

Cite as Det. No. 14-0099, 34 WTD 188 (2015)

BEFORE THE APPEALS DIVISION  
DEPARTMENT OF REVENUE  
STATE OF WASHINGTON

In the Matter of the Petition Concerning a ) **D E T E R M I N A T I O N**  
Ruling issued to )  
 ) No. 14-0099  
... )  
 ) Registration No. . . .  
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 )

[1] RCW 82.04.2404: B&O TAX -- MANUFACTURING -- PREFERENTIAL RATE -- SEMICONDUCTOR MATERIALS -- INTERMEDIATE PROCESS. Because the manufacture of compound semiconductor wafers that a taxpayer will incorporate into an end product being produced for sale is not subject to any manufacturing tax, the preferential manufacturing rate does not apply.

[2] RCW 82.08.9651 AND RCW 82.12.9651: RETAIL SALES AND USE TAXES - EXEMPTION -- MANUFACTURE OF SEMICONDUCTOR MATERIALS GASSES AND CHEMICALS -- INTERMEDIATE MANUFACTURING PROCESS. The retail sales and use tax exemptions for gases and chemical used in the manufacture of semiconductor materials applies even when the manufacture of compound semiconductor wafers is an intermediate manufacturing step of a final product for sale.

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.

Bauer, A.L.J. – A Washington manufacturer of high power semiconductor diode lasers and components appeals a ruling that it is ineligible for the preferential manufacturing B&O tax rate for the manufacture of semiconductor materials, and the retail sales and use tax exemption for gases and chemicals used in the manufacture of semiconductor materials. Taxpayer's petition is denied for the B&O tax preferential rate, and granted as to the retail sales tax/use tax exemption.<sup>1</sup>

## ISSUES

1. Is a manufacturer eligible for the RCW 82.04.2404 preferential B&O tax rate for the manufacture of semiconductor materials that it does not offer for sale, but uses in other final products that it manufactures and sells?

<sup>1</sup> Identifying details regarding the taxpayer and the assessment have been redacted pursuant to RCW 82.32.410.

2. Is a manufacturer eligible for the RCW 82.08.9651 exemption for gases and chemicals used in the manufacture of semiconductor materials that are included in the products it offers for sale?

## FINDINGS OF FACT

On November 27, 2012, Taxpayer requested a ruling from the Taxpayer Information and Education Section (TI&E) of the Department of Revenue (Department) concerning its eligibility for the special B&O tax rate for its manufacture of compound semiconductor wafers. On January 8, 2013, Taxpayer requested a ruling from TI&E as to its eligibility for the retail sales and use tax exemption for gases and chemicals used in the production of its compound semiconductor wafers.

TI&E determined that, while Taxpayer designs and manufactures high power semiconductor diode lasers and components (lasers and components), it does not manufacture compound semiconductor wafers because the latter were not listed on its website for sale. Accordingly, on December 10, 2012 and January 16, 2013, TI&E advised, based on its review of Taxpayer's website and ruling requests, that Taxpayer was ineligible for the manufacturing special B&O tax rate and the retail sales and use tax exemption for the manufacture of compound semiconductor wafers and gases and chemicals used in its production of such semiconductor wafers.

Taxpayer appealed these rulings on March 15, 2013.

Taxpayer manufactures compound semiconductor wafers by purchasing blank silicon "raw" wafers and further processes them into fully built up multi-layer compound semiconductor wafers. Taxpayer uses these wafers in the lasers and components it designs, manufactures, and sells; these end products are used in materials processing, defense, and various medical and consumer applications.

According to additional materials Taxpayer provided, the processing of the wafers uses many gases and chemicals. The first process is Metal Organic Chemical Vapor Deposition (MOCVD). In MOCVD ultra-pure gases are injected into a reactor and finely dosed to deposit a very thin layer of atoms onto a semiconductor wafer. Surface reaction of organic compounds or metal-organics and hydrides (chemical compounds) containing the required chemical elements creates conditions for crystalline growth of various compound semiconductor layers. The following gases and chemicals are used in this stage of production:

- Liquids and solid chemicals: GaAs, InP, TMIn, TMGa, TMAI, DMZn, CCl4
- Gases: AsH3, PH3, SiH4, H2, N2

Following MOCVD the wafers then go through semiconductor processing steps to pattern, thin, and coat the wafer with insulating and electrical contacting layers. This includes photolithography processing where a series of chemical treatments either engraves the photomask pattern into, or enables deposition of a new material in the desired pattern, upon the layer underneath the photo resist. During lithography the wafer is etched and then the resist is removed using various chemicals (acids and solvents). This type of process is repeated as necessary to complete all the patterning required on either surface of the semiconductor wafer. Additional processes include metallization, depositing electrical contact metal onto the wafer

surfaces, annealing, and lapping/polishing with alumina powder and bleach. The following gases and chemicals are used in these stages:

Patterning:

- Photoresist (AZ1512, AZ9260, nLOF2070)

Etching:

- DI water<sup>2</sup>
- Acids (H<sub>2</sub>SO<sub>4</sub>, HCl, H<sub>3</sub>PO<sub>4</sub>, CH<sub>3</sub>COOH, HBr, HF, H<sub>2</sub>O<sub>2</sub>, BOE)
- Hydrogen peroxide

Photoresist Stripping:

- Photoresist Stripper (PRX-127, AZ300T)
- Solvents (Acetone, IPA, Methanol)

P-side metallization:

- Metals (Au, Pt, Ti, Ge, Pd, Cr)
- Au plating solution
- Lap and Polish
- Alumina Powder (9.0 um, 5.0 um, 0.3 um)
- Bleach (Chemlox)

## ANALYSIS

RCW 82.04.2404 provides a preferential manufacturing B&O tax rate for those who manufacture semiconductor materials:

(1) Upon every person engaging within this state in the business of manufacturing or processing for hire semiconductor materials, as to such persons the amount of tax with respect to such business is, in the case of manufacturers, equal to the value of the product manufactured, or, in the case of processors for hire, equal to the gross income of the business, multiplied by the rate of 0.275 percent.

(2) For the purposes of this section "semiconductor materials" means silicon crystals, silicon ingots, raw polished semiconductor wafers, and compound semiconductor wafers.

(Emphasis added.) Taxpayer argues that because it manufactures compound silicon wafers, it is entitled to the special B&O tax rate. We disagree. Manufacturing B&O tax does not apply to the manufacture of a product that will become part of the end product<sup>3</sup> that is being manufactured for sale. See Det. No. 88-329, 6 WTD 321 (1988).<sup>4</sup>

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<sup>2</sup> DI Water is deionized water, which is water with the ions removed.

<sup>3</sup> [The "end product" in this case is high power semiconductor diode lasers and components (lasers and components). So, while Taxpayer is a "manufacturer" of those products, it is not a "manufacturer" of the intermediate semiconductor materials, because those products are not manufactured "for sale or for commercial or industrial use." RCW 82.04.110; see also RCW 82.04.120. This distinction explains why Taxpayer is not entitled to the preferential manufacturing B&O tax rate, but is considered a "manufacturer" for purposes of RCW 82.08.9651, discussed, *infra*.]

<sup>4</sup> 6 WTD 321 at 333-335 explains:

It is the Department's position that the manufacturing B&O tax does not apply to the intermediate substances which are produced during any manufacturing/refining process where such substances inhere in the end product being manufactured or refined. Such intermediate possessions and uses are not deemed to be industrial or commercial use when they occur on-line, within the continuing manufacturing/refining

Taxpayer's manufacture of its wafers is a nontaxable intermediate step of its process of manufacturing semiconductor laser equipment and components. Taxpayer does not owe manufacturing tax on the processing of its compound semiconductor wafers because the manufacturing of compound semiconductor wafers is merely an intermediate step in Taxpayer's manufacturing of its final products. Because there is no tax due on Taxpayer's manufacture of compound semiconductor wafers, the RCW 82.04.2404 preferential rate does not apply. The RCW 82.04.2404 regular manufacturing rate applies to Taxpayer's manufacture of its lasers and components end products.

Taxpayer's petition as to the preferential B&O tax rate is denied.

RCW 82.08.9651,<sup>5</sup> as currently in effect, provides an exemption for gases and chemicals used by a manufacturer<sup>6</sup> of semiconductor materials:

(1) The tax levied by RCW 82.08.020 does not apply to sales of gases and chemicals[<sup>7</sup>] used by a manufacturer or processor for hire in the production of semiconductor materials. This exemption is limited to gases and chemicals used in the production process to grow the product, deposit or grow permanent or sacrificial layers on the product, to etch or remove material from the product, to anneal[<sup>8</sup>] the product, to immerse the product, to clean the product, and other such uses whereby the gases and chemicals come into direct contact with the product during the production process, or uses of gases and chemicals to clean the chambers and other like equipment in which

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process. It is only when any such intermediate substance is withdrawn from the process for sale or some different industrial or commercial use that the B&O tax applies to the value of such substances. In short, the [manufacturing] B&O tax does not apply to every substance produced at each and every step or stage within a continuous production process. The [manufacturing] tax applies only to the value of the end-product.

<sup>5</sup> RCW 82.12.9651 provides similarly for purposes of the use tax. For ease of reference, we will refer only to RCW 82.08.9651.

<sup>6</sup> [We held, *supra*, that Taxpayer was not entitled to the preferential B&O tax rate, because the silicon wafers it produces are "intermediate substances" and that Taxpayer was not manufacturing silicon wafers "for sale." See Det. No. 88-329, 6 WTD 321 (1988). However, we find that Taxpayer qualifies as a "manufacturer" for purposes of RCW 82.08.9651, because it is engaged in manufacturing semiconductor diode lasers and components. As we explain, *infra*, RCW 82.08.9651 specifically contemplates that the exemption for gases and chemicals applies even for intermediate manufacturing steps, so it is applicable to Taxpayer's intermediate production of silicon wafers, even though the wafers themselves are not offered "for sale."]

<sup>7</sup> Title 82 RCW does not define the term "chemical" for purposes of this exemption. Words in a statute are given their ordinary and common meaning absent a contrary statutory definition." *John H. Sellen Constr. Co. v. Dep't of Revenue*, 87 Wn.2d 878, 882, 558 P.2d 1342 (1976). "Washington courts use WEBSTER'S THIRD NEW INTERNATIONAL DICTIONARY in the absence of other authority." *State v. Glas*, 106 Wn.App.895, 27 P.3d 216 (2001), citing *In re Personal Restraint of Well*, 133 Wn.2d 433, 438, 946 P.2d 750 (1997). WEBSTER'S THIRD NEW INTERNATIONAL DICTIONARY 384 (1993) defines "chemical" as "a substance (as an acid, alkali, salt, synthetic organic compound) obtained by a chemical process, prepared for use in chemical manufacture, or used for producing a chemical effect."

<sup>8</sup> Annealing, in metallurgy and materials science, is a heat treatment that alters a material to increase its ductility and to make it more workable. It involves heating a material to above its critical temperature, maintaining a suitable temperature, and then cooling. Annealing can induce ductility, soften material, relieve internal stresses, refine the structure by making it homogeneous, and improve cold working properties. See "Annealing (Metallurgy)," Wikipedia, [http://en.wikipedia.org/wiki/Annealing\\_\(metallurgy\)](http://en.wikipedia.org/wiki/Annealing_(metallurgy)) (last visited March 10, 2013).

such processing takes place. For the purposes of this section, "semiconductor materials" has the meaning provided in RCW 82.04.2404<sup>[9]</sup> and 82.04.294(3).<sup>[10]</sup>

(2) A person claiming the exemption under this section must file a complete annual report with the department under RCW 82.32.534. No application is necessary for the tax exemption. The person is subject to all of the requirements of chapter 82.32 RCW.

The current RCW 82.08.9651 exemption for the manufacture of semiconductor materials applies even for intermediate manufacturing steps. Thus, because Taxpayer is manufacturing compound semiconductor wafers, which are semiconductor materials as defined by RCW 82.04.2404(2), the exemption will be allowed provided Taxpayer can demonstrate that the gases and chemicals are used as prescribed by RCW 82.08.9651 or RCW 82.12.9651.

Taxpayer's petition as to this issue is granted.

#### DECISION AND DISPOSITION

Taxpayer's petition as to the preferential B&O tax rate is denied. Taxpayer's petition as to the ruling on the retail sales and use tax issue is granted under current law, provided that Taxpayer can demonstrate that the gases and chemicals are used as prescribed and other statutory requirements are met.

Dated this 18<sup>th</sup> day of March, 2014.

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<sup>9</sup> Quoted above.

<sup>10</sup> RCW 82.04.294(3) includes: "Silicon solar wafers, silicon solar cells, thin film solar devices, solar grade silicon, or compound semiconductor solar wafers are "semiconductor materials" for the purposes of RCW 82.08.9651 and 82.12.9651." This section is applicable to this case.