Cite as Det. No. 13 WTD 75 (1993).

BEFORE THE INTERPRETATION AND APPEALS DIVISION
DEPARTMENT OF REVENUE
STATE OF WASHINGTON

In the Matter of the Petition For Correction of Assessment and Refund of	)	D E T E R M I N A T I O N
	)	No. 92-161
. . .	)	Registration No. . . .
	)	. . ./Audit No. . . .

[1,2,3,4] RULE 113 -- RST AND USE TAX -- INGREDIENTS AND COMPONENTS -- STEEL MANUFACTURING -- REFRACTORY MATERIALS -- LIQUID OXYGEN -- LIMESTONE -- ALUMINUM. A retail sale or taxable use did not occur when liquid oxygen, refractory materials, limestone, and aluminum were consumed in the manufacturing of steel and became essential and intended constituents of the finished products, steel and/or slag.

[5] RULE 113 - RST AND USE TAX - INGREDIENTS AND COMPONENTS - CONSECUTIVE INTERVENING USE - "DIRECT CONSUMPTION TEST". An item will not lose its "ingredients or components" sales or use tax exemption under RCW 82.04.050(1)(c) merely because it is first put to some other intervening use if: (a) the intervening use is for a purpose directly related to the manufacturing of a new article of tangible personal property or substance; (b) the item is then used as an essential and intended ingredient or component of the same manufactured article; and (c) the item is required by generally accepted accounting principles to be expensed on the taxpayer's books of account. An item which is required to be capitalized because it has a life in excess of one year will be presumed to not meet the standard for exemption even if the item eventually should become a component of the new manufactured article.

Headnotes are provided as a convenience for the reader and are not in any way a part of the decision or in any way to be used in construing or interpreting this Determination.

TAXPAYER REPRESENTED BY: . . .

NATURE OF ACTION:

Petition concerning the tax liability of a steel manufacturer.

FACTS:

Bauer, A.L.J.-- The taxpayer's business records were examined for the period January 1, 1985 through December 31, 1988. The original assessment, . . . , was issued [in June 1989] in the amount of $ . . . , which amount included interest. Document No. . . . , issued [in October 1989], adjusted this amount . . . . Document No. . . . , issued [in January 1990], further reduced the tax due, but added interest that had accrued since the initial audit.

During the audit period the taxpayer manufactured and sold steel, steel products, and slag in Washington. In doing so, it operated an electric-arc steel plant.

Steel making is the process of melting and refining iron and ferrous scrap. First, undesirable elements are removed from the molten mix. Then necessary alloys are added in predetermined amounts. Each grade of steel has certain properties - formability, strength, toughness, hardenability, or corrosion resistance - which differ from those exhibited by the hundreds of other grades. Each steel grade is chemically unique and is designed to be suitable for a range of applications.

One mechanism employed in making steel is the electric-arc furnace. The electric-arc furnace steel making process involves four essential components: metal, slag, gas and refractory linings. The use and disposition of these components is the primary subject of this memorandum.

Electric-arc furnaces produce regular carbon steel grades, and also allow close control of temperature and refining conditions needed in the production of the more complex steels such as alloy, tool, and special analysis steels. Their initial charge consists of selected scrap metal, as well as carbon, limestone and burnt lime. The high temperatures required for melting and refining the charge are generated by the high-amperage electricity arcing between the furnace electrodes and the scrap.

Each of the two 120-ton capacity electric-arc furnaces in the taxpayer's plant was a large vessel approximately twenty feet in diameter and fourteen feet high shaped like a covered bowl. Holders above the furnace contained three cylindrical carbon electrodes which were lowered through holes in the furnace roof during the steel making process. A tapping spout extended from

the back of the furnace. At the end of each steel-making cycle, the molten steel and slag were tapped through the tapping spout into another bowl-shaped metal vessel called a ladle. Both the ladle and the furnace were lined with heat resistant refractories. The refractories were bricks, mortars and other materials composed of substances containing magnesium, silicon, aluminum, chrome, iron and other elements.
Once molten steel was tapped into the ladle from the steel making furnace, it would be poured into cast iron ingot molds. The molds, which weighed approximately ten thousand pounds each and were open on both ends, sat on cast iron slabs called "stools." After the steel had cooled sufficiently, the molds were removed. The ingots thus formed were then subjected to additional processing to yield steel products - including bars, rods, structural shapes, etc. - according to purchasers' specifications. The slag produced during this process was then poured off the ladle into large thimble-shaped cast iron slag pots where it would be allowed to solidify prior to being processed for sale.

The four processes involved in producing steel and slag were melt-down, refining, tapping, and repair.

Steel making at the taxpayer's plant would begin with the "charging" of cold steel scrap and limestone in one of the two 120-ton capacity electric-arc furnaces. The dome-shaped roof of the furnace would swing open and the scrap drop from a large overhead bucket onto the brick-lined hearth for melting. The load of scrap metal and fluxing agents together would be known as a "charge." The scrap used in a particular batch (known as a "heat") of steel would be selected for its content of alloy materials or for its freedom from certain residual contaminants, depending on the intended application of the steel being made.

The furnaces would be loaded from the top. Each furnace produced approximately 120 ingot-tons of steel per heat from a charge weight of approximately 260,000 pounds of scrap, coke and fluxes. When a furnace had been fully loaded ("charged"), the roof would close and the three carbon electrodes would be lowered into the furnace and positioned near the charge. A high voltage current of electricity would be transmitted through the electrodes, forming an electric arc. The arc converted electric energy to heat energy. The tremendous heat generated caused the scrap metal and other ingredients in the furnace to melt.

When the first charge was nearly melted, another charge would be added to the furnace. When the materials were partially melted, the electrodes would be swung away and another load of scrap would be deposited into the furnace and melted. Four charges would be melted in each heat, producing between 110 and 120 tons

of steel. Limestone and burnt lime ("lime") would be usually added to the furnace near the end of the melting period of the first charge. Lime chemically reacted with the molten scrap metal to remove impurities (refine) and to form a layer of liquid "slag" on top of the molten metal. The molten mass formed during melt-down was referred to as the "bath," and was made up of slag floating on molten metal.

Once the charge was melted, the molten metal was refined. During the refining phase, the aim was to bring the heat of steel to the desired chemical composition. At the beginning of the refining phase a small sample of the molten metal was analyzed to determine the quantities of various elements contained in the steel. Depending on the result of the chemical analysis and the intended use of the final product, certain additives would be added to the bath.

In essence, the refining phase involved a complex series of chemical reactions during which components of the scrap, additives, and refractories (as they sloughed off or melted due to extreme high temperatures and abrasion) entered into a series of exchange reactions between the molten steel and the slag. These chemical reactions included many oxidation-reduction and other reactions which removed unwanted or excess levels of elements such as sulfur and phosphorus.

Oxidation was the combination of oxygen with other elements. Oxidation of various excess or unwanted elements in the charge refined the molten scrap metal into steel. Oxidation was facilitated by injection of pure oxygen gas into the furnace through the oxygen lance, a tool which blew the oxygen directly into the molten metal under high pressure. The oxygen would thus be dispersed throughout the molten metal. The oxygen reacted with excess carbon in the melt to produce carbon monoxide gas, which exited by bubbling through the molten steel and slag. This bubbling was called a "carbon boil." The carbon boil stirred the bath, making it more uniform in composition and temperature. The carbon boil also lowered the percentage of carbon and other excess ingredients in the bath to the amounts required for the grade of steel being produced. During the carbon boil, some oxygen reacted with phosphorous, silicon, manganese, iron, and other elements in the scrap metal charge to produce various oxides.

When refining was complete and a temperature of approximately 2,900^{o}F had been obtained, the heat would be "tapped". The furnace would be tilted so that the steel could drain from the furnace into a large ladle suspended from an overhead crane. After the steel was tapped, the slag would be similarly tapped into slag pots. In the ladle, which was lined with refractory

material, various alloys and metals would be added to the molten metal in order to meet specifications for the grade of steel being produced. For example, aluminum would be added to control grain size and/or oxygen level in the finished steel.

The ladle was transferred to a pouring platform in another area where the steel would be poured into cast iron ingot molds sealed on one end by cast iron stools. The molds were large receptacles with open tops and bottoms. During use, the bottoms of the molds were sealed by placing them on cast iron slabs or "stools" approximately 12 inches thick.

After the steel cooled and solidified, the molds were removed and the steel ingots, weighing from 9,000 to 13,000 pounds, were ready for further processing. The slag was similarly poured into slag pots and allowed to cool and solidify. The ingot molds (each weighing approximately 10,000 pounds), the stools on which they sat, and the slag pots were all made of grey cast iron containing approximately 96% iron, 3% carbon and 1% silicon.

During melt-down, refining, and tapping, refractory materials lining the furnace and ladle were dissolved, melted and worn away. As the refractory materials were eroded and melted off the inside of the furnace and ladle, they became a part of the process and provided necessary ingredients in both the finished steel and the slag. As the refractories became worn, they were repaired. After each heat, the interior of the furnace and ladle was patched, as necessary, with refractory patching material. In addition, as the refractories were consumed, the furnace and ladle were periodically completely relined. The ladles were completely relined every 55 to 65 heats, the furnace roofs every 160 to 200 heats, and the furnace sidewalls were relined on a weekly basis.

The cast iron ingot molds (each weighing approximately 10,000 pounds), the stools on which they sit, and the slag pots were all made of gray case iron containing approximately 96% iron, 3% carbon, and 1% silicon.

After each heat, the molds, stools, and slag pots were inspected and repaired as required. When the molds, stools and slag pots were worn beyond further use, they were broken up and returned to the furnace as cast charge scrap, thus becoming part of the steel produced for sale. The worn out molds, slag pots and stools provided an important source of iron and carbon for the finished steel, both as they wore during the molding process and as scrap after they were worn beyond use.

The mold and stools, which were cracked, pitted, and distorted by the high temperatures to which they were subjected, would

completely wear out after 90 to 120 heats , i.e., approximately every 40 days). The taxpayer thus consumed approximately 550 molds and 250 stools per year. When molds, stools, and slag pots were worn beyond further use, they were broken up and used in the furnace as cast iron charge scrap, and, thus, became part of the steel produced for sale. The worn out molds, slag pots and stools thus provided an important source of iron and carbon for the finished steel, both as they wore out during the molding process and as scrap after they were worn beyond use.

It is uncontested that the primary purpose of the molds and stools was to contain the molten steel and slag solidified into ingots.
The slag pots were large thimble-shaped cast iron pots into which the slag was poured and allowed to solidify. Like the molds and stools, the slag pots gradually become distorted and cracked through the thermal stress created by containing the cooling slag. Eventually the slag pots were too worn for further use.

Once the molds, stools and slag pots became nonfunctional, they were broken up and used as cast iron charge materials in the furnaces. This cast iron scrap, a primary source of necessary carbon and iron in the finished steel, was added to the mix of scrap in each heat of steel. Thus, the molds, stools and slag pots were entirely consumed in the steel making process and provided necessary ingredients for the finished steel in the form of iron and carbon.

Studies done by the taxpayer's research department indicates that the average usage of molds and stools in the steel making process was in the range of 30 to 100 times, and that the average chronological life of the molds and stools used by the taxpayer in the period from 1978 through 1983 was less than one year (an average useful life of approximately seven months). During the audit period, the taxpayer expensed the molds, stools and slag pots in the year purchased in its books of account under generally accepted accounting procedures.

The taxpayer's plant produced a variety of steels with a variety of chemical compositions suited to the needs of particular consumers. All steels contained iron, carbon, manganese, sulfur, phosphorus and oxygen. Most steels also contained silicon and aluminum and chromium. Alloy steels contained additional elements including boron, chromium, lead, copper, molybdenum, nickel, and other trace elements.

The presence and quantity of these and other elements which were added to the steel in various combinations determined to a great extent the ultimate properties and characteristics of the

particular steel. Carbon, silicon, and chromium all improved the strength and hardness of finished steel.

Aluminum was used to control grain size and/or oxygen content in finished steel. Oxygen, which affected steel porosity and density, was the key element in the evolution of gas used to balance shrinkage during cooling of "semi-killed steels." In "rimmed steels," the presence of oxygen was essential to produce a low carbon outer skin which was important to subsequent use of the steel. Some of the oxygen contained in finished steel was introduced into the bath as pure oxygen gas during oxygen injection. The iron, chromium, silicon, and aluminum contained in finished steel was be provided from several sources: (1) the scrap metal in the charge (including the worn out molds, stools and slag pots); (2) additives; and (3) refractory materials consumed during each heat.
Slag was composed of various oxides and sulfides, lime and lime-iron compounds. The slag typically produced at the taxpayer's plant had a chemical composition of 18-28% iron oxide (FeO), 12-17% silicon dioxide (SiO_2), 33-42% calcium oxide (CaO), with the balance made up of oxides of magnesium, phosphorous, aluminum, manganese, sulfur and other elements. A typical heat produced between 150-240 cubic feet of slag with a density of approximately 200 pounds per cubic foot. This was a heavier slag than was generally produced in an electric arc furnace.

After being processed to remove metallics and sized by screening, slag was sold to be used for insulation, fill, ballast, bituminous paving and soil conditioning. A considerable amount of the oxygen introduced into the bath which did not become an ingredient of the finished steel became an ingredient of the slag in the form of various oxides which made up the slag. Virtually all of the lime introduced into the bath for slag forming and refining purposes became an ingredient in the slag. All refractory materials consumed in the steel making process which did not become a part of the finished steel became a part of the slag which was processed for sale.

The slag produced by the taxpayer was processed, pursuant to contract, by a neighboring corporation. After processing to remove the metallic content and after sizing, the slag was offered for sale. It was purchased, for example, by . . . as insulation material.

ISSUES AND TAXPAYER'S EXCEPTIONS:

The taxpayer objects to the assessment of use tax on purchases of limestone and other desulfurizers, molds, stools, slag pots, and certain other miscellaneous consumable supplies (principally refractory materials). In addition, the taxpayer has requested a

refund of sales taxes paid on prior purchases of molds, refractory brick, aluminum and oxygen.

The taxpayer's arguments as to each of these issues are as follows[1]:

1. Were the taxpayer's purchases of refractory materials consumed in making steel and marketable slag properly retail sales/use tax exempt?

RCW 82.04.050(1)(c) specifically excludes from the definition of the term "retail sale"

> . . . purchases for the purpose of consuming the property and producing for sale a new article of tangible personal property or substance, of which such property becomes an ingredient or component . . .

The taxpayer argues that refractories used to line and repair the ladles and the furnace hearth, sidewalls, and roof were excludable from retail sales and use tax under the "component or ingredient" exclusion.

According to the taxpayer, this exclusion clearly applies when one purchases tangible personal property for the purpose of consuming it as a component or ingredient in the production of a new article or substance. The intent is to avoid a pyramiding tax on products consumed in any given manufacturing process and incorporated, to some extent, into the substance or article ultimately passed on to a consumer.

The taxpayer's steel grades were made to certain established standards, each of which contained prescribed levels of iron, carbon, silicon, chromium, aluminum and other ingredients. The refractories contained, among other ingredients, silica, alumina, chromium oxide, carbon and iron oxide.

The refractories are broken down in the bath and, through a series of reversible chemical reactions, become ingredients in both the steel and slag. They provided some of the essential silicon, aluminum, chromium, and iron in the steel: Silicon increased strength and hardness; aluminum controlled grain size and/or oxygen level; chromium improved resistance to abrasion and wear and contributed to corrosion resistance and heat resistance. In addition, the refractories provided magnesium, silica, alumina, lime, and other substances in the slag.

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[1] Only the most persuasive of the taxpayer's arguments and theories are included herein.

2. Were the taxpayer's purchases of liquid oxygen consumed in making steel retail sales/use taxable?

The taxpayer claims that the applicability of the ingredient and component exception of RCW 82.04.050(1)(c) is equally clear with respect to its purchases of liquid oxygen. Oxygen, which was consumed in the production of steel and slag, became a necessary ingredient of both of these products.

In its production of carbon and alloy steel, the taxpayer purchased and used large quantities of pure (99.5%) liquid oxygen. During the steel making process, large quantities of this pure liquid oxygen were injected into the molten metal by means of "lances" (specially coated steel pipes) lowered through the door of the furnace. The oxygen was blown into the molten metal under high pressure and was dispersed throughout.

Steel could not be manufactured in an electric arc furnace without oxygen from some source. Adding oxygen served several purposes: (1) to chemically react with substances in the bath to produce a carbon boil and thereby remove impurities from the finished steel, (2) to regulate carbon content of the steel, and (3) to provide oxygen in the finished steel and slag. Oxygen was injected into the molten metal during the steel manufacturing process with the intent that it enter into and become a component part of the steel and slag and with the knowledge that oxygen was an essential raw material without which steel and slag could not be produced.

The presence of oxygen in various types of steel, including rimmed, capped, killed, or semi-killed, controlled the qualities and characteristics of its ingot structure, and influenced the strength, hardness and ductility of the steel. In most steel making processes, the primary chemical reaction was the combination of carbon and oxygen to form a gas. The degree to which this gas was removed prior to or during pouring and the extent to which the oxygen-containing gas was allowed to evolve during solidification were significant factors in determining the required characteristics of the steel produced.

Rimmed steel, for example, was only slightly deoxidized, thereby allowing a brisk evolution of gas (or effervescence) to occur as the molten steel began to solidify. This involved a reaction between the carbon and oxygen that occurred at the boundary between the solidified steel and the remaining molten steel. As a result of this reaction, the outer skin or "rim" of the ingot was practically free of carbon. This low-carbon surface layer of rimmed steel was very ductile and yielded a very sound surface in subsequent rolling.

Killed steel, on the other hand, was relatively strongly deoxidized, and allowed only a light evolution of gases to develop during solidification of the metal. Killed steels had more uniform chemical composition and properties than the other types. Semi-killed steels were intermediate in deoxidation between rimmed and killed steels. Sufficient oxygen was retained so that the gas bubbles produced during solidification and subsequently entrapped offset shrinkage, but there was no rimming action.

Depending on the type of steel sought to be produced in a particular heat, a specific range of parts per million of oxygen was sought. Typically, an instrument known as an oxygen probe was used to measure the oxygen content of the steel in the ladle. During the years in question, approximately 90% of the steel produced at the [Washington] Plant was of the semi-killed steel type. Semi-killed steel required on the order of 30 to 50 parts per million of pure (uncombined) oxygen.

Thus, every piece of steel produced by the taxpayer contained oxygen. Moreover, it has been demonstrated experimentally that, of the oxygen present in the finished steel, some percentage is traceable to the lance oxygen injected during the refining phase of steel making. This has been done in the laboratory through use of radioactive isotope tracing. See State v. United States Steel Corp., 6 Div. 395, 506 S.2d 358, 361 (Ala. 1968) . . . . Oxygen, an ingredient which contributed certain properties of the finished steel, was, thus, identifiable as having been directly provided by the lance oxygen.

Applying the legal principles discussed in the prior issues to the facts concerning the taxpayer's purchase and consumption of liquid oxygen, the taxpayer argued that these purchases were exempt from retail sales/use taxes under the ingredient and component exemption. Oxygen actually became an ingredient or component of the newly-created product. The taxpayer purchased oxygen for the purpose of using it in producing carbon steel, a product in which the oxygen becomes an essential ingredient. The oxygen is consumed in producing the steel and slag. This satisfied the requirements of RCW 82.04.050(1)(c).

The taxpayer also contends that oxygen was one of the primary ingredients of the slag which it produced and sold. The slag was composed almost exclusively of various oxides, including most notably oxides of iron, aluminum, magnesium, silicon and carbon. These necessary oxides made the slag suitable for use as insulation, fill, ballast, soil conditioning and other purposes. Slag, like steel, was "a new article of tangible personal property" produced for sale. See Northstar Steel v. Iowa

Department of Revenue, 380 N.W.2d 677 (Iowa 1986)[2] and State v. United States Steel Corp., supra, 506 S. 2d at 361.[3]

The taxpayer argues that not only was the slag rich in oxygen, but also that the lancing oxygen was analytically traceable to the slag. By far the major portion of the oxygen present as ferrous oxide in the slag was provided by the lancing oxygen. Much of the liquid oxygen purchased by the taxpayer and consumed in the steel-making process which did not become part of the finished steel became a part of the slag. Inasmuch as this oxygen was consumed in the production of this new product of which it became a necessary ingredient, the taxpayer's oxygen was properly exempt from application of retail sales or use tax.

3. Was the taxpayer's purchase and use of limestone and burnt lime exempt under RCW 82.04.050(1)(c)?

The taxpayer purchased quantities of limestone (calcium carbonate) and burnt lime (calcium oxide). Limestone was employed as a flux in the furnace where it played a major role in the chain of chemical reactions through which impurities were removed from the melt. Limestone was used either as crushed stone direct from the quarry or, after calcining[4], as burnt lime. The calcium compounds in limestone and burnt lime entered into a series of reactions that brought them in contact with iron sulfides and other ingredients in the bath leaving, in the final analysis, the iron in its elemental form in the finished steel.

In April 1985, the Washington Court of Appeals decided Northwest Steel Rolling Mills, Inc. v. Department of Revenue, 40 Wn. App. 237, 698 P.2d 100 (1985). In its decision, the Washington Court of Appeals reversed a trial court decision that slagging chemicals such as limestone used in steel making are exempt from tax under the chemical exception contained in RCW 82.04.050(1)(c). It interpreted RCW 82.04.050(1)(c) to exclude slagging compounds from the chemical exception on the basis that

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[2] Holding substances which enter slag exempt under a similar Iowa statute.

[3] Holding that it was undisputed that lance oxygen remains in both steel and slag produced.

[4] To "calcine" is to heat a substance to a high temperature but below the melting or fusing point, causing loss of moisture, reduction, or oxidation.

they don't remain in the steel, the final marketed product in that case.

In this case, the taxpayer argues that Northwest Steel Rolling Mills should not control. At the taxpayer's plant, the limestone substances chemically reacted with the molten scrap metal to remove impurities which, together, formed a layer of liquid slag on top of the molten metal. This slag was removed from the furnace, cooled separately from the refined steel, further processed, and then marketed.

Thus, in this case the limestone became a necessary and intended final ingredient of the slag, which was sold by the taxpayer on a regular basis. The limestone and desulfurizers therefore constituted property consumed in producing for sale a new article of tangible personal property.

3. Was the taxpayer's purchase and use of aluminum exempt under RCW 82.04.050(1)(c)?

As the facts indicate, after the molten steel was transferred to the ladle, but before it was poured into the ingot molds, various alloys and metals were added to the molten metal in order to meet specifications for the grade of steel being produced. Aluminum was a significant ingredient at this point, as it aided in controlling grain size and/or the oxygen level in the finished steel.
Larger amounts of aluminum were added to the molten steel in the ladle to establish the basic parameters of grain size and/or oxygen content in the finished steel. Aluminum was added to the molds in order to fine-tune the grade and ensure a consistent quality throughout the upper section of the steel in the mold. Aluminum was therefore a necessary ingredient in the casting of steel.

The taxpayer erroneously paid sales tax on its aluminum purchases during the refund period, but now seeks recognition that this aluminum is property consumed in producing for sale a new article of tangible personal property.

5. Were purchases of cast iron molds, stools and slag pots (approximately $475,000) consumed in making steel retail exempt under the "ingredients and components" exemption?

The taxpayer argues that, just as refractories should be excluded from the retail sales tax under the ingredient and component exception contained in RCW 82.04.050(1)(c), so should its purchases of cast iron ingot molds, stools and slag pots.

The taxpayer's most persuasive legal argument regarding this issue is, as in the other issues, based on the "ingredients and components exemption of RCW 82.04.050(1)(c).

Citing Lone Star Industries, Inc. v. Department of Revenue, 97 Wn.2d 630, 635, 647 P.2d 1013 (1982)[5] and Van Dyk v. Department of Revenue, 41 Wn. App. 71, 77, 702 P.2d 472, review denied 104 Wn.2d 114 (1985)[6], the taxpayer argues that it was not necessary that the molds, stools and slag pots be used primarily for the purpose of becoming ingredients in order to be eligible for the exclusion from taxation. The molds, stools and slag pots each served dual purposes in steel making: first to contain and shape the molten steel into ingots (or, in the case of slag pots, to contain the solidifying slag) and second, to provide a source of carbon and iron in the finished steel. Under applicable authorities, these purchases were thus necessarily exempt from tax.

The iron and carbon contained in the molds, stools and slag pots actually became necessary ingredients or components of the steel produced. The molds, stools and slag pots were purchased with the intent that they provide these essential ingredients in finished steel, and they were consumed in doing so. According to the taxpayer, this satisfied the requirements of the ingredients and components exemption.

DISCUSSION:

Issue #1: Sales/Use Taxability of Refractory Materials.

The principles of published Determination 87-48, 2 WTD 239 (1987) govern this issue. The taxpayer in that case contested an assessment of use tax on purchases of refractory brick and electrodes used in the manufacture of colored glass. One of the ingredients in the refractories - silica - was an ingredient in the type of glass produced by the taxpayer. The taxpayer's glass-making process involved the mixing of ingredients according to particular color recipes. This mixture was poured into a furnace lined with refractory brick. Electrodes were inserted through the brick-lined walls and used to heat the mixture to a very high temperature. Because of the heat and the caustic nature

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[5] Holding necessary and intended ingredients exempt from taxation, regardless of whether the primary purpose of those articles is to become an ingredient in the finished product.

[6] Refusing to adopt an apportionment test whereby "only the percentage of a substance that ultimately becomes an ingredient" would be exempt.

of the molten mixture, the refractory bricks and electrodes were worn away. The furnaces were rebuilt every nine to sixteen months as the refractories were consumed in the manufacturing process.

[1] In concluding that the taxpayer's purchase of refractory brick was not subject to use tax, the Administrative Law Judge ruled that a retail sale does not occur if the materials are consumed in the manufacturing process, and supply essential ingredients or components to the finished product. This is so, even if:

a. The materials were used for some other primary purpose;

b. The materials make up only a small percentage of the total ingredients contained in the final product; and

c. The same type of material, but from another source, was added during the manufacturing.

The important question was whether or not a material became an essential and intended constituent of the finished product, not whether the percentage supplied was large or small. Lone Star Industries, Inc. v. Department of Revenue, supra.; Bethlehem Steel Corp. v. Department of Revenue, supra.; Det. No. 86-306, 2 WTD 71 (1986); Det. No. 87-15, 2 WTD 139 (1987).

Here, as the refractories in the steel-making process were worn and used up, they provided necessary silicon, aluminum, iron and chromium to both the steel and the slag produced by the taxpayer. We therefore conclude that the use sales/use tax assessment as to refractory materials should be deleted.

Issue #2: Sales/Use Taxability of Oxygen Consumed in Manufacturing Steel.

The taxpayer has argued sales/use tax exemption under the "ingredients and components" theory on the liquid oxygen it injected into the molten steel by means of lances through the door of the furnace. One of the main reasons this oxygen was injected was to regulate the carbon content of the steel by producing a carbon boil. The taxpayer argues under the "ingredients and components" exemption that the addition of oxygen was not only necessary to the steel's manufacture for controlling the carbon content, but oxygen's own presence in the final product in greater or lesser quantities controlled the characteristics of the final product (e.g., its strength, hardness, ductibility) and was carefully controlled and measured.

[2] As in the first issue, to be use/sales tax exempt as an "ingredient or component" of a manufactured product, the ingredient or component must have been an essential and intended constituent of the finished product.

Because oxygen was purposefully injected into the molten steel, and because it was an essential element of the final product which determined the steel's characteristics, we accept the taxpayer's argument that the "ingredient" exemption was applicable to the liquid oxygen.

We therefore hold that the liquid oxygen is exempt as a component or ingredient, and need not address the issue of whether it is also qualifies for the "chemical" exemption.

Issue #3: Limestone and Burnt Lime.

The taxpayer argues that, although lime derivatives may not have been a necessary and intended ingredient of the finished steel, and that even though Northwest Steel Rolling Mills may have held that lime does not chemically react with an ingredient of the final product steel, it should nevertheless be held exempt under the "ingredients" exemption because it is a necessary and intended ingredient in the byproduct slag which the taxpayer also manufactures and markets.

[3] We agree that lime and lime compounds are a necessary and intended ingredient of the slag which the taxpayer manufactures. Accordingly, we hold limestone to be exempt of retail sales/use tax.

Issue #4: Aluminum.

The taxpayer has argued sales/use tax exemption under the "ingredients and components" theory on the aluminum it added to the molten steel. Aluminum was added because it controlled grain size and oxygen content in the finished steel.
[4] As in the preceding issues, to be use/sales tax exempt as an "ingredient or component" of a manufactured product, the ingredient or component must be an essential and intended constituent of the finished product.

Because aluminum was purposefully added to the molten steel, and because it was an essential element of the final product which determined the steel's characteristics, we accept the taxpayer's argument that the "ingredients and components" exemption is applicable to aluminum.

We therefore hold that the aluminum is exempt as a component or ingredient of steel.

Issue #5: Sales/Use Taxability of cast iron molds, stools and slag pots used in the manufacture of steel.

This issue of first impression involves the sales/use taxability of an article which had a consecutive dual use, one of which qualifies for the ingredients and components exemption of the retail sales/use tax: a first intervening use in the direct manufacture of a product, and a second use as an ingredient of the same manufactured product.

In particular, the taxpayer asserts that the cast iron molds, stools and slag pots it used in the manufacture of steel should not be sales/use taxable because, once they were worn out from their use as such in the manufacturing process, they were scrapped and eventually used as ingredients in the steel.

The taxpayer argues that, because it knew and planned to ultimately use these molds, stools, and pots as ingredients, that their purchase, and their first intervening use, were properly sales/use tax exempt.

In Lone Star and Van Dyk, each of the materials whose sales/use taxability was at issue had a dual purpose in the manufacturing process. These dual purposes took place simultaneously. In both cases, one of the purposes of the article was to become an essential ingredient of the final product which was being manufactured: In Lone Star, the dual purposes took place simultaneously in that the grinding balls ground up the ingredients in the mix and, as they deteriorated in their grinding capacity, they supplied iron to the cement mixture. In Van Dyk, the majority of the carbon in the coke burned while, simultaneously, some of the carbon retained its original chemical identity and mixed with the molten scrap iron and became a necessary ingredient of the final product.

Both the Lone Star and Van Dyk decisions thus involved simultaneous dual uses.
No case to date in this state has addressed (by holding or dicta) dual uses which were consecutive and not simultaneous in the same manufacturing process - i.e., an item used for one purpose until it is no longer capable of performing that purpose, and then subsequently used as an ingredient in the same manufacturing process.

The applicable statutory exemption for "ingredients" applies to:

> (c) purchases for the purpose of consuming the property purchased in producing for sale a new article of

> tangible personal property or substance, of which such property becomes an ingredient or component . . .

[Emphasis added.]

The exemption makes it clear that any consumption (i.e., exempt use) of the property must be in the manufacturing process itself and result in becoming an ingredient of the product. Conversely, if a product is used in any nonmanufacturing capacity before becoming an ingredient in a product, that use would be fully sales/use taxable.

There is no reason in law or policy why consecutive uses cannot and should not be allowed under the ingredients exemption if the intervening use is "in producing for sale a new article," the article is intended to become an essential ingredient in the manufactured product at the time it is acquired, and that its purchase or use as an ingredient is not simply incidental or an afterthought to an otherwise taxable purchase or use.[7]

To this end, we adopt the following "direct consumption test" to be used in determining exemption when an item is purchased and used as an ingredient after intervening use:

[5] In interpreting the "component and ingredient exception", several tests have evolved. Items which "actually become ingredients or components of [a] newly created article" are exempted from taxation, regardless of whether the primary purpose of these articles is to become an ingredient in the finished product. Washington courts have specifically rejected interpretations of the exception that go beyond this plain meaning of the statute. See, e.g., Lone Star Industries, supra; Van Dyk v. Department of Revenue, supra. Under the plain meaning of the statute, as interpreted in Lone Star and Van Dyk, the taxpayer's purchases of molds, stools and slag pots are exempt from retail sales or use tax.

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[7] Examples of articles which would not be exempt because their use as ingredients would be incidental to their use as an ingredient would be trucks or metal desks purchased and used as such by a steel manufacturer, even though these items might later be scrapped and added to the melt. These articles would not be exempt for two reasons: First, their purchase and use would not be directly in the manufacturing process itself. Second, their later addition to the melt, as ingredients, would be only incidental to the first extended intervening use.

In Lone Star, the leading case interpreting the component and ingredient exception, the issue was whether the purchase of iron grinding balls and refractory fire brick use in the manufacture of cement came within the terms of the exclusion created by RCW 82.04.050(1)(c). It was agreed that the iron grinding balls and the refractory both were used for a primary purpose other than supplying ingredients int he finished cement. Notwithstanding this fact, the Lone Star court made it clear (1) that no primary purpose test could be applied to the ingredient and component exception and (2) that it was sufficient that the grinding balls and refractory materials provided a very small percentage of the total ingredients in the finished product. it sufficed that the iron grinding balls and refractories supplied some materials which were essential ingredients in the finished product.

The analysis first enunciated in Lone Star, and subsequently developed in Van Dyk, has been followed by the Board of Tax Appeals and by the Department of Revenue. See Bethlehem Steel Corp. v. Department of Revenue, BTA Docket No. 85-8 (1985).

In light of the underlying rationale of existing cases, then, we hold that an item will not lose its "ingredients or components" sales or use tax exemption under RCW 82.04.050(1)(c) merely because it is first put to some other intervening use if:

(a) the intervening use is for a purpose directly related to the manufacturing of a new article of tangible personal property or substance;

(b) the item is then used as an essential and intended ingredient or component of the same manufactured article; and

(c) the item is required by generally accepted accounting principles to be expensed on the taxpayer's books of account. An item which is required to be capitalized because it has a life in excess of one year will be presumed not meet the standard for exemption even if the item eventually should become a component of the new manufactured article.

In this case, we think the molds, stools, and slag pots meet the "direct consumption" test for exemption. First, their use is directly related to the manufacture of steel and slag byproduct. Second, they become ingredients of the these same steel and slag products. Third, they are properly expensed on the taxpayer's books of accounts since they are used up, scrapped, and become ingredients within one year of their acquisition by the taxpayer.

Accordingly, the taxpayer's petition as to this issue is granted. Use tax assessed on the molds, stools, and slag pots will be deleted.

DECISION AND DISPOSITION:

The taxpayer's petition is granted. Audit will make the necessary adjustments to the assessment as supported by the taxpayer's records regarding retail sales/use tax imposed on oxygen, limestone, refractory materials, molds, stools, and slag pots. A refund or credit, as appropriate, will be issued regarding sales taxes paid on aluminum.

DATED this 24th day of June 1992.