloy free)...........	-	79	346	402	43	478	469	-	-	-	-	626	2,443
Rerolling rails..........	-	-	-	-	-	-	-	-	-	-	-	-	-
Scrap rails..............	14	-	10	-	-	9	-	321	13	9	-	-	376
High-speed steel.........	-	-	-	-	-	-	-	-	-	-	-	-	-
Stainless steel..........	329	323	320	291	208	205	206	295	208	252	191	252	3,080
All other alloy iron and steel..................	20	13	18	13	-	-	-	-	-	-	-	-	64
All other prepared scrap.	575	495	532	522	420	476	397	418	471	476	400	393	5,575
Unprepared scrap.........	3,398	4,571	4,825	3,274	3,738	3,655	3,272	9	896	387	503	633	29,161
Total (all grades)..	16,436	15,489	17,685	17,189	16,949	15,147	16,288	11,082	15,135	17,131	16,165	15,951	190,647
Washington--1957													
No. 1 heavy melting steel	11,386	7,307	10,397	11,033	12,689	13,069	10,307	10,068	10,222	10,111	8,034	8,570	123,193
No. 2 heavy melting steel	8,064	8,802	9,847	4,122	5,536	4,399	8,151	7,461	7,450	8,696	5,839	4,518	82,885
Bundles..................	1,823	1,978	2,425	1,756	2,233	1,696	2,524	2,193	1,620	1,645	1,235	904	22,032
Low-phosphorus scrap.....	1,551	1,398	1,468	1,232	1,372	1,296	1,363	1,174	1,307	1,359	1,199	1,292	16,011
Cast iron scrap, other than boring.............	4,327	3,870	4,329	4,238	5,219	4,256	4,498	4,750	4,607	5,707	3,432	3,962	53,195
Turnings and/or borings (alloy free)...........	688	451	528	529	487	590	651	239	718	404	408	419	6,112
Rerolling rails..........	-	-	-	-	-	-	-	-	-	-	-	-	-
Scrap rails..............	606	300	523	1,009	1,138	729	238	786	50	237	5	-	5,621
High-speed steel.........	-	-	-	-	-	-	-	-	-	-	-	-	-
Stainless steel..........	18	8	32	5	7	2	6	2	15	13	9	6	123
All other alloy iron and steel..................	390	522	708	571	836	620	554	629	697	615	537	493	7,172
All other prepared scrap.	1,588	1,158	1,599	1,481	2,389	1,451	1,642	2,032	1,806	1,437	1,691	1,559	19,833
Unprepared scrap.........	2,048	1,806	1,512	2,339	3,730	2,430	1,716	1,679	1,290	386	1,585	2,166	22,687
Total (all grades)..	32,489	27,600	33,368	28,315	35,636	30,538	31,650	31,013	29,782	30,610	23,974	23,889	358,864

Grade	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Oregon--1958													
No. 1 heavy melting steel	5,857	5,004	5,117	3,388	3,403	4,558	3,013	3,737	4,610	2,204	1,920	5,216	48,027
No. 2 heavy melting steel	4,336	3,210	3,886	3,327	3,912	3,819	2,622	3,661	3,063	7,418	7,896	6,226	53,376
Bundles (No. 1 and electric furnace bundles)...	1,905	2,130	1,591	1,577	1,602	1,604	851	1,650	1,265	1,539	1,605	1,752	19,071
Low-phosphorus scrap.....	153	116	126	100	124	144	188	186	158	180	133	133	1,741
Cast iron scrap, other than borings...........	2,397	1,936	2,122	2,113	1,854	1,400	1,543	1,422	1,596	1,700	1,612	1,622	21,317
Turnings and/or borings (alloy free)...........	648	551	213	155	74	-	-	-	-	490	500	487	3,118
Rerolling rails..........	-	-	-	-	-	-	-	-	-	-	-	-	-
Scrap rails.............	-	146	-	-	-	-	-	-	-	-	27	-	173
High-speed steel.........	-	-	-	-	-	-	-	-	-	-	-	-	-
Stainless steel..........	274	216	274	282	282	232	284	253	235	311	193	211	3,047
All other alloy iron and steel..................	-	-	-	-	-	-	-	-	-	-	-	-	-
All other prepared scrap.	396	373	445	403	372	412	419	443	449	464	395	430	5,001
Unprepared scrap.........	617	2,174	1,110	1,896	1,346	730	268	959	2,224	817	1,509	1,297	14,947
Total (all grades)..	16,583	15,856	14,884	13,241	12,969	12,899	9,188	12,311	13,600	15,123	15,790	17,374	169,818
Washington--1958													
No. 1 heavy melting steel	7,505	4,327	8,606	11,143	11,406	8,739	7,827	7,277	5,785	6,526	6,295	3,957	89,393
No. 2 heavy melting steel	4,617	3,460	3,682	3,022	3,439	4,912	3,647	1,015	1,174	2,376	1,260	823	33,427
Bundles (No. 1 and electric furnace bundles)...	50	37	37	52	186	173	91	73	132	325	414	145	1,715
No. 2 and all other bundles................	710	114	2,445	2,533	3,001	3,395	2,253	814	1,387	2,399	1,704	1,687	22,442
Low-phosphorus scrap.....	1,248	1,409	1,231	1,245	1,142	1,145	1,269	1,099	1,131	1,236	1,157	1,179	14,491
Cast iron scrap, other than borings...........	3,509	2,692	2,058	1,918	1,731	1,754	1,839	1,773	1,824	1,804	1,852	2,037	24,791
Turnings and/or borings (alloy free)...........	399	416	415	405	356	168	257	458	476	332	516	527	4,725
Rerolling rails..........	-	-	-	-	-	-	-	-	-	-	-	-	-
Scrap rails.............	-	72	9	96	425	253	333	279	326	75	75	357	2,300
High-speed steel.........	-	-	-	-	-	-	-	-	-	-	-	-	-
Stainless steel..........	11	9	10	2	15	6	5	7	5	9	4	3	86
All other alloy iron and steel[1]	717	382	679	667	480	487	372	563	401	657	517	557	6,479
All other prepared scrap.	1,140	1,813	782	808	627	868	994	715	851	1,101	458	547	10,704
Unprepared scrap.........	978	605	1,501	1,473	1,827	1,467	493	293	1,366	4,785	3,059	3,048	20,895
Total (all grades)..	20,884	15,336	21,455	23,364	24,635	23,367	19,380	14,366	14,858	21,625	17,311	14,867	231,448

[1] Includes "Home Scrap," Northwest Steel Rolling Mills.

Grade	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Oregon--1959													
No. 1 heavy melting steel	7,839	3,989	6,922	3,071	5,086	7,145	6,244	4,733	7,634	6,630	2,073	2,613	63,979
No. 2 heavy melting steel	2,094	4,398	4,179	4,921	2,371	2,088	4,489	3,386	2,708	2,325	6,388	7,699	47,046
Bundles (No. 1 and electric furnace bundles)...	2,086	1,632	1,899	2,118	1,552	1,842	1,665	776	1,739	2,092	1,421	1,705	20,527
Low-phosphorus scrap.....	142	201	229	246	257	254	234	192	158	157	160	229	2,459
Cast iron scrap, other than borings...........	1,613	1,926	1,918	2,094	1,918	1,707	1,771	2,006	2,006	1,804	1,146	942	20,851
Turnings and/or borings (alloy free)...........	-	-	-	-	-	-	-	-	-	-	-	586	586
Rerolling rails..........	-	-	-	-	-	-	-	-	-	-	-	-	-
Scrap rails..............	1,483	-	7	-	-	260	-	-	-	-	-	-	1,750
High-speed steel.........	-	-	-	-	-	-	-	-	-	-	-	-	-
Stainless steel..........	283	265	245	254	239	352	312	289	231	241	251	250	3,212
All other alloy iron and steel..................	-	-	-	-	-	-	-	-	-	-	-	-	-
All other prepared scrap.	435	394	461	477	456	447	513	440	485	496	465	526	5,595
Unprepared scrap.........	499	2,985	1,456	3,811	3,921	2,593	1,556	363	1,497	3,674	3,132	277	25,764
Total (all grades)..	16,474	15,790	17,316	16,992	15,800	16,688	16,784	12,185	16,458	17,419	15,036	14,827	191,769
Washington--1959													
No. 1 heavy melting steel	9,130	9,457	13,771	17,293	12,026	8,561	4,999	1,738	1,543	3,847	10,739	15,732	108,836
No. 2 heavy melting steel	2,757	3,364	5,227	6,735	7,888	8,590	5,503	-	-	750	4,826	4,228	49,868
Bundles (No. 1 and electric furnace)...........	273	118	284	45	189	234	-	558	230	397	442	311	3,081
No. 2 and all others.....	2,080	2,964	4,574	6,363	5,806	4,718	2,320	-	-	269	2,507	3,909	35,510
Low-phosphorus scrap.....	1,184	1,221	1,302	1,430	1,163	1,226	1,358	1,159	1,310	1,244	1,174	1,309	15,080
Cast iron scrap, other than borings...........	1,663	1,682	1,831	2,176	1,959	1,913	1,864	1,786	1,831	1,837	2,087	2,207	22,836
Turnings and/or borings (alloy free)...........	413	350	517	441	454	411	346	268	329	276	578	611	4,994
Rerolling rails..........	-	-	-	-	-	-	-	-	-	-	-	-	-
Scrap rails..............	169	206	8	250	220	150	86	-	1	32	113	16	1,251
High-speed steel.........	-	-	-	-	-	-	-	-	-	-	-	-	-
Stainless steel..........	4	4	8	10	12	28	25	44	17	17	11	10	190
All other alloy iron and steel[1].................	491	550	611	688	535	632	736	284	299	524	679	780	6,809
All other prepared scrap.	546	494	1,026	1,379	950	672	958	520	424	713	890	861	9,433
Unprepared scrap.........	318	478	488	193	293	418	188	68	68	578	518	243	3,851
Total (all grades)..	19,028	20,888	29,647	37,003	31,495	27,553	18,383	6,425	6,052	10,484	24,564	30,217	261,739

[1] Includes "Home Scrap," Northwest Steel Rolling Mills.

APPENDIX D.--OREGON AND WASHINGTON IRON AND STEEL SCRAP EXPORTS BY TYPES, 1951-60, SHORT TONS

Month	Heavy melting, steel	Bundles, steel	Other scrap, steel	Iron, scrap	Heavy melting, steel	Bundles, steel	Other scrap, steel	Iron, scrap
	1951				1952			
January	161	4	-	77	-	-	7	-
February	163	1	-	265	-	82	-	-
March	167	152	-	109	-	97	-	-
April	377	39	-	69	-	180	7	75
May	37	73	-	158	-	87	-	-
June	-	6	-	-	-	102	-	-
July	50	-	-	-	-	-	-	-
August	96	50	-	-	-	192	-	81
September	-	-	-	-	-	100	-	-
October	-	51	-	-	-	97	98	14
November	-	69	-	-	-	101	54	-
December	-	-	-	-	-	-	140	-
Total	1,051	445	-	678	-	1,038	306	170
	1953				1954			
January	-	-	-	-	280	628	1,690	616
February	-	-	-	-	-	597	-	511
March	-	-	-	-	2,912	-	669	93
April	-	-	-	-	2,399	-	1,019	974
May	-	-	-	-	-	-	-	199
June	-	-	6	345	-	-	-	82
July	-	99	-	80	-	68	3,357	305
August	-	99	-	123	-	106	-	182
September	-	-	-	31	-	68	-	40
October	-	-	243	506	-	-	-	-
November	-	101	-	214	30	96	-	134
December	2,088	613	-	158	-	-	-	87
Total	2,088	912	249	1,457	5,621	1,563	6,735	3,223
	1955				1956			
January	-	67	-	116	4,229	-	50	-
February	-	-	-	79	5,002	2,763	43	1,643
March	6,885	5,006	-	94	7,897	1,643	144	1,407
April	-	-	217	826	1,736	2,210	-	-
May	2,958	2,346	505	105	8,604	5,635	58	4,579
June	10,080	4,710	119	87	59	-	138	207
July	11,102	3,891	53	-	7,280	3,662	-	7,478
August	-	71	-	33	2,352	1,319	52	3,928
September	6,095	3,746	147	47	3,032	23	3,760	7,201
October	14,185	7,141	-	205	3,963	5,669	33	45
November	-	429	-	85	20,594	12,103	338	9,969
December	11,756	924	-	3,606	-	-	97	12,706
Total	63,061	28,311	1,041	5,283	64,784	35,027	4,713	49,163
	1957				1958			
January	3,810	1,610	-	62	7,000	2,950	-	38
February	10,866	2,334	55	3,600	-	-	-	58
March	17,196	13,910	27	4,067	-	-	-	-
April	19,888	8,994	-	7,833	15,509	2,140	-	-
May	28,329	14,402	65	13,237	-	-	-	-
June	25,586	3,343	144	19,914	3,822	1,460	276	3,233
July	3,000	1,500	27	39	8,854	2,133	-	180
August	-	-	-	41	-	-	-	-
September	7,126	1,500	120	293	35,578	8,870	114	115
October	16,113	6,953	94	-	-	-	11	40
November	8,184	4,427	94	39	-	-	-	157
December	2,312	-	-	1,822	7,952	2,128	-	5,142
Total	142,410	58,973	626	50,947	78,715	19,681	401	8,963
	1959				1960			
January	9,042	-	50	1,962	-	-	-	-
February	-	-	186	2,644	10,080	-	128	-
March	6,100	1,500	190	317	9,072	1,008	421	-
April	-	-	395	1,796	-	-	207	2,889
May	8,153	2,500	227	6,766	16,216	2,240	246	6,272
June	19,164	4,416	51	123	-	-	730	9,851
July	9,600	-	481	-	9,744	3,360	-	3,289
August	12,768	2,240	42	7,346	-	-	-	512
September	10,125	-	45	1,344	13,294	13,445	3,388	6,654
October	888	-	95	2,821	6,436	1,292	2,817	7,827
November	264	-	67	96	10,080	-	-	840
December	7,456	1,528	45	3,491	13,689	6,680	147	4,086
Total	83,560	12,184	1,874	28,706	88,611	28,025	8,084	42,220

☆ U.S. GOVERNMENT PRINTING OFFICE : 1964 O—757-105

Bureau of Mines
Information Circular 8243

IRON AND STEEL SCRAP IN THE PACIFIC NORTHWEST

by

Gary A. Kingston

ERRATA

Page 28, figure 7.

From   Coefficient of correlation (r) = 0.88
        Coefficient of correlation (r_2) = 0.79

To   Coefficient of correlation (r) = 0.88
        Coefficient of determination (r^2) = 0.79