

Cite as Det No. 08-0243, 29 WTD 34 (2010)

BEFORE THE APPEALS DIVISION  
DEPARTMENT OF REVENUE  
STATE OF WASHINGTON

In the Matter of the Petition For ) D E T E R M I N A T I O N  
Correction of Assessment of )  
                                    ) No. 08-0243  
                                    )  
                                    ) Registration No. ....  
                                    )  
                                    ) Document No. .... / Audit No. ....  
                                    )  
                                    ) Docket No. ....  
                                    )

- [1] RULE 113; RCW 82.04.050 (1): RETAIL SALES TAX - INGREDIENT OR COMPONENT - CHEMICALS USED IN PROCESSING. For a chemical to qualify as an “ingredient or component” excludable from retail sales tax or use tax, the primary purpose of the chemicals must be to create a chemical reaction directly through contact with an ingredient of a new article being produced.
- [2] RULE 113; RCW 82.04.050 (1): RETAIL SALES TAX - INGREDIENT OR COMPONENT - CHEMICALS USED IN PROCESSING. The Taxpayer bears the burden of establishing a specific reaction with an ingredient of the new article and providing evidence that this reaction is the primary purpose for using the chemical at issue.

Kreger, A.L.J. – A manufacturer of [an electronic product] protests the assessment of retail sales tax on chemicals used in its manufacturing process based on its belief that the chemicals qualify as “chemicals used in processing” and contain the necessary attributes for exemption detailed in RCW 82.04.050(1)(c) [and] WAC 458-20-113 .... We conclude that the Taxpayer has not established that the primary purpose of the chemicals at issue is to create a chemical reaction directly through contact with an ingredient of a new article being produced for sale. Accordingly, we affirm the denial of the exemption for the resist chemicals, the developer, and the strip chemicals.

#### ISSUES

1. Do resist chemicals used in the manufacture of [an electronic product] qualify as “chemicals used in processing” that are exempt from retail sales tax under RCW 82.04.050(1) and WAC 458-20-113?

2. Do developer and strip chemicals used in the manufacture of [an electronic product] qualify as “chemicals used in processing” that are exempt from retail sales tax under RCW 82.04.050(1) and WAC 458-20-113?

### FINDINGS OF FACT

[Taxpayer] is [an out-of-state] Corporation engaged in the business of manufacturing [an electronic product].

In February of 2006, the Audit Division (Audit Division) of the Department of Revenue (Department) completed an audit of the Taxpayer's Washington business activities for the period of January 1, 2001, through September 30, 2004. In conjunction with this audit, the Audit Division generated a partial audit addressing discrete contested items, specifically the taxability of certain chemicals used in the manufacturing process. Based on the information provided by the Taxpayer to the Audit Division, three classes of chemicals were determined to fall outside the parameters of “chemicals used in processing.” Accordingly, the Audit Division issued an assessment in the amount of \$... comprised of \$... in use tax, \$... in interest, and a five percent assessment penalty of \$..... The Taxpayer timely appealed this assessment, contesting \$... of the use tax assessed on certain chemicals.

Taxpayer purchases . . . wafers, which provide the base layer or foundation on which the [electronic product is] built [through a sequential process that] builds up layers of various materials [in exact patterns]. These steps are performed sequentially hundreds of times to create a finished [electronic product]:

- Depositing materials: thin layers of various materials [are applied to the wafer].
- Etching: the material is then etched through either a wet chemical or gas process. The etching process uses photolithography to apply a pattern onto the surface of the chip and then removes material from specific areas.
- Implantation: deposits elements [to] change the electrical characteristics of the wafer.
- Patterning: is the layering process that builds and connects the different structures. Hundreds of different patterns create complex structures on the surface akin to floors of a skyscraper. Each floor may have specific attributes and design elements, but in order to be useful there needs to be controlled access to other floors. The connectors between layers are comparable to electrical and plumbing conduits in a building. Unlike the building construction analogy, the connections in a chip are not stacked consistently or centrally truncated but rather vary from layer to layer.

At issue in this case is the etching process. The following is a more detailed description of the etching process:

- A thin layer of resist material is applied [to the top surface], and then a mask or template is placed over the wafer and exposed to light.

- The mask can be placed directly on the wafer; however, it is more commonly placed in a projection machine. Light is then projected through the mask onto the wafer. The mask is commonly made of glass with a shaded chrome pattern on it.
- Chemicals in the resist material react to the light exposure altering its composition. Developer chemicals are then applied, which react with the exposed resist material to make it soluble and capable of being removed. The developer chemicals do not react chemically with the unexposed resist material or the underlying substrate materials (the layers of previously deposited materials).
- After resist materials are removed from the exposed areas, the unexposed resist material forms a pattern on the surface of the chip that is the same as the pattern on the mask.
- The substrate material (either in single or in multiple layers) is then removed in the exposed areas through the application of an etch chemical.
- The etch chemical reacts with the substrate materials in the exposed areas and with the unexposed resist materials; however, substrate materials under the unexposed resist materials are protected from the etch chemicals.
- At the conclusion of the etching process, the remaining resist materials are removed with strip chemicals and the wafer is then ready to have the next layer of materials deposited onto it. The strip chemicals react with the resist material but do not react chemically with substrate materials.

. . . The goal [of the etching process is] to create a u-shaped channel with straight sidewalls. This is achieved by controlling the chemical reactions during the etch process to restrict or prevent anisotropic etching. Anisotropic etching occurs when, in addition to removing the substrate material directly below the exposed area of resist pattern, the chemical reaction also removes substrate material beneath the protective area of the resist.

Anisotropic etching is restricted or prevented by sidewall polymerization. Sidewall polymerization is a desirable chemical reaction between the etch chemicals, the resist chemicals, and the substrate materials in the layers that are being etched through. During this process carbon from the resist material interacts with the etching chemicals and materials in the substrate layers to form a Teflon-like plastic or polymer along the side walls . . . . This material enhances vertical etching and impedes lateral etching by restricting the etching process from carving out substrate material from underneath the resist material.

The resist material performs a reflective or protective function on the surface of the wafer, where it masks the substrate from the etch chemicals. This portion of the resist material only reacts chemically with the etch chemicals. However, on the edges of the resist pattern, adjacent to the areas where the substrate material is exposed and the etching is actually occurring, the resist chemically interacts with both the etch chemicals and with the substrate materials to create the sidewall polymer. The sidewall polymer is subsequently removed and discarded with the exposed resist chemicals.

The Taxpayer provided information from process patents and journal articles to substantiate that the sidewall polymer contains metal components from the substrate materials and that the

sidewall polymer is formed through a chemical reaction between the etch chemical, the resist chemical, and the substrate material. The specific concentration of the substrate material is not discussed in the literature and information reviewed and provided by the Taxpayer's expert witness so it was not possible to comment or provide an opinion on the effectiveness of a polymer that would not contain substrate materials.

## ANALYSIS

All sales of tangible personal property to consumers in the state of Washington are subject to retail sales tax, unless there is a specific exclusion or exemption. RCW 82.08.020 and 82.04.050. In general, the use tax applies upon the use within Washington of any tangible personal property the sale or acquisition of which has not been subjected to the Washington retail sales tax. It supplements the retail sales tax by imposing a tax of like amount. WAC 458-20-178 (Rule 178); RCW 82.12.020.

RCW 82.04.050(1) excludes from the definition "sale at retail" a sale of tangible personal property to a person who:

- (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 or is a chemical used in processing, when the primary purpose of such chemical is to create a chemical reaction directly through contact with an ingredient of a new article being produced for sale; . . .

The chemicals used in processing exemption, like all tax exemptions in Washington, is strictly construed in favor of application of the tax and against the person claiming the exclusion. *Yakima Fruit Growers Ass'n v. Henneford*, 187 Wash. 252, 258, 60 P.2d 62 (1936); *All-State Constr. Co. v. Gordon*, 70 Wn.2d 657, 425 P.2d 16 (1967). A taxpayer must claim, as well as carry the burden of showing qualification for, a tax deduction, exception, or exemption. *Budget Rent-a-Car of Washington- Oregon, Inc. v. Dep't of Revenue*, 81 Wn.2d 171, 500 P.2d 764 (1972); *Group Health Co-op v. Tax Comm'n*, 72 Wn.2d 422, 433 P.2d 201 (1967); Det. No. 01-198, 23 WTD 257 (2004). "When we interpret exemption provisions, the burden is upon the taxpayer to show the exemption applies and any ambiguity is "construed strictly, though fairly and in keeping with the ordinary meaning of their language, against the taxpayer." Det No. 04-0147, 23 WTD 369, 375 (2004) (*quoting Simpson Inv. Co. v. Dep't of Revenue*, 141 Wn.2d 139, 150, 3 P.3d 741 (2000)). However, the policy of strict construction of exemption provisions does not mean that they will be read so narrowly that the legislative purpose and intent in enacting the provisions are undermined. *Cherry v. Metro Seattle*, 116 Wn.2d 794, 808 P.2d 746 (1991).

WAC 458-20-113 (Rule 113) is the administrative rule implementing the above exemption. It provides, in relevant part:

- (5) Chemicals used in processing. Sales of chemicals to a person for use in processing articles produced for sale are not retail sales, and therefore are not subject to the retail sales tax.

(6) "Chemicals used in processing" carries its common restricted meaning in commercial usage. It includes only chemical substances which are used by the purchaser to unite with other chemical substances, present as ingredients or components of the articles or substances being processed, to produce a chemical reaction therewith, as contrasted with merely a physical change therein. A chemical reaction is one in which there takes place a permanent change of certain properties, with the formation of new substances which differ in chemical composition and properties from the substances originally present, and usually differ from them in appearance as well. It is not necessary that all of the new substances which are formed be present in the final completed article or substance which is sold; one or more of such new substances resulting from the chemical reaction may be removed or drawn off in the processing.

(7) To illustrate: Sales of chemicals to a pulp mill for use in the digesting and bleaching of pulp are not subject to the retail sales tax because such chemicals react chemically with the cellulose in the pulp fiber which, in turn, becomes a major ingredient of the final product, paper. Similarly, sales of carbon to an aluminum reduction plant for the primary purpose of forming a chemical reaction with alumina to remove its oxygen content are not retail sales.

(8) Conversely, sales of water purifiers and wetting agents to a pulp mill are taxable sales. The treated water acts primarily as a conveyor or carrier of the pulp fibers and only an insignificant part of the water becomes an ingredient of the final product. Similarly, sales of caustic soda to potato processors to remove peelings from potatoes are retail sales because the chemical reacts only with the peelings which are removed as waste, and not with the potatoes which are sold as the final product.

[1] Thus, the statute and Rule 113 set out two requirements for the chemicals used in processing exemption:

1. The chemical must create a chemical reaction directly through contact with an ingredient of a new article being produced for sale.
2. Creating that chemical reaction must be the primary purpose for using the chemical.

There are three published Washington court decisions interpreting the "chemicals used in processing" exemption. All interpret the statute literally, and none interpret it more broadly than the rule.

In *Pacific Northwest Alloys, Inc. v. State*, 49 Wn.2d 702, 306 P.2d 197 (1959), the taxpayer manufactured a metal alloy, ferrosilicon, the components of which were iron and silicon. The raw materials used to manufacture the alloy were scrap iron, hydrate quartz, coal, coke, and wood chips. These raw materials were placed in an electric furnace. Pure carbon electrodes protruded into this mixture of ingredients listed above. The electrodes introduced electric current into the furnace, which created high heat that caused the chemical processes to occur. At a high temperature, the carbon in the mixture of ingredients reacted with the quartz to produce silicon and carbon monoxide, a waste product. The silicon then united with the iron to form the alloy.

The carbon electrodes themselves oxidized, and as they were gradually consumed in the furnace, a part of the carbon in them reacted with the quartz in the same manner as did the carbon supplied by the coal, coke, and wood chips. The taxpayer sought to exempt the carbon electrodes as a chemical used in processing or, alternatively, as property which becomes an ingredient.

The parties stipulated that the electrodes were used principally in the process to conduct electricity into the furnace, and that the carbon furnished by the electrodes was only a small portion of the carbon required to produce the chemical reaction. The Supreme Court concluded that the electrodes did not qualify under the exemption for chemicals used in processing, because the primary purpose of the electrodes was not to create a chemical reaction, but rather to furnish the mechanical means by which the electrical current was introduced into the furnace. *Id.* at 706-07. The Court analogized the electrodes to tools that wear away during the manufacturing process and incidentally enter into the products manufactured. *Id.* at 706.

In *Northwest Steel Rolling Mills, Inc. v. Dep't of Revenue*, 40 Wn. App. 237, 698 P.2d 100, *rev. denied*, 104 Wn.2d 1006 (1985), the taxpayer manufactured new steel products from scrap steel which it first melted and refined in electric arc furnaces. The refining process included the removal of impurities from the scrap steel through the use of slagging chemicals, calcium carbonate, calcium oxide, and a combination of silicon oxide and magnesium oxide. The slagging chemicals were added to the scrap steel after it was melted and reacted with impurities in the molten steel to form slag which settled to the bottom of the molten mass. The purified steel then became the material for the new products.

In describing the process, the Court of Appeals stated: "As the chemicals are mixed with the melted scrap, they can be said to contact the ingredients of the final products. The chemical reaction, however, is with the impurities rather than with the steel ultimately used by Northwest to make the articles it sells." 40 Wn. App. at 239. The Court stated the following finding of fact by the Thurston County Superior Court was "of pivotal importance:" "The slagging chemicals come into direct contact with the ingredients of the finished product, although the chemical reaction is . . . with the impurities sought to be removed for the purpose of removing undesirable elements from the mix." 40 Wn. App. at 239-40. Northwest argued, and the superior court held, that this finding brought Northwest under the "chemicals used in processing" exemption. The Court of Appeals disagreed, stating: "We hold that the language of the exemption is clear, and it does not apply to the process used by Northwest." 40 Wn. App. at 240.

The Court of Appeals stated that the language of the statute should be interpreted by giving every word its ordinary meaning. Applying that approach to the issue before it, the Court of Appeals held:

The exemption applies only to chemicals that "create a chemical reaction directly through contact with an ingredient of a new article being produced". "Directly" means "without any intervening space and time" *Webster's Third New International Dictionary* 641 (1969); "through," when used in this context, means "by reason of: on the basis of: because of".

*Webster's Third New International Dictionary* 2384. Consequently, the exemption covers only those chemicals that react *because of* their contact with an *ingredient* of the new product. Finding 5 says only that, although the chemicals contact ingredients of the final product, they *react* with impurities in the mixture. It must follow that the reaction takes place because of contact with the impurities, not because of contact with the ingredients. The trial court did not find that the reaction occurs “through [because of] contact” with an ingredient of the final product. Therefore, the exemption does not apply.

40 Wn. App. at 240-241 (emphasis in original).

In *Van Dyk v. Dep't of Revenue*, 41 Wn. App. 71, 702 P.2d 474, *rev. den.* 104 Wn.2d 1014 (1985), the taxpayer operated an iron refinery, manufacturing gray and ductile iron products from scrap iron, coke, and other ingredients by melting and refining the scrap in a large cupola. At the beginning of the process, a bed of coke was ignited in the bottom of the cupola by propane torches and blasts of air. As the bed heated up, charge ingredients, including scrap iron, limestone, and more coke were added to the cupola. As the mixture was fired, the scrap iron melted and mixed with the carbon from unburned coke present in both the bed and the charge. According to the court, the coke was about 92 percent carbon. As it burned, the carbon united with oxygen in the air in a chemical reaction, but did not “chemically react through contact with any of the ingredients of the final products.” 41 Wn. App. at 72. Instead, some of the carbon mixed with the molten scrap iron. This carbon itself became a necessary ingredient of the final products. About 4 percent of the total carbon in the coke became an ingredient of gray iron, and about 13 percent inhered in ductile iron. The rest was burned.

The Court of Appeals ultimately held that the coke was exempt from use tax under the “ingredient or component” exemption. However, in dictum, it first concluded, citing *Northwest Steel Rolling Mills*, that the coke did not qualify for the “chemical used in processing” exemption “because it does not chemically react with any ingredients of the final product.” 41 Wn. App. at 73. The court discussed the two exemptions, stating:

The chemicals used in processing exemption is narrow, requiring that the chemical involved be used for the primary purpose of entering into a reaction because of its contact with an ingredient in a finished product. *Northwest Steel Rolling Mills v. Department of Rev.*, *supra*. This permits taxation of chemicals exhausted in processing which do not directly contribute to the finished product. The ingredients exemption is broader, requiring only that the article inhere in the final product.

In Det. No. 92-185, 12 WTD 217 (1993), we held that catalysts used by an oil refiner to break down crude oil molecules into ingredients of final products are exempt as chemicals used in processing. The Audit Division had denied the exemption, on the basis that the catalysts did not unite with ingredients being processed, but only caused the crude oil molecules to break apart – there was a chemical reaction but no uniting. The taxpayer’s uncontested evidence was that the catalysts temporarily united with the crude oil molecules, causing them to break apart, and that as soon as the oil molecules broke apart, the catalyst molecules broke off and separated out. In finding the chemicals eligible, we reasoned in Det. No. 92-185 that the catalyst was

introduced to create a chemical reaction, and did unite with ingredients in the petroleum products being produced.

Conversely, in Det. No. 98-157, 19 WTD 753 (2000), we held that carbon cathode blocks used in aluminum smelting were not exempt as a chemical used in processing because they did not meet the primary purpose test. They had long been used in processing, but had been viewed as just tools. It had only recently been reported in scientific literature that the anodes caused a secondary chemical reaction. In 19 WTD 753, we reasoned that because the reaction was secondary in nature, and was relatively unknown until recently, it could not have been the primary purpose of the blocks.

#### 1. Resist Chemicals:

During the audit, analysis of the resist chemicals focused on the application of the resist chemicals to mask the surface of the wafer. On appeal, the Taxpayer has provided additional information and expert testimony to clarify that in addition to this surface-masking function, the resist chemicals react with the etch chemicals and interact with chemical elements of the substrate to create a side-wall polymer. . . . Furthermore, Taxpayer's expert witness testified that . . . the resist chemicals are part of the etching process and interact with ingredients in the final product.

Based on information previously provided to the Audit Division, the primary purpose of the resist chemicals was characterized as a masking function, which inhibited a chemical reaction. On appeal, Taxpayer provided a more detailed explanation of the role of the resist chemical. Differentiating between the surface [masking] function . . . , which does not involve any interaction with substrate materials, and the portion of the resist chemical involved in creating the side-wall polymer. The Taxpayer focused on the role of the resist chemicals in creating the side-wall polymer, asserting that this additional function supports a characterization of the resist as a chemical used in processing because the presence of substrate elements in the polymer establishes a reaction with substrate materials.

Taxpayer also contests the Audit Division's characterization of the side-wall polymerization activity as a secondary reaction to the surface-masking function. On appeal, Taxpayer's expert witness stated that focusing on the masking function of the resist chemicals simplifies the process at issue by focusing on the two-dimensional surface interaction of the resist chemicals rather than considering a more complete three-dimensional view that incorporates side-wall polymerization. The expert witness also noted that the reference materials relied upon by the Audit Division were overly simplified and not current. The expert witness provided a more detailed description of the process at issue, an excerpt from a more recent text book, and critical reviews of the previously relied upon reference material.

On appeal, the Taxpayer argues that the resist chemical is involved in two different reactions and has two primary purposes. The Taxpayer differentiates between the portion of the resist that performs a masking function, and the portion of the resist that is involved in the formation of side-wall polymer, which influences and controls the etching process . . . . The Taxpayer asserts

that the presence of substrate materials in the side-wall polymer establishes that the resist is part of the chemical process with the etch chemicals and does interact with elements of the substrate material. . . . Thus, based on this more detailed and specific testimony, the Taxpayer argues that a portion of the resist chemicals, those that are involved in side-wall polymerization, are part of the etching chemical reaction that involves contact with the substrate materials.

The information and expert testimony that Taxpayer provided supports the conclusion that the side-wall polymer controls or inhibits the etching process . . . . The side-wall polymer contains substrate materials and resist chemicals, and is formed by and serves to control the action of the etch chemicals. We note initially, that unlike the chemical catalysts addressed in Det. 12 WTD 217, the Taxpayer has not presented evidence that the resist chemicals directly create a reaction through contact with the substrate materials. The resist is introduced to inhibit the chemical reaction of the etching chemicals. The Taxpayer has established that the side-wall polymerization process is integral to the etching chemistry, and that substrate materials are present in the polymer, but not that the presence of the substrate material is necessary to the side-wall polymerization process.

In 12 WTD 217, we concluded that a tool was not eligible as a chemical used in processing because the chemical reaction was secondary to its primary use or purpose. In this case, the primary purpose of the resist chemical is to control the etching process. Both functions of the resist chemical involve chemical reactions that control the etching process. The surface resist completely inhibits reactions on the covered area. However, a portion of the resist at the edge of the uncovered area is part of a chemical reaction that produces a polymer containing substrate materials. The polymer, in turn, controls and inhibits the etching [to create straight sidewalls]. The Taxpayer has established that the formation of [straight sidewalls is] essential [to] formation [of the product], and that the polymer is involved in and even integral to [this portion of the] etching [process]. However, the Taxpayer has not established that the primary purpose of the resist chemicals is to react with the substrate materials.

[2] . . . As noted above, taxpayers bear the burden of proving entitlement to an exemption. Here, the Taxpayer has provided information and expert testimony to rebut information relied upon by the Audit Division, which characterized the side-wall polymer as a waste product or the product of an undesirable reaction. The Taxpayer has established that side-wall polymerization is an important part of [the manufacturing process], but in the absence of any evidence that the presence of substrate materials is necessary to the side-wall polymerization process, this does not establish that the primary purpose for using the resist chemical is to react with the substrate material.

Therefore, we conclude that the Taxpayer has not established all of the necessary elements for an exempt chemical used in processing exemption as to the resist chemicals, and affirm the Audit Division's assessment of use tax on these chemicals.

We also note that the Taxpayer's bifurcated approach to the resist chemicals is problematic. None of the case law or determinations addressing chemicals used in processing involves such a bifurcated approach to a particular chemical, or an assertion that a single chemical can have two

primary purposes. The resist chemical prevents or inhibits the action of the etch chemical. The Taxpayer's argument is essentially that the portion of the resist chemical that is involved in the side-wall polymerization process is sufficient to qualify all of the resist chemical as a chemical used in processing. The chemical reaction between the resist chemical that completely blocks the etch does not create a chemical reaction through contact with an ingredient of the substrate. Thus, even if the presence of substrate materials in the side-wall polymerization process were sufficient to characterize the resist as a chemical used in processing, it would only do so for the portion that is involved in the formation of the side-wall polymer, leaving the surface area portion of the resist, which completely blocks the etch reaction, as a non-qualifying chemical.

...

## 2. Developer and strip chemicals:

The developer and strip chemicals do not create a chemical reaction through contact with an ingredient of a new article being produced for sale. Accordingly, under the analysis detailed above, these chemicals do not fit within the definition of chemicals used in processing under RCW 82.04.050(1)(c) and Rule 133. . . .

## DECISION AND DISPOSITION

The Taxpayer's petition is denied.

Dated this 12th day of September 2008.