

**INITIAL STATEMENT OF REASONS**

**Photovoltaic (PV) Modules – Universal Waste Management**

**Department Reference Number: R-2017-04**

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## I. DETAILED STATEMENT OF THE SPECIFIC PURPOSE AND RATIONALE

### Introduction

Photovoltaic modules (PV modules, commonly referred to as “solar panels”) provide an alternative form of energy that impacts the environment less than traditional energy sources like fossil fuels. The use of PV modules continues to grow as demands for alternative energy in California increase. As PV modules reach the end of their useful life and are taken out of service, consideration must be taken as to how to manage these wastes. Companies and services that manage waste PV modules have only begun to develop in response to the recent, steady increase of PV modules, which can be recycled or reclaimed to manufacture new PV modules or other products.

PV modules may exhibit the hazardous waste characteristic of toxicity due to the presence of heavy metals such as cadmium, copper, lead, or selenium. If the waste is suspected to be hazardous, generators must determine the presence and quantity of toxic substances in the PV modules, which requires sampling and laboratory testing. The time and cost associated with this determination may discourage generators of waste PV modules from making these determinations. In addition, there are many generators who are unaware that waste PV modules may be hazardous. This has resulted in these wastes being illegally and improperly handled, transported, and disposed of as municipal solid wastes.<sup>1</sup> California’s Hazardous Waste Control Law requires that any facility that accepts, treats, and recycles hazardous waste must be permitted to accept the PV modules waste stream,<sup>2</sup> meaning that very few recycling options are currently available for PV modules specifically. Despite these challenges, hazardous wastes are required to be managed in a way that is protective of human health and the environment, in accordance to hazardous waste management regulations.

The Department of Toxic Substances Control (DTSC) proposes to amend its regulations in order to reduce the number of PV modules being illegally disposed of as solid waste and to facilitate collection and proper management of waste PV modules. Specifically, DTSC proposes to amend California Code of Regulations, title 22, division 4.5, chapter 10 (commencing with § 66260.10), chapter 11 (commencing with §66261.1) and chapter 23 (commencing with § 66273.1) to include PV modules on the list of hazardous wastes eligible to be managed as universal waste and to adopt universal waste management standards that would apply to those that generate, transport, handle, treat, or dispose of PV modules.

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<sup>1</sup> Complaint for Permanent Injunction, Civil Penalties, and Other Equitable Relief. (filed in superior court on August 23, 2017 case number: 34-2017-00217931, People of the state of California, Director of Department of Toxic Substances Control v California Electronic Asset Recovery, a California corporation).

<sup>2</sup> See Health and Safety Code section 25200

## PV Modules Description and Use

PV modules are devices designed to convert solar energy into electrical energy and consist of one or more connected photovoltaic cells (PV cells). PV cells, made of semi-conducting silicon materials shaped into individual cells, are connected via electrical contacts which consist of metals such as palladium, silver, nickel, copper, or cadmium. Some PV cells, commonly referred to as “thin-film” cells, are composed of non-siliceous materials, including copper indium diselenide, cadmium telluride, or gallium arsenide. PV cells are protected from potential environmental damage by a transparent laminate such as tempered glass. Protective glass composes up to 85 percent of the mass of a PV module.<sup>3</sup> For this proposed regulation, DTSC defines PV module to also include metal frames used to support panels, junction boxes, batteries, inverters, and cables.

In 2017, California led the nation in installed PV modules providing close to 16 percent of the state’s electricity.<sup>4</sup> Many recently enacted California laws, initiatives, and environmental programs prompted an increase in demand for solar energy by various public and private sectors, which resulted in an increasing number of installation and operation of PV modules. Furthermore, California law<sup>5</sup> established a basic policy framework for the increased use of renewable energy resources in California, known as the Renewables Portfolio Standard. The program has expanded its goals, intending that 60 percent of California’s energy sources in 2030 will be derived from renewable energy resources. Solar power is one of the means of achieving California’s increasing alternative energy production. In addition, the California Energy Commission recently adopted building standards that require the installation of solar powered systems on all new homes starting 2020.<sup>6</sup> The demand for PV panel installation in the United States is expected to continue to grow.<sup>7</sup>

Many PV modules operate for an expected service life of 30 years,<sup>8</sup> and there are many ways modules may become a waste. PV modules may (1) become a waste during manufacturing due to defects or breakage; (2) be damaged during installation by accident or by environmental factors; (3) be replaced with newer ones before the end of

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<sup>3</sup> End-of-Life Management: Solar Photovoltaic Panels,” International Renewable Energy Agency and International Energy Agency Photovoltaic Power Systems (IRENA and IEA-PVPS) (2016). Available at [http://www.irena.org/DocumentDownloads/Publications/IRENA\\_IEAPVPS\\_End-of-Life\\_Solar\\_PV\\_Panels\\_2016.pdf](http://www.irena.org/DocumentDownloads/Publications/IRENA_IEAPVPS_End-of-Life_Solar_PV_Panels_2016.pdf)

<sup>4</sup> Solar Energy Industries Association Solar Spotlight – California.

[https://www.seia.org/sites/default/files/2018-09/Factsheet\\_State\\_California\\_2018Q2.pdf](https://www.seia.org/sites/default/files/2018-09/Factsheet_State_California_2018Q2.pdf)

<sup>5</sup> California Renewables Portfolio Standard Program: emissions of greenhouse gases, S. 100, Sess. Of 2018 (CA. 2018).

<sup>6</sup> 2019 Building Energy Efficiency Standards. Available at:

<https://www.energy.ca.gov/title24/2019standards/>

<sup>7</sup> <https://www.seia.org/us-solar-market-insight>

<sup>8</sup> End-of-Life Management: Solar Photovoltaic Panels,” International Renewable Energy Agency and International Energy Agency Photovoltaic Power Systems (IRENA and IEA-PVPS) (2016). Available at [http://www.irena.org/DocumentDownloads/Publications/IRENA\\_IEAPVPS\\_End-of-Life\\_Solar\\_PV\\_Panels\\_2016.pdf](http://www.irena.org/DocumentDownloads/Publications/IRENA_IEAPVPS_End-of-Life_Solar_PV_Panels_2016.pdf)

their service life; or (4) reach the end of their service life. When PV modules are discarded as waste, they must be properly recycled or disposed of.

### **Hazardous Waste Management Concern with PV Modules & Current Regulatory Requirements**

California hazardous waste regulations require that any person that generates a waste to determine whether the waste is hazardous and manage it according to that determination.<sup>9</sup> One method to determine if a waste is hazardous is by conducting analytical testing of representative samples using the federal and state testing requirements, the Toxicity Characteristic Leaching Procedure (TCLP) and Waste Extraction Test (WET), respectively.<sup>10</sup> Conducting analytical testing could be technically challenging and routinely collecting, preparing, and performing tests on representative samples that meet both the federal and state requirements can be costly. Another method to determine if a waste is hazardous is the generator's knowledge<sup>11</sup> of the waste based on materials or processes used in the manufacture of PV modules. This information is mostly protected and confined to PV module manufacturers and may not always yield the same results as chemically analyzing representative samples when the PV modules have been taken out of service (e.g., knowing a toxic heavy metal is present is not an adequate predictor of how much of that toxic metal will be measured in the required tests).

Analytical tests using the federal or the state procedures demonstrated that PV modules may exceed the threshold levels for toxicity of regulated metals.<sup>12</sup> Based on this information, DTSC predicts that many PV modules will fail the federal and/or California state hazardous waste criteria for toxicity. PV modules that fail the federal hazardous waste criteria for toxicity are considered Resource Conservation and Recovery Act (RCRA) waste and are regulated as RCRA hazardous waste. Those that are not RCRA hazardous waste, but exhibit the California hazardous waste characteristic for toxicity, are non-RCRA hazardous waste. These wastes are regulated as hazardous waste under California's hazardous waste control laws and their implementing regulations.

When DTSC inspected electronic waste handling facilities and records from universal waste handlers that manage electronic waste in 2012, DTSC found that hazardous PV modules are currently improperly handled in those facilities.<sup>13</sup> Additionally, through

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<sup>9</sup> See California Code of Regulations, title 22, division 4.5, chapter 12, section 66262.11.

<sup>10</sup> See California Code of Regulations, title 22, division 4.5, chapter 12, section 66262.11.

<sup>11</sup> See California Code of Regulations, title 22, division 4.5, chapter 12, section 66262.11(b)(2).

<sup>12</sup> (i) NTSA Final Report for CdTe solar PV-modules; (ii) *Study on the Development of a Take Back and Recovery System for Photovoltaic Products*, K. Sander, Institute fur Okologie und Politik, Hamburg 2007. (iii) *Regulations on Photovoltaic Module Disposal and Recycling*, Vasilis Fthenakis, Brookhaven National Laboratory, 2001. (iv) Fthenakis V. and Gonsiorawski R., Lead-free solder technology from ASE Americas, Workshop Report BNL-67536, 1999.

<sup>13</sup> Complaint for Permanent Injunction, Civil Penalties, and Other Equitable Relief. (filed in superior court on August 23, 2017 case number: 34-2017-00217931, People of the state of California, Director of Department of Toxic Substances Control v California Electronic Asset Recovery, a California corporation).

workshops and meetings with industry representatives, DTSC was informed that very few PV modules or waste PV modules had undergone hazardous waste testing, whether by the manufacturers or the installers of PV modules, or any other person that had generated waste PV modules. This indicates that generators of PV module wastes may not be aware that PV modules are hazardous wastes that require them to comply with hazardous waste generator requirements in California.

In summary, DTSC concluded that hazardous waste PV modules are currently not managed properly. Although PV modules are not currently generated in large quantities, their present mismanagement significantly increases the likelihood of illegal disposal of PV modules at municipal solid waste landfills in California.

Currently, hazardous waste PV modules are handled as any other waste generated in California – the generator must make a determination whether the waste is hazardous, and if it is, then the generator must comply with all generator requirements outlined in California Code of Regulations, title 22, division 4.5, chapter 12, in addition to hazardous waste management requirements outlined in chapters 10 through 16, 18, 20 and 22. Some of these requirements include:

- Storage and containment of hazardous wastes to prevent release to the environment;
- Limits on the amount of time hazardous wastes can be accumulated;
- Use of a manifest and a registered hazardous waste transporter to ship hazardous wastes offsite;
- Training of personnel in hazardous waste management requirements and emergency procedures;
- Permits from DTSC to accept, store, and treat the hazardous waste prior to recycling or disposal in a permitted hazardous waste facility; and/or
- Financial assurance for facility closure.

### **Proposed Management of PV Modules as Universal Waste**

DTSC proposes to amend regulations in California Code of Regulations, title 22, division 4.5, chapter 10, chapter 11 and chapter 23 (commencing with § 66273.1) to include waste PV modules on the list of hazardous wastes eligible to be managed as universal waste, and to adopt universal waste management standards that would apply to those that generate, transport, handle, and treat or dispose of PV modules. DTSC determined that adopting regulations under universal waste standards will divert more hazardous waste PV modules from the solid waste stream to proper management and disposal. The universal waste approach, proposed in these regulations for PV modules, was selected because it has proven its ability to successfully achieve DTSC's goals of protecting human health and the environment, while ensuring the regulatory requirements are limited to what are adequate for such protection.

## Authority to Designate PV Modules as Universal Waste

DTSC proposes to designate PV modules as universal waste, and allow their management under the universal waste management standards, based on the authority it was granted through SB 489 (Monning, chapter 419, statutes of 2015). SB 489 added article 17 (section 25259 et seq.) to chapter 6.5 of the California Health and Safety Code, which authorized DTSC to adopt regulations to designate end-of-life PV modules that are hazardous wastes as a universal waste, and to allow those PV modules to be managed according to universal waste management standards.

### RCRA hazardous waste PV modules

DTSC is aware that some PV modules are RCRA hazardous wastes. This proposed rulemaking will allow RCRA regulated PV modules to also be managed as universal waste under California's universal waste regulations once DTSC's universal waste program is authorized by the U.S. EPA. Upon authorization, RCRA hazardous waste PV modules can only be managed as universal waste in California – once they leave California, they must be managed as RCRA hazardous wastes or comply with respective state and local regulations.

DTSC has analyzed PV modules under the criteria considered when adding a waste stream to universal waste management standards (Cal. Code Regs., tit. 22, § 66260.23 and analogous criteria in 40 C.F.R § 273.81). The following presents the criteria, and DTSC's demonstration for including PV modules as universal waste:

- **Title 22, Code of California Regulations, section 66260.23(a)**  
*The waste or category of waste, as generated by a wide variety of generators, is listed in article 4 of chapter 11 of [division 4.5 of Title 22, California Code of Regulations], or if not listed, a proportion of the waste stream exhibits one or more characteristics of hazardous waste identified in article 3 of chapter 11 of [division 4.5 of Title 22, California Code of Regulations].*

Available information indicates that some PV modules are likely to exhibit the characteristic of toxicity due to the presence of toxic heavy metals (e.g., lead, cadmium, copper, and selenium) and thus are classified as hazardous waste when discarded.<sup>14</sup> As such, these devices shall not be disposed of in municipal solid waste landfills. DTSC is limiting the scope of the proposed regulation to apply to only those PV modules that are hazardous solely because they exhibit the characteristic of toxicity (based on either the federal or state criteria).

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<sup>14</sup> End-of-Life Management: Solar Photovoltaic Panels,” International Renewable Energy Agency and International Energy Agency Photovoltaic Power Systems (IRENA and IEA-PVPS) (2016). Available at [http://www.irena.org/DocumentDownloads/Publications/IRENA\\_IEAPVPS\\_End-of-Life\\_Solar\\_PV\\_Panels\\_2016.pdf](http://www.irena.org/DocumentDownloads/Publications/IRENA_IEAPVPS_End-of-Life_Solar_PV_Panels_2016.pdf)

➤ **Title 22, Code of California Regulations, section 66260.23(b)**

*The waste or category of waste is not exclusive to a specific industry or group of industries, is commonly generated by a wide variety of types of establishments (including for example, households, retail and commercial businesses, office complexes, conditionally exempt small quantity generators, small businesses, governmental organizations, as well as large industrial facilities).*

As the need for alternative and renewable energy sources increases over time, and the cost of PV modules decreases, the amount PV modules in use increases. PV modules are no longer found at only large commercial businesses or utilities. Their prevalence has led to their presence on a larger variety of structures and dwellings, including industrial complexes and commercial and residential buildings. Additionally, utility companies use many PV modules in vast arrays to generate electricity to augment other sources of electricity to meet customer demand.

➤ **Title 22, Code of California Regulations, section 66260.23(c)**

*The waste or category of waste is generated by a large number of generators and is frequently generated in relatively small quantities by each generator.*

Due to the increased presence of PV modules on a large variety of structures and dwellings, the number of generators subsequently increases throughout California. As more Californians utilize solar energy as an energy source, the frequency of waste generation also increases. DTSC expects waste PV modules to be generated in relatively small quantities since they have a long, predicted service life of 30 years. For example, solar farms or large industrial businesses with large solar arrays will likely generate a limited number of waste PV modules per year, caused by environmental damage or defective modules.

➤ **Title 22, Code of California Regulations, section 66260.23(d)**

*Systems to be used for collecting the waste or category of waste (including packaging, marking, and labeling practices) would ensure close stewardship of the waste.*

DTSC determined that categorizing PV modules as universal waste and incorporating management standards for PV modules into the existing universal waste management standards ensure that waste PV modules are not mismanaged or illegally disposed of, both of which have been observed in

California.<sup>15</sup> Many generators of waste PV modules are unaware that they may be hazardous. Identifying PV modules as universal waste will incentivize better management of PV modules because universal waste standards are less onerous than full hazardous waste standards while still protective of human health and the environment. These more cost effective and efficient proposed standards will help ensure proper collection, transportation, and disposal or recycling of waste PV modules, like other universal wastes such as batteries and electronic devices, which consumers and businesses are more familiar with. The universal waste requirements, including labeling, accumulation time limits, personnel training, offsite shipments, response to releases, tracking shipments, transportation, and export requirements are designed to be protective of public health and the environment for the risks posed by PV modules.

➤ **Title 22, Code of California Regulations, section 66260.23(e)**

*The risk posed by the waste or category of waste during accumulation and transport is relatively low compared to other hazardous wastes, and specific management standards proposed or referenced by the petitioner (e.g., waste management requirements appropriate to be added to sections 66273.33, 66273.33.5, and 66273.52; and/or applicable Department of Transportation requirements) would be protective of human health and the environment during accumulation and transport.*

DTSC concluded that hazardous waste PV modules are low-risk hazardous waste due to their manufacturing design. PV modules are constructed to withstand environmental conditions to last up to 30 years, which requires durability and structural integrity. The hazardous constituents that make up the PV modules, including the toxic metals (e.g., lead, copper, cadmium, etc.) are in laminated solid form, as typically found in a semiconductor layer. The hazardous constituents are further sandwiched between glass panes or types of protective layers which render mobility in the environment unlikely. Additionally, the hazardous constituents are not in a liquid form and thus makes it less likely to be released into the environment during accumulation or transport.

The proposed regulation for waste PV modules applies management standards to contain any potential release and prevent contamination that could result from the handling and management through all phases of handling, collection, accumulation, and transport. The management standards proposed are similar to

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<sup>15</sup> Complaint for Permanent Injunction, Civil Penalties, and Other Equitable Relief. (filed in superior court on August 23, 2017, case number: 34-2017-00217931, People of the state of California, Director of Department of Toxic Substances Control v California Electronic Asset Recovery, a California corporation).



the standards for universal waste electronic devices because the hazards for managing electronic devices and PV modules are comparable. DTSC believes that because of the relatively low hazards associated with handling waste PV modules, the proposed management standards provide adequate protection to human health and the environment.

The proposed regulations apply the same transportation standards to PV modules as all other universal wastes (i.e., a person may only transport the wastes to a destination facility or to another universal waste handler). If the universal waste handler sends a waste classified as a hazardous material under United States Department of Transportation (DOT) requirements offsite, the handler must comply with all applicable DOT requirements for the shipment. If a universal waste shipment is rejected, then the originating handler must take back the shipment or arrange with the rejecting facility/handler to send the waste to another destination. The proposed regulations apply the same export requirements that apply to other hazardous wastes.<sup>16</sup> This is to address the concerns that PV modules may be exported from California to other countries, where the waste could be inappropriately managed or cause harm to the handlers or the environment during handling and management.

The proposed regulation allows treatment methods for PV modules that primarily change only the physical shape of the waste (e.g., breaking, shredding, crushing or compacting) and that separate processed materials by their physical properties (e.g., size, color, density). These physical treatment methods pose lower hazards than treatments that utilize chemicals or heat (e.g., smelting metals). Excluding treatment through chemicals or external heat is necessary because these treatment methods pose high risk, unless the universal waste handler obtains a hazardous waste permit and is properly prepared. The distinction in treatment activities allowed under universal waste standards is important to clarify that only low-risk activities occur at universal waste facilities.

The proposed regulation also specifies appropriate management standards for different levels of treatment, which are necessary to ensure that treatment is performed safely by handlers that do not possess hazardous waste facility permits they would otherwise be required to obtain. DTSC establishes this form of self-implementing authorization because the cost, time, and protections associated with a full or standardized hazardous waste facility permit are not commensurate with the hazards posed by managing the universal waste in

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<sup>16</sup> See California Code of Regulations, title 22, division 4.5, chapter 23, section 66273.40(a)(1).

accordance with the standards specified in this section.

➤ **Title 22, Code of California Regulations, section 66260.23(f)**

*Regulation of the waste or waste category under chapter 23 will increase the likelihood that the waste will be diverted from non-hazardous waste management systems (e.g., the municipal waste stream, non-hazardous industrial or commercial waste stream, municipal sewer or storm water systems) to recycling, treatment or disposal in compliance with [division 4.5 of Title 22, California Code of Regulations] and division 20 of the California Health and Safety Code.*

Under existing law, generators of hazardous waste PV modules are required to transport the waste to a permitted facility using a hazardous waste manifest and a registered hazardous waste transporter. This is a significant disincentive for generators of waste PV modules to test if the wastes are hazardous and transport hazardous wastes using an authorized transporter, due to associated time and costs, which prompt a significant motive to improperly manage and illegally dispose of them as municipal solid waste. Classifying PV modules as universal waste also reduces the need to perform hazardous waste determinations since all waste PV modules could be managed as universal waste and reduces mismanagement and improper disposal.

Additionally, DTSC anticipates that universal waste handlers that participate in California's electronic waste recycling program could serve as consolidation points for the waste PV modules prior to their recycling or disposal. Collecting waste PV modules at such consolidation points reduces the cost of transportation and makes it less likely that the wastes will be improperly disposed of in municipal solid waste landfills.

➤ **Title 22, Code of California Regulations, section 66260.23(g)**

*Regulation of the waste or category of waste under chapter 23 will improve implementation of and compliance with the hazardous waste regulatory program.*

DTSC expects compliance with its universal waste management requirements to increase over time as businesses that manage PV modules become familiar with the universal waste standards. DTSC has observed similar trends with the management of electronic devices and other universal wastes (e.g., lamps and batteries). These compliance trends are attributed to two factors. First, many local governments developed local collection programs at landfills, transfer stations, and county yards in response to the greater flexibility provided under the universal waste standards. These collection programs provide a place for households and businesses to discard their PV modules.

Second, the proposed regulations reduce barriers for existing universal waste handlers and transporters because under the proposed regulations they will be able to collect universal waste PV modules. This will increase management options for the anticipated growth of waste PV modules generation in the coming years. Many of these entities already collect and consolidate existing universal wastes, diverting them from the municipal landfills and directing them to destinations that can appropriately manage them. DTSC believes that such existing infrastructure will also grow to accommodate universal waste PV modules.

The proposed regulation also increases compliance by raising awareness among waste PV module generators. Many generators are currently unaware that some waste PV modules are hazardous. Designating these wastes as universal waste and defining the words “PV modules” in regulation alerts generators that waste PV modules may be hazardous and require proper handling.

Finally, universal waste standards are compiled in a single chapter in the DTSC’s regulations and are tailored to be more easily implemented by a diverse community of waste generators that are affected by the universal waste rule. Therefore, DTSC believes the universal waste standards encourage and help achieve increased compliance with the overall hazardous waste program.

Based on this analysis, DTSC concludes that hazardous waste PV modules warrant being added to California’s authorized universal waste program.

## II. DETAILED STATEMENT OF REASONS: SUMMARY AND RATIONALE

### **Amend the following section contained in Chapter 10. Hazardous Waste Management System: General<sup>17</sup>**

**Amend Section 66260.10. Definitions.** Several terms and their associated definitions are added to this section. These definitions are added to chapter 10 as these terms are used throughout the remainder of division 4.5. Terms added to this section and described below are: photovoltaic cell, photovoltaic modules, photovoltaic panel, PV cell, PV module, solar cell, and solar panel.

**Add the definition of “photovoltaic cell.”** The definition is added to the section to clarify the use of the term for purposes of chapter 23. This definition is necessary to ensure that businesses understand what is considered to be a photovoltaic cell by DTSC for correct application of chapter 23 requirements. Additionally, this definition is necessary as it explains that photovoltaic cells are an integral part to a photovoltaic

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<sup>17</sup> Unless otherwise specified, all regulatory citations from this point forward are to the California Code of Regulations, title 22, division 4.5.

module, and distinguishes the difference between a photovoltaic module and a photovoltaic cell.

**Add the definition of “photovoltaic module.”** The definition is added to the section to clarify the use of the term for purposes of chapter 23. This definition is necessary to ensure that businesses understand what products are considered to be photovoltaic modules by DTSC for correct application of chapter 23 requirements.

**Add the definition of “photovoltaic panel.”** The definition is added to the section to clarify the use of the term for purposes of chapter 23. This term is necessary to include in the definitions as it captures other commonly used terminology by persons who may not be familiar with the term “photovoltaic module” and directs them to that definition, as they are one and the same for the purposes of this chapter.

**Add the definition of “PV cell.”** The definition is added to the section to clarify the use of the term for purposes of chapter 23. This term is necessary to include in the definitions as it captures other commonly used terminology with the term “photovoltaic cell” and directs them to that definition, as they are one and the same by DTSC for the purposes of this chapter.

**Add the definition of “PV module.”** The definition is added to the section to clarify the use of the term for purposes of chapter 23. This term is necessary to include in the definitions as it captures other commonly used terminology with the term “photovoltaic module” and directs them to that definition, as they are one and the same by DTSC for the purposes of this chapter.

**Add the definition of “solar cell.”** The definition is added to the section to clarify the use of the term for purposes of chapter 23. This term is necessary to include in the definitions as it captures other commonly used terminology by persons who may not be familiar with the term “photovoltaic cell” and directs them to that definition, as they are considered to be one and the same by DTSC for the purposes of this chapter.

**Add the definition of “solar panel.”** The definition is added to the section to clarify the use of the term for purposes of chapter 23. This term is necessary to include in the definitions as it captures other commonly used terminology by persons who may not be familiar with the term “photovoltaic module” and directs them to that definition, as they are considered to be one and the same by DTSC for the purposes of this chapter.

**Amend the following section contained in  
Chapter 11. Identification and Listing of Hazardous Waste.**

**Amend Section 66261.9. Requirements for Universal Waste.** This section designates the specific categories of hazardous wastes that are subject to regulation as universal waste under chapter 23. **Subsection (a)(8)** is added to include PV modules as wastes subject to regulation pursuant to universal waste management requirements found in chapter 23.

This amendment is necessary because, PV modules must be specifically exempted from the management requirements of chapter 6.5 of the Health and Safety Code

except as specified in chapter 23, in order to manage PV modules under the universal waste requirements specified in chapter 23. This amendment also clarifies that PV modules are not subject to two sets of requirements. Note, however, that if a universal waste handler fails to properly manage universal waste pursuant to chapter 23, the waste is then regulated as hazardous waste and the generator must manage it as such under the applicable requirements of chapters 10 through 16, 18, and 20 through 22.

Additional non-substantive changes have been made to accommodate the addition of another waste stream.

**Amend or Add the following sections to  
Chapter 23. Standards for Universal Waste Management.**

Chapter 23 implements DTSC's universal waste program, which includes PV modules in the proposed regulations. Article 1 addresses general subjects, including the applicability of chapter 23 to PV modules, and the definitions of the terms used in chapter 23. Editorial changes have been made throughout the chapter to clarify additions and amendments to existing sections.

**Amend Article 1. General**

**Add subsection (a)(8) to section 66273.1.** This subsection is added to include photovoltaic modules covered under section 66273.7.1 on the list of universal wastes that may be managed pursuant to the standards in chapter 23. This subsection is necessary to designate photovoltaic modules that may be managed under chapter 23 universal wastes requirements, as an alternative to the existing hazardous waste management requirements.

**Add section 66273.7.1. Applicability – PV modules.** This new section clarifies that waste PV modules are to be managed as universal waste under the requirements outlined in chapter 23. This new section is necessary as it clarifies which PV modules can and cannot be managed as universal waste and prevents confusion among the regulated community.

**Add subsection (a) to section 66273.7.1.** This subsection is added to identify which PV modules are subject to the universal waste requirements. This subsection is necessary to clarify to businesses that choose to manage PV modules as universal waste what requirements they must adhere to in order to be in compliance with the applicable requirements contained in chapter 23.

**Add subsection (b) to section 66273.7.1.** This subsection is added to identify those PV modules that are not subject to the universal waste management standards. This subsection is necessary to clarify to businesses that manage PV modules as universal waste when the universal waste standards do not apply to them.

**Add subsection (b)(1) to section 66273.7.1.** This subsection is added to clarify that PV modules that are not yet waste are not subject to universal waste management standards. This is necessary because DTSC does not have the authority to regulate PV modules that are not yet wastes.

**Add subsection (b)(2) to section 66273.7.1.** This subsection is added to clarify that PV modules that do not exhibit a characteristic of hazardous waste, or are not otherwise determined to be hazardous waste pursuant to article 3 of chapter 11, are not subject to universal waste management standards in this chapter. This is necessary because DTSC does not intend to regulate universal wastes it knows to be nonhazardous, and therefore pose no or low risk to human health and the environment. It is necessary to distinguish which PV modules are not subject to universal waste management standards.

**Add subsection (b)(3) to section 66273.7.1.** This subsection is added to clarify that PV modules that exhibit any characteristic of a hazardous waste other than toxicity are not eligible to be managed as universal waste. Rather, these PV modules must be managed as hazardous waste in accordance with all applicable requirements in chapters 10 through 16, 18, and 20 through 22 of division 4.5 of Title 22. This is necessary to specify that only PV modules that show characteristic for toxicity are determined to be low-risk hazardous wastes that are to be managed as universal waste, and PV modules that exhibit hazardous waste characteristics other than toxicity are not qualified to be managed as universal waste due to unacceptable risks.

**Add subsection (b)(4) to section 66273.7.1.** This subsection is added to clarify that PV modules that are destined for recycling by being used in a manner that constitutes disposal are not eligible for management as universal waste pursuant to chapter 23. Rather, these PV modules must be managed as hazardous waste in accordance with all applicable requirements in chapters 10 through 16, 18, and 20 through 22 of division 4.5 of Title 22. DTSC considers recycling by being used in a manner that constitutes disposal as posing high risk to human health and release to the environment. This is necessary to clearly identify the hazardous waste PV modules that are not eligible for management under chapter 23 standards, even when being recycled using certain methods.

**Add subsection (b)(5) to section 66273.7.1.** This subsection is added to clarify that PV modules that are destined for disposal at a permitted hazardous waste disposal facility are not eligible for management as universal waste pursuant to chapter 23. Rather, these PV modules must be managed as hazardous waste in accordance with all applicable requirements in chapters 10 through 16, 18, and 20 through 22 of division 4.5 of Title 22. This is necessary to clearly identify the point at which hazardous waste PV modules are not eligible for management under chapter 23 standards. It is necessary to clarify when a generator or a universal waste handler chooses to dispose of waste PV modules at a permitted hazardous waste disposal facility, the wastes must be managed as hazardous wastes due to risks associated with the disposal.

**Add subsection (b)(6) to section 66273.7.1.** This subsection is added to clarify that PV modules that are managed as hazardous waste must continue to be managed as such in accordance with the applicable portions of chapters 10 through 16, 18, and 20 through 22 of division 4.5 of Title 22 (i.e., once a discarded PV module is managed as a fully regulated hazardous waste, it is no longer eligible for management under chapter 23

standards). This subsection is necessary to clarify that a business may manage hazardous waste PV modules as a fully regulated hazardous waste or as a universal waste, but not under both regulatory structures. For example, a universal waste handler may not accept and accumulate hazardous waste PV modules shipped to them by a registered hazardous waste transporter under a Uniform Hazardous Waste Manifest unless they possess a hazardous waste facility permit.

**Add subsection (b)(7) to section 66273.7.1.** This subsection is added to clarify that waste PV modules that have been refurbished and returned to service as serviceable PV modules are not required to be managed further as universal waste, until they are discarded. This subsection is necessary to promote refurbishment of PV modules, thus promoting reuse of PV modules that remain serviceable.

**Add subsection (b)(8) to section 66273.7.1.** This subsection is added to clarify that those devices that meet the definition of an electronic device in chapter 23, but contain a PV module, are considered electronic devices and not PV modules. There are specific regulatory requirements associated with electronic devices due to specific risks, and therefore it is necessary to ensure such wastes are managed commensurate with the risks they pose. This distinction is necessary to ensure that universal waste handlers of electronic devices with integrated PV modules are subject to only one set of universal waste standards, rather than subject to the universal waste standards for both electronic devices and PV modules.

**Add subsection (c) to section 66273.7.1.** This subsection clarifies and defines when a PV module becomes a waste. Once it is considered a waste, the generator must determine whether the PV module is a hazardous waste. This is necessary to clarify to businesses when a PV module becomes a waste and is thus subject to universal waste management standards.

**Add subsection (c)(1) to section 66273.7.1.** This subsection is added to establish that a used PV module becomes a waste on the date that the PV module is discarded. This subsection is necessary to clarify when a generator must determine that a PV module becomes a waste. The date is necessary and important as it clarifies to the generator when to begin tracking the accumulation time for the purpose of recordkeeping and other requirements as necessary.

**Add subsection (c)(2) to section 66273.7.1.** This subsection is added to clarify when unused PV modules become a waste. This subsection is necessary to ensure that generators of PV modules that are unused clearly understand the scenarios under which PV modules become wastes.

**Add subsection (c)(2)(A) to section 66273.7.1.** This subsection is added to establish that an unused PV module that is not a retrograde material pursuant to 66260.10 becomes a waste on the date that the PV module is discarded (e.g., stored while destined for reclamation). This is necessary to clarify when PV modules that are unused and not retrograde materials become a waste. The date is necessary and important as it

clarifies to the generator when to begin tracking the accumulation time for the purpose of recordkeeping and other requirements as necessary.

**Add subsection (c)(2)(B) to section 66273.7.1.** This subsection is added to establish that an unused PV module that is a retrograde material becomes a waste on the date that it becomes a recyclable material, pursuant to 66260.10. The definition of “recyclable material” includes the conditions under which a “retrograde material” becomes a waste. This is necessary to clarify when universal waste handlers that reclaim unused PV modules are subject to requirements of chapter 23. The date is necessary and important as it clarifies to the generator when to begin tracking the accumulation time for the purpose of recordkeeping and other requirements as necessary.

**Add subsection (d) to section 66273.7.1.** This subsection is added to establish that a respondent that makes a claim that a PV module is not a waste in an action enforcing hazardous waste management regulations bears the burden to demonstrate that there is a known market or disposition for its use as a PV module. This requirement is necessary to establish that the respondent in an enforcement action, not the enforcement agency (e.g., DTSC or a Certified Unified Program Agency (CUPA)), must prove the facts supporting its position that a material is not a waste. This requirement is necessary to support DTSC enforcement activities because it makes clear that respondents raising this defense have the burden of proving that defense.

**Amend Section 66273.9. Definitions.** This section defines terms used in chapter 23 and is amended to add definitions used in chapter 23 as explained below.

**Add the definition of “photovoltaic cell.”** The definition is added to clarify the use of the term for the purposes of this chapter. This definition is necessary to ensure that businesses understand what is considered to be a photovoltaic cell for correct application of chapter 23 requirements. Additionally, this definition is necessary as it explains that photovoltaic cells are an integral part to a photovoltaic module, and distinguishes the difference between a photovoltaic module and a photovoltaic cell.

**Add the definition of “photovoltaic module.”** The definition is added to clarify the use of the term for purposes of this chapter. This definition is necessary to ensure that businesses understand what products are considered to be photovoltaic modules for the correct application of chapter 23 requirements.

**Add the definition of “photovoltaic panel.”** This definition is added to clarify the use of the term for the purposes of this chapter. This term is necessary to include in the definitions as it captures other commonly used terminology by persons who may not be familiar with the term “photovoltaic module” and directs them to that definition, as they are considered to be one and the same for the purposes of this chapter. This is also necessary to ensure that the terms photovoltaic module and photovoltaic panel may be used interchangeably by DTSC and businesses that generate photovoltaic modules.



**Add the definition of “PV cell.”** The definition is added to the section to clarify the use of the term for purposes of chapter 23. This term is necessary to include in the definitions as it captures other commonly used terminology with the term “photovoltaic cell” and directs them to that definition, as they are considered to be one and the same by DTSC for the purposes of this chapter.

**Add the definition of “PV module.”** The definition is added to the section to clarify the use of the term for purposes of chapter 23. This term is necessary to include in the definitions as it captures other commonly used terminology with the term “photovoltaic module” and directs them to that definition, as they are considered to be one and the same by DTSC for the purposes of this chapter.

**Add the definition of “solar cell.”** The definition is added to the section to clarify the use of the term for the purposes of this chapter. This term is necessary to include in the definitions as it captures other commonly used terminology by persons who may not be familiar with the term “photovoltaic cell” and directs them to that definition, as they are considered to be one and the same by DTSC for the purposes of this chapter. This is necessary to ensure that the terms photovoltaic cell and solar cell may be used interchangeably by DTSC and businesses that generate photovoltaic modules.

**Add the definition of “solar panel.”** The definition is added to clarify the use of the term for the purposes of this chapter. This term is necessary to include in the definitions as it captures other commonly used terminology by persons who may not be familiar with the term “photovoltaic module” and directs them to that definition, as they are considered to be one and the same by DTSC for the purposes of this chapter. This is necessary to ensure that the terms photovoltaic module and solar panel may be used interchangeably by DTSC businesses that generate photovoltaic modules.

### **Amend Article 3. Standards for Universal Waste Handlers**

This article specifies the standards that universal waste handlers must comply with regarding the acceptance and handling of universal waste.

**Amend subsection (a) of section 66273.31.** This subsection is amended to add PV modules to the list of certain universal wastes that universal waste handlers may only dispose of at a destination facility. This amendment clarifies that although universal waste handlers may not dispose of a universal waste themselves, the handlers may send the waste to destination facility for disposal that is in compliance with applicable hazardous waste management standards. This amendment is necessary to ensure that universal waste PV modules are appropriately handled and disposed of when managed under the authority of chapter 23.

**Amend subsection (b) of section 66273.31.** This subsection is amended to reflect the establishment of universal waste handler standards for managing universal waste PV modules in section 66273.33.6 of the proposed regulations. This subsection is necessary to prohibit any treatment or dilution of PV modules, which poses a risk to

human health and the environment except in a case of containment from spillage or as specified in section 66273.33.6.

**Amend subsection (c)(1) of section 66273.32.** This subsection is amended to reflect the numbering changes made to this section, where subsections (e) and (f) are renumbered to subsections (g) and (h). This is necessary to accommodate the addition of notification and reporting requirements for PV modules to section 66273.32.

**Amend subsection (d)(1) of section 66273.32.** This subsection is amended to reflect the numbering changes made to this section, where subsections (e) and (f) are renumbered to subsections (g) and (h). This is necessary to accommodate the addition of notification and reporting requirements for PV modules to section 66273.32.

**Amend subsection (d)(2) of section 66273.32.** This subsection is amended to reflect the numbering changes made to this section, where subsections (e) and (f) are renumbered to subsections (g) and (h). This is necessary to accommodate the addition of notification and reporting requirements for PV modules to section 66273.32.

**Add subsection (e) to section 66273.32.** This newly added subsection reflects renumbering to accommodate the addition of notification requirements for PV modules. This is necessary to ensure DTSC has a method of documenting and tracking universal waste handling facilities that accept and treat PV modules under the authority of universal waste requirements. Documentation is necessary for DTSC inspectors to validate where and what types of activities occur at universal waste handling facilities, to ensure adherence to universal waste management requirements and ultimate protection of human health and the environment.

**Add subsection (e)(1) to section 66273.32.** This subsection is added to require that any universal waste handlers that may accept and accumulate, but not treat, any amount of universal waste PV modules from an offsite source must notify DTSC in writing at least 30 days prior to accepting any PV modules. The notification is necessary so that DTSC can identify, locate, and inspect these handlers of PV modules as necessary to validate the information they provide in the notification. The 30-day timeframe provides DTSC with sufficient time to coordinate any facility inspections that might be necessary to implement these regulations. Without the notifications, DTSC would have no means to identify these handlers or where they are operating.

**Add subsection (e)(2) to section 66273.32.** This subsection is added to specify the contents of the notification that are required under this subsection. This is necessary to clarify to universal waste handlers what specific information they must provide to comply with the requirements of chapter 23. The notification is necessary for DTSC to uniquely identify each offsite handler of PV modules, contact the handler if necessary, identify the location where universal waste PV module handling activities may occur, and document the types of PV modules managed at that location as necessary for compliance with the requirements of chapter 23.

**Add subsection (e)(2)(A) to section 66273.32.** This subsection is added to require the notification to include the name of the universal waste handler of PV modules, and the facility owner's name if it is different from the person operating the facility. This is necessary for DTSC to identify the responsible person who oversees the management of PV modules at the universal waste handling facility.

**Add subsection (e)(2)(B) to section 66273.32.** This subsection is added to require the notification to include the Identification Number of the universal waste handler of PV modules, if applicable to the universal waste handling activities of that facility. This is necessary to ensure that if the facility generates hazardous waste, it complies with the requirement to obtain an Identification Number for the appropriate management of that hazardous waste.

**Add subsection (e)(2)(C) to section 66273.32.** This subsection is added to require the notification to include the telephone number of the universal waste handler of PV modules. The information is necessary for DTSC to have a method of remotely contacting the universal waste handler if there are any questions or concerns about the information provided in the notification.

**Add subsection (e)(2)(D) to section 66273.32.** This subsection is added to require the notification to include the mailing address of the universal waste handler of PV modules and the physical address where the universal waste handling occurs if it is different than the mailing address provided. The physical address is necessary to provide DTSC with a physical location to inspect universal waste handling activities described in the notification the handler submitted to DTSC, and the mailing address is necessary to provide DTSC with a means to contact the universal waste handler via certified mail. Knowing the location of the facility also assists DTSC in compiling data on hazardous waste management activities occurring in the locality of the facility. The physical address is necessary to provide DTSC with a physical location to inspect universal waste treatment activities that took place at the location and to provide DTSC with data on hazardous waste management activities occurring at the location.

**Add subsection (e)(2)(E) to section 66273.32.** This subsection is added to require the notification to include the name of the person who can be contacted at the site and who can provide information about the universal waste handlers management activities. It is necessary for DTSC to have a contact person at the universal waste handling facility who can answer questions regarding the specific handling activities that occur at the facility and ensure compliance with the requirements of chapter 23. The handler may choose to designate a contact person different from the facility owner or operator for the purposes of answering specific handling questions.

**Add subsection (e)(2)(F) to section 66273.32.** This subsection is added to require the notification to include the telephone number of the contact person listed in the notification regarding universal waste management activities at the facility. The information is necessary for DTSC to have a method of remotely contacting the contact person listed in the notification regarding any questions or concerns about the

information provided in the notification and/or follow-up to any inspections or enforcement actions.

**Add subsection (e)(2)(G) to section 66273.32.** This subsection is added to require the notification to include the email address of the contact person or organization, if available. The information is necessary for DTSC to have a method in addition to telephone to reach the contact person listed in the notification regarding any questions or concerns about the information provided in the notification.

**Add subsection (e)(2)(H) to section 66273.32.** This subsection is added to require the notification to include the types of PV modules, such as monocrystalline, polycrystalline, and thin-film, expected to be handled by the universal waste handler. It is necessary for DTSC to know what types of PV modules universal waste handlers expect to handle to ensure that they understand and can communicate in writing the appropriate management methods of the PV modules they intend to accept. Additionally, this information is necessary for DTSC inspectors to validate what the universal waste handler reported in its notification to DTSC and to ensure compliance with the requirements of chapter 23.

**Add subsection (e)(2)(I) to section 66273.32.** This subsection is added to require the notification to include the sources of the PV modules collected by the universal waste handler. Examples of these source types include residential collections, business asset recovery, other collectors, or any other source. It is necessary for DTSC to have this information to ensure that universal waste handlers know the sources of the PV modules they are accepting and ensures that they understand and can communicate in writing those sources of PV modules they intend to accept. Additionally, this information is necessary for DTSC inspectors to validate what the universal waste handler reported in the notification to DTSC and ensure compliance with the requirements of chapter 23.

**Add subsection (e)(2)(J) to section 66273.32.** This subsection is added to require the notification to include a statement indicating whether the universal waste handler might accumulate 5,000 kilograms or more of universal waste at one time. This information is necessary because universal waste handlers that accumulate large quantities of universal waste pose a greater risk to human health and the environment. DTSC can validate, through inspections, that the universal waste handling facility has the means to appropriately manage the large quantity and the variety of universal wastes they accumulate based on the submitted notifications. DTSC can also prioritize inspections of facilities based on the amount of universal waste each facility accumulates onsite.

**Add subsection (e)(3) to section 66273.32.** This subsection is added to require the universal waste handler to notify DTSC for each separate location where universal waste PV modules are accepted and accumulated from an offsite source. For purposes of implementing this subsection, each location is considered a separate universal waste handler for notification and inspection purposes. Thus, if one company has several locations at which PV modules are collected or accumulated, each location is and must notify as a separate handler. This requirement is necessary for DTSC to be able to

uniquely identify and inspect all locations where PV modules from offsite sources are accepted and accumulated.

**Add subsection (f) to section 66273.32.** This subsection is added to specify that universal waste handlers of PV modules must comply with annual reporting requirements. This is necessary to ensure that universal waste handlers of PV modules appropriately notify DTSC of the activities they conducted, which allows DTSC inspectors to verify compliance with the requirements of chapter 23 and helps DTSC gather information about the amount of PV modules managed under chapter 23.

**Add subsection (f)(1) to section 66273.32.** This subsection is added to require handlers of PV modules that accept from any offsite source more than 100 kilograms (or 220 pounds) of PV modules in a calendar year to submit a report to DTSC by February 1 of the following year. This subsection is necessary so that DTSC can adequately track and record changes to universal waste handler activities. Reporting requirements such as this allow DTSC to understand the universal waste management activities that are occurring throughout the year at times when DTSC inspectors are not able to be present at the handlers' locations. This information is also necessary for state administrative purposes, such as estimating the volume of PV modules managed by the largest handlers of PV modules in the state and determining DTSC's future inspection workload. February 1 is the same date required for electronic waste annual reports, and was chosen to provide sufficient time for the handlers to complete their reports for the activities performed in the previous calendar year.

**Add subsection (f)(2) to section 66273.32.** This subsection is added to require handlers of PV modules that generate 5,000 kilograms or more of PV modules in a calendar year to submit a report to DTSC by February 1 of the following year. This subsection is necessary so that DTSC can adequately track and record changes to the generation of PV module waste. Reporting requirements such as this allow DTSC to understand the universal waste management activities that are occurring throughout the year at times when DSTC inspectors are not able to be present at the handlers' locations. This information is also necessary for state administrative purposes, such as estimating the amount of generated module waste and determining DTSC's future inspection workload. February 1 is the same submission date required for electronic waste annual reports and was chosen to provide sufficient time for the handlers to complete their reports for the activities performed in the previous calendar year.

**Add subsection (f)(3) to section 66273.32.** This subsection is added to establish the required contents of the annual report. The information required in the annual report is necessary for DTSC to uniquely identify each generator and handler of PV modules, identify the location where universal waste PV module handling activities occur, and perform site inspections as necessary to ensure compliance with the requirements of chapter 23.

**Add subsection (f)(3)(A) to section 66273.32.** This subsection is added to require the annual report to include the name of the universal waste handler of PV modules, and

the facility owner's name, if it is different from the person operating the facility. This is necessary to ensure that DTSC can identify the universal waste handler of PV modules, and the site owner if different from the waste handler, at a specific universal waste operation site during inspection and enforcement activities as needed to ensure compliance with the requirements of chapter 23.

**Add subsection (f)(3)(B) to section 66273.32.** This subsection is added to require the annual report to include the Identification Number of the universal waste handler of PV modules, if applicable. This is necessary for DTSC to ensure that if the facility generates hazardous waste that it complies with the requirement to obtain an Identification Number for the appropriate management of that hazardous waste. This is also necessary for DTSC to identify and inspect these handlers to ensure compliance with hazardous waste generator activities.

**Add subsection (f)(3)(C) to section 66273.32.** This subsection is added to require the annual report to include the telephone number of the universal waste handler of PV modules. The information is necessary for DTSC to have a method of remotely contacting the universal waste handler if there are any questions or concerns about the information provided in the notification and/or follow-up to any inspections or enforcement actions.

**Add subsection (f)(3)(D) to section 66273.32.** This subsection is added to require the annual report to include the mailing address of the universal waste handler of PV modules and the physical address where the universal waste handling occurs if it is different than the mailing address provided. The physical address is necessary to provide DTSC with a physical location to inspect universal waste handling activities described in the annual report submitted to DTSC, and the mailing address is required to provide DTSC with a means to contact the universal waste handler via certified mail. The physical address is necessary to provide DTSC with a physical location to inspect universal waste treatment activities that took place at the location and to provide DTSC with data on hazardous waste management activities occurring at the location.

**Add subsection (f)(3)(E) to section 66273.32.** This subsection is added to require the annual report to include the name of the person who can be contacted at the site and who can provide information about the universal waste handlers management activities. It is necessary for DTSC to have a contact person at the universal waste handling facility who has knowledge of PV module waste management activities at a specific site location during inspections and enforcement activities and can ensure compliance with the requirements of chapter 23.

**Add subsection (f)(3)(F) to section 66273.32.** This subsection is added to require the annual report to include the telephone number of the contact person listed in the annual report regarding universal waste management activities at the facility. The information is necessary for DTSC to have a method of remotely contacting the contact person listed in the annual report regarding any questions or concerns about the information provided in the annual report and/or follow-up to any inspections or enforcement actions.

**Add subsection (f)(3)(G) to section 66273.32.** This subsection is added to require the annual report to include the email address of the contact person or organization, if available. The information is necessary for DTSC to have a method in addition to telephone to reach the contact person listed in the notification regarding any questions or concerns about the information provided in the notification.

**Add subsection (f)(3)(H) to section 66273.32.** This subsection is added to require the annual report to include the types of PV modules, such as monocrystalline, polycrystalline, and thin-film, handled by the universal waste handler in the previous year. It is necessary for DTSC to know types of PV modules universal waste handlers handled to ensure that they are handling the PV modules that are applicable to the requirements of chapter 23.

**Add subsection (f)(3)(I) to section 66273.32.** This subsection is added to require the annual report to include the quantities of PV modules handled during the previous calendar year, including any quantities handled but not shipped during the calendar year. The quantity of universal waste handled can indicate the potential risk posed to human health and the environment, which may dictate DTSC's future inspection priority and workload. Also, because handlers that accumulate large quantities of universal waste PV modules pose a greater risk of release, DTSC could identify and prioritize locations that accumulate large quantities of PV modules.

**Add subsection (f)(3)(J) to section 66273.32.** This subsection is added to require the annual report to include a list of locations and the contact information where PV modules were shipped, the quantity shipped, and descriptions of the intended handling of the PV modules at each of the locations. This information is necessary for DTSC to understand which facilities receive PV modules, the amounts of PV modules shipped throughout the year, and how the PV modules are managed, providing DTSC inspectors a way to ensure compliance with the requirements of chapter 23.

**Add subsection (f)(3)(J)1 to section 66273.32.** This subsection is added to require the annual report to include the name, address, and telephone number for each of the locations to which the universal waste handler shipped PV modules during the previous calendar year. This information is necessary for DTSC to track which facilities receive PV modules and ensure that they comply with the requirements of chapter 23.

**Add subsection (f)(3)(J)2 to section 66273.32.** This subsection is added to require the annual report to include the quantity of PV modules shipped to each of the locations as indicated in paragraph 1 of subsection (f)(3)(j) of section 66273.32. This information is necessary for DTSC to track the quantity of PV modules shipped to each location throughout the year.

**Add subsection (f)(3)(J)3 to section 66273.32.** This subsection is added to require the annual report to include a description of how each location, as indicated in paragraph 1 of subsection (f)(3)(j) of section 66273.32, intended to manage the PV modules, including whether the PV modules were to be recycled or disposed of. This is necessary

because this information allows DTSC to understand how the PV modules are managed and ensures compliance with the requirements of chapter 23.

**Amend subsection (g)(1) to section 66273.32.** This subsection is renumbered from existing section 66273.32(e) to (g)(1). This is necessary to accommodate the addition of the department notification and annual reporting requirements for PV modules to section 66273.32.

**Add subsection (g)(2) to section 66273.32.** This subsection is added to clarify that universal waste handlers that have submitted a written notification and/or annual report to DTSC are not required to also submit the same information electronically. This subsection is necessary to avoid duplication of the universal waste handler efforts.

**Add subsection (g)(3) to section 66273.32.** This subsection is added to clarify that if the DTSC web-based reporting system is unavailable and cannot accommodate electronic submittals of notifications or annual reports, the universal waste handlers are required to submit their notifications and/or annual reports in writing. This subsection is necessary to ensure that DTSC receives the information it needs to identify and track universal waste handlers and to clarify to universal waste handlers that lack of availability of the electronic reporting system is not a rationale for nonsubmittal of a notification and/or annual report to DTSC.

**Amend subsection (h)(1) to section 66273.32.** This subsection is renumbered from existing section 66273.32(f) to (h)(1). This subsection is also amended to include the newly added subsection 66273.32(e), which is specific to the notification and reporting requirements of PV modules, and 66273.32(f), which is specific to the annual reporting requirements that universal waste handlers must comply. This is necessary to accommodate the addition of the department notification and annual reporting requirements for PV modules to section 66273.32.

**Add subsection (h)(2) to section 66273.32.** This subsection is added to clarify that universal waste handlers that have submitted a notification and/or annual report to DTSC electronically are not required to also submit the same information in writing. This subsection is necessary to avoid duplication of the universal waste handler efforts.



### **New section 66273.33.6. Universal Waste Management Requirements for PV Modules**

This new section is added to specify waste management requirements applicable to handlers of universal waste PV modules. This section is necessary to clarify to universal waste handlers that this section only applies to universal waste handlers of PV modules.

**Add subsection (a) to section 66273.33.6.** This section explains what the universal waste handlers of PV modules must do in order to comply with the requirements of this section. This is necessary to clarify to the universal waste handlers what specific requirements they are expected to conform to since chapter 23 requirements are self-authorizing and DTSC does not provide a grant of authorization for them to conduct the activities specified in this section. This also provides DTSC inspectors with a clear outline of the requirements that universal waste handlers must adhere to so they remain in compliance with the requirements of chapter 23.

**Add subsection (a)(1) to section 66273.33.6.** This subsection is added to establish and clarify that universal waste handlers of PV modules must also comply with the applicable requirements specified in sections 66273.30 through 66273.32 and sections 66273.34 through 66273.39 of article 3 of chapter 23. These requirements include notification and reporting requirements, prohibitions on disposal, appropriate notification, labeling and marking, accumulation time limits, personnel training, response to releases, offsite shipments, and tracking of shipments. This language is necessary to provide universal waste handlers with a list of the applicable requirements to facilitate their compliance with this chapter in the management of universal waste PV modules. This section is consistent with the requirements for handlers of the other universal waste categories contained in the article 3 of chapter 23.

**Add subsection (a)(2) to section 66273.33.6.** This subsection is added to clarify that universal waste handlers of PV modules are required to manage the PV modules in a way to prevent releases of any constituent of a PV module to the environment (e.g., a release of a hazardous constituent to air, water or soil) under reasonably foreseeable conditions. The requirements of this subsection are consistent with existing universal waste management standards designed to prevent releases for other universal wastes, and are necessary to ensure that handlers of PV modules plan for the conditions they are likely to encounter while managing the PV modules, i.e., “reasonably foreseeable conditions.”

**Add subsection (a)(2)(A) to section 66273.33.6.** This subsection is added to clarify that universal waste handlers must contain PV modules in a manner that prevents breakage and release of hazardous constituents to the environment. If the universal waste handlers choose to use a container or package to fulfill the requirements of this subsection, they are responsible for ensuring that the container or package prevents breakage, leakage, spillage, or damage under reasonably foreseeable conditions. This subsection is necessary to clarify that the universal waste handlers are responsible for

containing the PV modules in a way that prevents a release to the environment that could cause contamination or harm to human health.

**Add subsection (a)(2)(B) to section 66273.33.6.** This subsection is added to clarify and establish that intact PV modules that are managed in a manner that prevents breakage and release of constituents to the environment are deemed to comply with subsection (a)(2)(A), described above. This is necessary to clarify to the universal waste handlers what is considered to be compliance with the containment requirements explained in this subsection. It is also necessary for DTSC enforcement staff to ensure that universal waste handlers are complying with the requirements of this subsection.

**Add subsection (a)(3) to section 66273.33.6.** This subsection is added to require that broken PV modules or constituents of the PV modules be immediately cleaned up and placed into a container when a PV module is unintentionally or accidentally broken. This is necessary because PV module breakage may result in a release to the environment or harm to human health. A business is responsible for determining the nature and extent of the spill or release as well as the appropriate method(s) of cleanup. This subsection is necessary to ensure that PV module breakage is responded in a timely manner to minimize releases of hazardous constituents that could impact any public health or environmental harm. Additionally, this subsection is necessary to clarify that such breakage would not constitute a violation of the containment requirement above nor would it be considered unauthorized treatment so long as the handler responds to the release in a timely manner.

**Add subsection (b) to section 66273.33.6.** This subsection is added to incorporate by reference the alternative management standards for treatment of universal waste PV modules that are located in article 7 of chapter 23. The standards for conducting authorized treatment of PV modules are necessary to provide a form of authorization for the PV module handlers that conduct these activities (i.e., these standards are necessary to implement Health & Safety Code section 25201).

**Add subsection 66273.33.6(c).** This subsection is added to establish an exemption from the applicable treatment requirements in article 7 of chapter 23 for universal waste handlers that manage intact PV modules. This is necessary to reduce any undue burden on universal waste handlers for complying with regulations that handle PV modules in a way that poses a low risk to human health and the environment.

**Add subsection (c)(1) to section 66273.33.6.** This subsection is added to specify that the exemption from the requirements of article 7 of chapter 23 applies to universal waste handlers of PV modules who manage only PV modules that are intact, except for the PV module accidentally or unintentionally broken. This exemption is necessary to provide universal waste handlers that manage only intact PV modules with flexibility to manage PV modules without requiring compliance with added management processes. Exemption language is necessary to ensure if PV modules are broken by accident, the universal waste handler understands that it must be contained in a manner that

prevents release of hazardous substances to the environment, but still reduces any undue burden for complying with regulations that are not commensurate with the risk.

**Add subsection (c)(2) to section 66273.33.6.** This subsection is added to specify that universal waste handlers of PV modules need to ensure that PV modules remain intact the entire time that they are in universal waste handlers' custody, except for PV modules that are broken by accident occasionally, which are managed based on the applicable provisions as directed. This is necessary to ensure that universal waste handlers of PV modules take care to prevent PV modules from breaking.

**Add subsection(c)(3) to subsection 66273.33.6.** This subsection is added to specify that the exemption provided in this subsection is only available to universal waste handlers of PV modules that also comply with the applicable requirements of article 3 of chapter 23. These include requirements on disposal prohibitions, appropriate notification, labeling and marking, accumulation time limits, personnel training, response to releases, offsite shipments, and tracking of shipments. This is necessary to ensure that universal waste handlers of PV modules still adhere to the requirements of (a)(1) of this section.

**Amend section 66273.34.** This section is amended to reflect the numbering changes made to this section in which subsection (g) of section 66273.34 is renumbered to subsection (h) due to the insertion of new subsection (g) and amended to reflect the numbering changes made to this section, where subsection (f) is renumbered to subsection (g). This is necessary to accommodate the addition of labeling and marking requirements for PV modules to section 66273.34.

**Add subsection (g) to section 66273.34.** This subsection is added to clarify the marking and labeling phrase requirements for PV modules or containers in which PV modules are contained. This is necessary to ensure that universal waste handlers of PV modules understand how to label and mark waste PV modules at their facility. It also is necessary to facilitate DTSC inspections, by making it easier to identify where universal waste PV modules are contained.

**Amend subsection (h) of section 66273.34.** This subsection is amended to renumber subsection (g) to subsection (h), include PV modules on the list of universal wastes that may use an alternative form of labeling and marking, and include the labeling phrase "Universal Waste-PV module(s)" into the text. This is necessary to allow an alternative form of labeling and marking from individually labeling and marking each PV module to allowing PV modules that are combined, packaged, and accumulated together to be placed in a designated area that is marked with the phrase "Universal Waste-PV module(s)." These amendments are necessary to require labeling and demarking area requirements for PV modules be consistent with those of other universal waste categories. Additionally, subsection (f) is changed to (g) to accommodate the renumbering described above.

**Amend subsection (a)(2) of 66273.39.** This subsection is amended for universal waste handlers to provide and keep record of the quantity (count or weight) of PV modules in

their receipt of PV modules shipments. The quantity of universal waste handled can indicate the potential risk posed to human health and the environment. It is necessary for DTSC to be able to identify and prioritize locations that receive large quantities of PV modules for future inspections to ensure they are complying with the regulations since handlers that receive and accumulate large quantities of universal waste PV modules pose a greater risk of release. This information is also necessary for universal waste handlers of PV modules to determine whether they have the capacity to manage the quantity of PV module waste on the shipping documents before accepting the waste.

**Amend subsections (c)(2) of 66273.39.** This subsection is amended to include PV modules on the list of universal wastes that are included as examples for the universal waste handler to provide the quantity (count or weight) of each type of universal waste that the universal waste handler sends offsite. This amendment is necessary to clarify that universal waste handlers of PV modules must keep records of offsite shipments of PV modules. The quantity of universal waste handled can indicate the potential risk posed to human health and the environment, which may dictate DTSC's future inspection priority and workload. Also, because handlers that ship offsite large quantities of universal waste PV modules pose a greater risk of release, DTSC could identify and prioritize locations that ship offsite large quantities of PV modules.

#### **Amend Article 5. Standards for Universal Waste Transporters**

This article specifies the standards that universal waste transporters must comply with regarding the shipment of universal waste.

**Add subsection (e) to section 66273.51.** This subsection is added to clarify that universal waste handlers are prohibited from transporting more than 100 kilograms (220 pounds) of PV modules at any one time, unless the PV modules are in containers, as described in section 66273.33.5, subsection (d)(1)(B). This subsection is necessary as it facilitates PV module maintenance activities and allows for the transport of small quantities of PV modules without subjecting them to the PV module containment requirement.

#### **Amend Article 7. Authorization Requirements for Universal Waste Handlers Who Treat Universal Wastes**

This article specifies the appropriate management standards for the different levels of treatment allowed by DTSC as universal waste. The standards for treatment (i.e., self-implementing authorized treatment) are necessary to ensure that treatment is performed safely by handlers that do not possess the hazardous waste facility permits they would otherwise be required to obtain. DTSC established this form of self-implementing authorization because a full or standardized hazardous waste facility permit is not commensurate with the hazards posed by treating the universal waste allowed pursuant to the standards specified in this section. This alternative form of self-implementing authorization is needed to realize the full benefits of the universal waste program because it allows certain treatment activities to be conducted without the issuance of a permit or other grant of authorization.

**Amend subsection (b) of section 66273.70.** This subsection is amended to provide authorization to universal waste handlers of PV modules that perform specified treatment activities that would otherwise require a hazardous waste facility permit. Except for CRTs and CRT glass, all other universal wastes may be treated as specified only for purposes of recycling, not for disposal. DTSC is aware that recycling options for PV modules may not currently be available. This revision is necessary to accomplish the purposes of the universal waste program by facilitating the removal of recyclable components from PV modules, allowing treatment of PV modules (i.e., removal, disassembly, and other forms of physical treatment) and disposing of PV modules or some PV module components. This revision also requires that to be authorized to conduct such activities, the universal waste handler must also comply with the newly added handler requirements applicable to universal waste handlers of PV modules.

**Amend subsection (c)(1) of section 66273.70.** This subsection is amended to add PV modules to the list of universal wastes that are eligible for treatment by removing user-replaceable components. This is necessary to accomplish the purposes of article 7 to create a self-implementing authorization for universal waste handlers that conduct simple removal activities and to promote or increase recycling opportunities for PV modules. This amendment is also necessary to clarify to DTSC inspectors and universal waste handlers that PV modules are eligible for authorization by removing user replaceable components.

**Add subsection (c)(2)(E) to section 66273.70.** This subsection is added to establish that PV modules are eligible for authorization to be treated through dismantling activities. This is necessary to clarify to universal waste handlers of PV modules that dismantling activities, as specified in section 66273.72(f), are eligible for authorization. This is also necessary for DTSC inspectors to know exactly what dismantling activities are allowed under this authorization.

**Add subsection (c)(3)(C) to section 66273.70.** This subsection is added to establish that PV modules are eligible for authorization when treated in specific ways. This is necessary to clarify to universal waste handlers of PV modules that treatment activities, as specified in section 66273.73(d), are eligible for authorization. This is also necessary for DTSC inspectors to know exactly what dismantling activities are allowed under this authorization.

**Amend subsection (a) of section 66273.71.** This subsection is amended to include PV modules in the specific removal activities of user-replaceable components that universal waste handlers may conduct to be authorized by DTSC to perform, and that those universal waste handlers are exempt from the requirements of section 66273.74 through 66273.77, provided they comply with requirements as specified in subsection (b) through (g) of this section. This is necessary to specify which removal activities universal waste handlers of PV modules are authorized by DTSC to conduct. This is also necessary for DTSC inspectors to know exactly what removal activities are allowed under this authorization.

**Amend subsection (b) of section 66273.71.** This subsection is amended to include the removal of discrete assemblies of PV modules, such as batteries or inverters, as removal activities that universal waste handlers are authorized to conduct, clarifying that such components are typically removed for replacement during the normal operations of a PV module, and that such removal activities pose low hazard risks and is not specific to waste management activities. It is necessary to specify to both universal waste handlers of PV modules and DTSC inspectors which assemblies of an electronic device and PV module can be removed with low hazard risk, and still be deemed authorized by DTSC.

**Amend subsection (c) of section 66273.71.** This subsection is amended to include PV modules under the authorized removal activities as described above in section 66273.71(b) when conducted according to operation manuals. This is necessary to specify to both universal waste handlers of PV modules and DTSC inspectors that removal activities such as prescribed in the operating manual may be conducted because these types of treatment pose low hazard risks and are less likely to result in breakage and unintended release and deemed authorized by DTSC.

**Amend subsection (a)(2) of section 66273.72.** This subsection is amended to include the newly added subsection 66273.72(f), which is specific to the dismantling of PV modules. This amendment is necessary to ensure that universal waste handlers of PV modules perform a hazardous waste determination on all residuals resulting from dismantling PV modules because residuals are no longer considered PV modules and may pose higher risks. It is therefore necessary to make sure any hazardous residuals that are not PV modules and are determined to be hazardous are properly managed pursuant to chapters 10 through 16, 18, and 20 through 22 to prevent their potential release to the environment.

**Add subsection (f) to section 66273.72.** This subsection clarifies the specific authorized treatment standards for universal waste handlers that dismantle PV modules, provided the universal waste handlers comply with the requirements of this subsection. This subsection is necessary so that universal waste handlers of PV modules understand which specific dismantling activities are determined to be low hazard risks and authorized by DTSC. The compliance requirements established in this subsection are necessary to ensure that the activities are conducted safely and do not result in release of hazardous constituents to the environment or harm to human health.

**Add subsection (f)(1) to section 66273.72.** This subsection is added to clarify that universal waste handlers that dismantle, remove, or segregate components from PV modules, provided they do not break the PV module glass, are authorized by DTSC. Dismantling, removing, or segregating components are activities that have a low risk of releasing hazardous constituents to the environment or harm to human health and can be conducted safely. Breaking PV module glass poses a higher hazard risk and is not authorized under this section. This is necessary so that universal waste handlers of PV modules know which specific dismantling activities are determined to be low risk and are authorized by DTSC under chapter 23.

**Add subsection (f)(2) to section 66273.72.** This subsection is added to clarify that the universal waste handler that dismantles, as specified in subsection (f)(1), and conducts certain activities is deemed authorized by DTSC. This is necessary so that both universal waste handlers of PV modules and DTSC inspectors know what requirements the universal waste handler must comply with to be authorized by DTSC under chapter 23. The requirements established in this subsection are necessary to ensure that dismantling activities are conducted safely and do not result in release of hazardous constituents to the environment or harm to human health.

**Add subsection (f)(2)(A) to section 66273.72.** This subsection is added to ensure that the universal waste handler complies with the required notification, reporting, and recordkeeping requirements, as specified in section 66273.74, subsections (a)(4) and/or (a)(5), (b)(3), and (c)(3). These requirements are necessary for universal waste handlers to understand the notification, reporting, and recordkeeping requirements they must adhere to, to be deemed authorized by DTSC to conduct dismantling activities outlined in this section. These compliance requirements are also necessary for DTSC to validate the information submitted in the notification, reporting, and recordkeeping by the facility regarding operations and handling practices of PV module waste stream during inspections.

**Add subsection (f)(2)(B) to section 66273.72.** This subsection is added to ensure that residuals from dismantling activities that meet the definition of scrap metal are recycled. This requirement is necessary to ensure that universal waste handlers recycle scrap metal residuals from the dismantling activities of PV modules in compliance with the scrap metal exclusion in section 66261.6(a)(3)(B).

**Add subsection (f)(2)(C) to section 66273.72.** This subsection is added to require that after the dismantling activities, a universal waste handler must either treat the PV modules pursuant to the requirements in section 66273.73 or send or take the PV modules to a handler that performs further treatment on PV modules pursuant to the requirements in section 66273.73. This subsection is necessary to ensure that any further treatment or disposal activities are conducted in a manner that is safe for human health and the environment. Further treatment of the PV module components must be conducted as outlined in section 66273.73, as DTSC determined these treatment activities as low hazard risks and less likely to result in release to the environment. If the universal waste handler does not further treat, but chooses to dispose of PV modules after dismantling activities, the wastes are no longer universal waste and must be managed as hazardous waste.

**Add subsection (f)(2)(D) to section 66273.72.** This subsection is added to require that dismantling activities be conducted in a manner to prevent releases of any universal waste or constituents of universal waste to the environment and are protective of the persons managing the PV modules as specified. This is necessary to clarify to universal waste handlers that they must protect the persons managing PV modules and conduct activities in a way that prevents contamination, thereby protecting public health and the environment from harm.

**Add subsection (f)(2)(D)1 to section 66273.72.** This subsection is added to require that PV module dismantling is conducted over or in a designated area that is able to contain any materials that might be released under reasonably foreseeable conditions, provided the dismantling occurs in a manner that prevents breakage. This is necessary to ensure that handlers of PV modules conduct dismantling activities in a specified area that can contain any materials that may be released, thereby preventing large-scale contamination of the facility and the environment.

**Add subsection (f)(2)(D)2 to section 66273.72.** This subsection is added to clarify that the universal waste handler must contain any hazardous residuals generated during the dismantling activities of PV modules to prevent releases to the environment under reasonably foreseeable conditions. This is necessary to ensure that handlers of PV modules contain any spill, leakage, or breakage during the dismantling of PV modules and preventing any large-scale releases to the environment.

**Add subsection (f)(2)(D)3 to section 66273.72.** This subsection is added to clarify that any PV module that is accidentally broken during the authorized dismantling of PV modules must be immediately cleaned up and placed into a container that is able to contain the broken PV module and prevent releases to the environment (i.e., soil, air, water). This is necessary to ensure that universal waste handlers of PV modules that dismantle PV modules clean up and contain any broken PV modules adequately to prevent any hazardous waste release to the environment.

**Add subsection (f)(2)(D)4 to section 66273.72.** This subsection is added to ensure that universal waste handlers are thoroughly familiar with the hazards associated with such treatment and have access to proper procedures and protective equipment necessary to conduct treatment activities pursuant to this section to protect the health and well-being of the workers who dismantle PV modules. This is necessary to ensure that universal waste handlers take necessary precautions to protect their employees who conduct dismantling activities of PV modules.

**Add subsection (f)(2)(D)5 to section 66273.72.** This subsection is added to ensure that the universal waste handler of PV modules complies with all applicable health and safety laws and regulations to protect the health and well-being of the workers who dismantle PV modules. This is necessary to ensure that the universal waste handlers take necessary precautions to protect their employees who conduct dismantling activities of PV modules.

**Add subsection (f)(2)(D)6 to section 66273.72.** This subsection is added to require the universal waste handler to maintain adequate aisle space in compliance with fire code standards. This is necessary not only to protect the health and well-being of the workers who dismantle PV modules, but also to ensure that fire response personnel have sufficient access to respond to fires or emergencies which might arise. This is also necessary to ensure that locations where universal waste handlers dismantle waste PV modules provide sufficient work space, access, and ability for workers and emergency



responders to manage and contain any incidents that could harm human health and the environment.

**Add subsection (f)(3) to section 66273.72.** This subsection is added to specify the options that are available to the universal waste handler of PV modules that dismantles PV modules, but does not perform further treatment on the PV modules pursuant to section 66273.73 and does not send or take PV modules to another universal waste handler that performs further treatment pursuant to section 66273.73. This subsection is necessary to ensure that universal waste handlers understand what options are available to them if they do not conduct any further treatment or send the PV modules to another universal waste handler for further treatment.

**Add subsection (f)(3)(A) to section 66273.72.** This subsection is added to require that a universal waste handler that does not further treat and does not send or take PV modules for further treatment to another universal waste handler pursuant to section 66273.73, must ensure that the PV modules are either recycled or disposed of. This is necessary to ensure that the universal waste handler understands that it must recycle or dispose of the PV modules that they do not intend to conduct further treatment on as specified in this section.

**Add subsection (f)(3)(B) to section 66273.72.** This subsection is added to specify requirements of a universal waste handler that chooses to dispose of PV modules at a permitted hazardous waste disposal facility. This is necessary to give DTSC the ability to track universal waste handlers that pursue this option and ensure the handlers meet the requirements for hazardous waste generators rather than the universal waste standards. Additionally, providing a disposal option for PV modules under chapter 23 is necessary to account for unavailable recycling options for PV modules in California, in addition to mitigating illegal disposal.

**Add subsection (f)(3)(B)1 to section 66273.72.** This subsection is added to specify that a universal waste handler that chooses to dispose of PV modules at a permitted hazardous waste disposal facility becomes a hazardous waste generator and can no longer manage PV modules as universal waste. This is necessary to give DTSC the ability to track universal waste handlers that pursue this option and ensure the handlers are meeting the requirements for hazardous waste generators rather than the universal waste standards.

**Add subsection (f)(3)(B)2 to section 66273.72.** This subsection is added to specify that a universal waste handler that chooses to dispose of PV modules and not conduct further treatment or send the PV modules to another universal waste handler for further treatment becomes the generator of hazardous waste, and is required to manage the PV modules as a hazardous waste according to the applicable requirements of chapters 12 through 16, 18, 20 and 22. This is necessary to ensure that hazardous wastes are being appropriately handled and managed by generators to be protective of human health and the environment.

**Add subsection (f)(3)(B)3 to section 66273.72.** This subsection is added to specify that the universal waste handler that chooses to dispose of PV modules and not conduct further treatment or send the PV modules to another universal waste handler for further treatment is required to notify DTSC of the handler's intent to dispose of hazardous waste PV modules in accordance with 66273.74(a)(5). This is necessary to give DTSC the ability to track the handlers that pursue this option and provides DTSC with advance notice of the disposal destination.

**Add subsection (d) to section 66273.73.** This subsection is added to establish the requirements universal waste handlers that treat PV modules in specified ways must meet to be deemed authorized by DTSC. This is necessary to specify terms and conditions that universal waste handlers are authorized by DTSC for treatment of PV modules in lieu of requiring full hazardous waste permits as would be required for treatment of other hazardous wastes.

**Add subsection (d)(1) to section 66273.73.** This subsection is added to authorize universal handlers of PV modules that perform treatment by intentionally breaking the PV module, such as breaking glass. This subsection is necessary to clarify to both the universal waste handler of PV modules and DTSC inspectors that treatment activities such as intentionally breaking PV module glass are deemed authorized, as long as the treatment facility meets the management standards of this section. It is necessary to clarify that universal waste handling facilities that accidentally break PV modules are not required to comply with management standards outlined in this section.

**Add subsection (d)(2) to section 66273.73.** This subsection is added to authorize universal handlers of PV modules to conduct treatment other than, or in addition to, the removal activities authorized in section 66273.71 and the dismantling activities authorized by section 66273.72(f), and involves one of the methods described in the newly added subsection 66273.73(e). This is necessary to clarify to universal waste handlers of PV modules that the self-implementing authorization is available for handlers that conduct the other types of treatment as specified in 66273.73(e) that are consistent with, or pose the same limited risks and hazards, as breaking of PV module glass or other processes that change only the physical properties of the PV modules.

**Add subsection (d)(3) to section 66273.73.** This subsection is added to establish the requirements for universal waste handlers that treat PV modules as specified in this subsection, in addition to the newly added requirements outlined in section 66273.33.6. This is necessary to ensure that DTSC inspectors can track and have records of PV module treatment activities performed by universal waste handlers to ensure they conform to the treatment requirements for PV modules outlined in chapter 23. In addition, this subsection outlines the specific requirements that universal waste handlers that treat PV modules must follow in order to fulfill DTSC's self-implementing authorization requirements.

**Add subsection (d)(3)(A) to section 66273.73.** This subsection is added to specify the notification, annual reporting, and recordkeeping requirements pursuant to section

66273.74 that universal waste handlers that treat PV modules as specified in section 66273.73 must follow to fulfill DTSC's self-implementing authorization requirements. The notification, annual reporting, and recordkeeping requirements are necessary for DTSC to identify and inspect universal waste handlers performing the treatment activities on PV modules, verify their compliance with article 7 requirements, and know the disposition of the PV modules being managed by the universal waste handler. This also is necessary to ensure that universal waste handlers that treat PV modules understand the requirements they must comply with and ensure that operations at these facilities are conducted in safe manner which is protective of human health and the environment.

**Add subsection (d)(3)(B) to section 66273.73.** This subsection is added to ensure that the universal waste handler that treats PV modules is aware of and complies with the required treatment standards for PV modules as specified in section 66273.75. This is necessary to ensure that operations at these facilities are conducted in safe manner which is protective of human health and the environment.

**Add subsection (d)(3)(C) to section 66273.73.** This subsection is added to ensure that the universal waste handler that treats PV modules is aware of and complies with the required closure plan and financial requirements in sections 66273.76. These requirements are necessary to ensure that the universal waste handler performing treatment of PV modules has anticipated the steps necessary to close their treatment operation and address any hazardous waste releases that may occur, and has the financial resources available to adequately close and respond to or mitigate hazardous waste releases. These requirements also serve as an additional incentive to facilities to prevent or minimize releases to the environment because they may be financially liable for those releases.

**Add subsection (d)(3)(D) to section 66273.73.** This subsection is added to ensure that the universal waste handler that treats PV modules complies with the closure notification requirements in sections 66273.77 when applicable. This requirement is necessary to ensure that the universal waste handler that performs treatment of PV modules has notified DTSC of what is necessary to close their treatment operation and address any releases that may occur. These requirements also serve as an additional incentive to reduce or minimize releases to the environment, so that any cleanup required when the facility is closed, and the costs associated with that cleanup, can be reduced.

**Add subsection (e) to section 66273.73.** This subsection is added to specify the treatment methods to be conducted by universal waste handlers that treat PV modules. These physical treatment methods pose lower risks than treatment methods that utilize the addition of chemicals or heat (e.g., smelting metals). It is necessary to clarify the distinction between authorized treatment methods that are determined to pose lower risks to human health and the environment from treatments which may pose significant hazards are not authorized under the proposed authorized treatment regulations, and to ensure that this distinction is adhered to.

**Add subsection (e)(1) to section 66273.73.** This subsection is added to specify the treatment methods for universal waste PV modules that are authorized to be performed under Article 7. This subsection limits the treatment methods allowed to those that primarily change the physical properties of the waste (e.g., breaking, shredding, crushing or compacting) and that separate processed material by its physical properties (e.g., size, color, density). This is necessary to specify those treatment activities that universal waste handlers of PV modules can perform that pose low risk to human health and the environment (as authorized treatment under the universal waste regulations).

**Add subsection (e)(1)(A) to section 66273.73.** This subsection is added to specify authorized physical treatments that changes only the physical properties of PV modules (e.g., cutting, sawing, breaking, shredding, crushing, grinding, screening, sieving, acceleration, or compacting). These physical treatment methods pose lower hazards than methods that utilize chemicals or heat. This is necessary to clarify to the universal waste handler that conducts treatment on PV modules which authorized physical treatment methods can be performed with lower risks (as authorized treatment under the universal waste regulations) from those treatment activities that the handler cannot perform without a hazardous waste permit because of higher risks.

**Add subsection (e)(1)(B) to section 66273.73.** This subsection is added to specify authorized physical separation of PV modules based on physical properties, such as size, color, density, or ferromagnetism. These physical treatment methods pose lower hazards than methods that utilize chemicals or heat. This is necessary to clarify to the universal waste handler that conducts physical separation of PV modules which authorized separation methods can be performed with lower risks (as authorized treatment under the universal waste regulations) from those treatment activities that the handler cannot perform without a hazardous waste permit because of higher risks.

**Add subsection (e)(2) to section 66273.73.** This subsection is added to specify the conditions where the physical treatment methods identified in 66273.73(e)(1) are not authorized by DTSC under chapter 23 and are subject to the full hazardous waste permitting requirements under chapters 14 through 16, 18, 20, and 22. It is necessary to clarify that universal waste handlers of PV modules that conduct physical treatment using chemicals or heat cannot be authorized to do so by DTSC under chapter 23 because these physical treatment methods require a hazardous waste permit due to higher risks to human health and the environment.

**Add subsection (e)(2)(A) to section 66273.73.** This subsection is added to specify that physical treatment specified under 66273.73(e)(1) that uses or applies chemicals, including water, is not eligible to be deemed authorized by DTSC under chapter 23. Use of chemicals for treatment, such as solvents or water, poses a higher risk by increasing the likelihood of mobilization of hazardous constituents to release to the environment than physical treatments such as cutting or sawing. This clarification is necessary to ensure universal waste handlers of PV modules that conduct certain treatments that use or apply chemicals, including water, are not authorized to do so by DTSC under chapter

23 due to the higher risk to human health and the environment, and would require a hazardous waste permit from DTSC.

**Add subsection (e)(2)(B) to section 66273.73.** This subsection is added to specify that physical treatment specified under 66273.73(e)(1) that uses or applies external heat is not eligible for authorization by DTSC under chapter 23. Treatment by heat could cause a change in the PV module's property such as melting of constituents or a chemical change which could increase mobilization of hazardous constituents to release to the environment and potential release of vapors which could harm human health. This clarification is necessary to ensure universal waste handlers of PV modules that conduct certain treatments that use or apply external heat, are not authorized to do so by DTSC under chapter 23 due to the higher risk to human health and the environment, and would require a hazardous waste permit from DTSC.

**Add subsection (e)(3) to section 66273.73.** This subsection is added to specify what is required of a universal waste handler that chooses to dispose of PV modules at a permitted hazardous waste disposal facility and clarifies that the universal waste handler would be deemed the hazardous waste generator. This is necessary to clarify to universal waste handlers that they are now subject to hazardous waste generator requirements and cannot manage those PV modules destined for disposal under the requirements of chapter 23. This provides DTSC with the ability to track universal handlers of PV modules that pursue this option and ensure the handlers are meeting the requirements for hazardous waste generators.

**Add subsection (e)(3)(A) to section 66273.73.** This subsection is added to clarify that the universal waste handler that chooses to dispose of PV modules at a permitted hazardous waste disposal facility is required to manage the PV modules as hazardous waste in accordance with chapters 12 through 16, 18, 20 and 22. This is necessary to ensure that hazardous wastes are handled and managed by generators so as to be protective of human health and the environment and to clarify that the universal waste handler is now subject to hazardous waste generator requirements and cannot manage those PV modules destined for disposal under the authority of chapter 23.

**Add subsection (e)(3)(B) to section 66273.73.** This subsection is added to clarify that the universal waste handler that chooses to dispose of PV modules at a permitted hazardous waste disposal facility is required to notify DTSC of its intent to dispose of in accordance with section 66273.74(a)(5). This is necessary to provide DTSC with the ability to track the universal waste handlers of PV modules that pursue this option and know in advance the disposal destination.

**Renumber subsection (d) of section 66273.73.** This subsection is amended to be renumbered as subsection 66273.73(f) to accommodate the addition of new subsections 66273.73(d) and (e). This is necessary to reflect the number changes due to the addition of PV module treatment methods to section 66273.73.

**Add subsection (a)(4) to section 66273.74.** This subsection is added to establish what information must be submitted in notification requirements for universal waste handlers

that intend to perform authorized treatment of PV modules as specified under this article. The universal waste handlers are required to provide this notification no later than 30 calendar days prior to treating any PV modules. This is necessary to ensure DTSC has a method of documenting and tracking universal waste handling facilities that intend to conduct treatment of PV modules under the authority of article 7 because of the potential for release posed by the treatment. Documentation is necessary for DTSC inspectors to validate what types of activities are occurring at universal waste handling facilities and to ensure adherence to universal waste management requirements and for the protection of human health and the environment. This information is also necessary for state administrative purposes, such as estimating the amount of waste PV modules being managed in the state, determining DTSC's future inspection workload, and ensuring that all treatment residuals are appropriately managed.

**Add subsection (a)(4)(A) to section 66273.74.** This subsection is added to require the notification to include the name of the universal waste handler that intends to treat PV modules, and the facility owner's name if it is different from the person operating the facility. This is necessary for DTSC to identify the responsible person who oversees the management of PV module treatment.

**Add subsection (a)(4)(B) to section 66273.74.** This subsection is added to require the notification to include the Identification Number of the universal waste handler of PV modules that intends to treat PV modules, if applicable to the universal waste handling activities of that facility. This is necessary to ensure that if the facility generates hazardous waste that it complies with the requirement to obtain an Identification Number for the appropriate management of that hazardous waste. This is also necessary for DTSC to easily identify facilities by number and inspect these handlers to ensure compliance with hazardous waste generator activities.

**Add subsection (a)(4)(C) to section 66273.74.** This subsection is added to require the notification to include the telephone number of the universal waste handler of PV modules that intends to treat PV modules. The information is necessary for DTSC to have a method of remotely contacting the universal waste handler if there are any questions or concerns about the information provided in the notification.

**Add subsection (a)(4)(D) to section 66273.74.** This subsection is added to require the notification to include the mailing address of the universal waste handler of PV modules that intends to treat PV modules and the physical address where the universal waste handling is occurring if it is different than the mailing address provided. The physical address is necessary to provide DTSC with a physical location to inspect universal waste handling activities described in the notification the handler submitted to DTSC, and the mailing address is necessary to provide DTSC with a means to contact the universal waste handler via certified mail. Knowing the location of the facility also assists DTSC in compiling data on hazardous waste management activities occurring in the locality of the facility.

**Add subsection (a)(4)(E) to section 66273.74.** This subsection is added to require the notification to include the name the person who can be contacted at the site and who can provide information about the universal waste handler's treatment activities. It is necessary for DTSC to have a contact person at the universal waste handling facility who can answer questions regarding the specific handling activities that occur at the facility and ensure compliance with the requirements of chapter 23. The handler may choose to designate a contact person different from the facility owner or operator for the purposes of answering specific handling questions.

**Add subsection (a)(4)(F) to section 66273.74.** This subsection is added to require the notification to include the telephone number of the contact person listed in the notification regarding the universal waste handler's treatment activities at the facility. The information is necessary for DTSC to have a method of remotely contacting the contact person listed in the notification regarding any questions or concerns about the information provided in the notification.

**Add subsection (a)(4)(G) to section 66273.74.** This subsection is added to require the notification to include the email address of the contact person or organization, if available. The information is necessary for DTSC to have a method in addition to telephone to reach the contact person listed in the notification regarding any questions or concerns about the information provided in the notification.

**Add subsection (a)(4)(H) to section 66273.74.** This subsection is added to require the notification to include a description of the authorized treatment method(s) the universal waste handler intends to use to treat PV modules. The information required to be included in the notification is necessary for DTSC to identify and inspect these handlers to ensure compliance with the authorized treatment methods described in article 7. Requiring the facility to provide notice in advance to DTSC of the facility's treatment methods will increase the likelihood of compliance with the law because DTSC will validate the facility's reporting with what is observed during inspections.

**Add subsection (a)(4)(I) to section 66273.74.** This subsection is added to require the notification to include a description of how the universal waste handler that treats PV modules intends to recycle and/or dispose of the treated PV modules. The information required to be included in the notification is necessary for DTSC to identify and inspect these handling activities to ensure compliance with the authorized disposition options described in article 7. This information is also necessary for state administrative purposes, such as estimating the amount of waste PV modules being managed in the state and to ensure that all treatment residuals are appropriately managed.

**Add subsection (a)(5) to section 66273.74.** This subsection is added to establish what information the universal waste handler of PV modules must submit to DTSC no later than 15 days after determining that the PV modules are destined for disposal. This subsection is necessary to provide DTSC inspectors with information regarding the universal waste handlers that intend to dispose of PV modules. The 15-day timeframe allows DTSC time to coordinate any inspections of the universal waste handler and to

verify that the destination facility is authorized to receive and dispose of the PV modules.

**Add subsection (a)(5)(A) to section 66273.74.** This subsection is added to require the handler to provide a hazardous waste Identification Number for the location of the universal waste handling facility where the PV modules were generated. This information is necessary to provide DTSC with facility information in preparation of inspections and allows DTSC to verify facility compliance with the hazardous waste generator standards.

**Add subsection (a)(5)(B) to section 66273.74.** This subsection is added to require the universal waste handler of PV modules to describe the authorized treatment method used to generate the PV modules to be disposed of. This subsection is necessary to allow DTSC to verify that the universal waste handler conducted authorized treatment prior to making the decision to dispose of the PV modules. The information is necessary for DTSC to identify and inspect these handlers to ensure compliance with the authorization requirements outlined in article 7. This information is also necessary for state administrative purposes, such as estimating the amount of waste PV modules being disposed of in the state, determining DTSC's future inspection workload, and ensuring that all treatment residuals are appropriately managed.

**Add subsection (a)(5)(C) to section 66273.74.** This subsection is added to require the universal waste handler of PV modules to provide the name, address, and Identification Number of the hazardous waste disposal facility where the PV modules will be disposed of. This information is necessary for DTSC inspectors to verify that the destination facility is authorized to receive and dispose of the PV modules.

**Add subsection (b)(3) to section 66273.74.** This subsection is added to establish the required information in annual reporting for a universal waste handler that has performed authorized treatment on PV modules in a previous calendar year. The annual report is required to be submitted by February 1 of the following year. This is necessary to ensure DTSC has a method of documenting and tracking universal waste handling facilities that conducted treatment of PV modules under the authority of article 7 in the previous year. Documentation is necessary for DTSC inspectors to validate what types of activities occur at universal waste handling facilities and to assure adherence to universal waste management requirements and protection of human health and the environment. This information is also necessary for state administrative purposes, such as estimating the amount of waste PV modules being managed under universal waste regulations, determining DTSC's future inspection workload, and ensuring that all treatment residuals are appropriately managed.

**Add subsection (b)(3)(A) to section 66273.74.** This subsection is added to require the annual report to include the name of the universal waste handler of PV modules that treated PV modules, and the facility owner's name, if it is different from the person operating the facility. This information is necessary for DTSC to identify the facility generating the report and allows DTSC to correlate the information in the annual report



with the information that was provided by the universal waste handler in its notification and for DTSC to identify the responsible person who oversees the management of PV module treatment.

**Add subsection (b)(3)(B) to section 66273.74.** This subsection is added to require the annual report to include the telephone number of the universal waste handler that treated PV modules. This information is necessary for DTSC to have a method of remotely contacting the universal waste handler if there are any questions or concerns about the information provided in the annual report.

**Add subsection (b)(3)(C) to section 66273.74.** This subsection is added to require the annual report to include the mailing address of the universal waste handler that treated PV modules and the physical address where the PV module treatment occurred if it is different from the mailing address. This information is necessary to provide DTSC with a means to contact the universal waste handler via certified mail, and to allow DTSC to correlate the information in the annual report with the information that was provided by the universal waste handler in its notification. The physical address is necessary to provide DTSC with a physical location to inspect universal waste treatment activities that took place at the location and to provide DTSC with data on hazardous waste management activities occurring at the location.

**Add subsection (b)(3)(D) to section 66273.74.** This subsection is added to require the annual report to include the name of the person who can be contacted at the universal waste handling facility that treated PV modules and who can provide information about the universal waste handler's treatment activities. It is necessary for DTSC to have a contact person at the universal waste handling facility who can answer questions regarding the specific handling activities that occur at the facility and ensure compliance with the requirements of chapter 23. The handler may choose to designate a contact person different from the facility owner or operator for the purposes of answering specific handling questions.

**Add subsection (b)(3)(E) to section 66273.74.** This subsection is added to require the annual report to include the telephone number of the contact person listed in the annual report regarding the universal waste handler's treatment activities at the facility. This information is necessary for DTSC to have a method of remotely contacting the contact person listed in the notification regarding any questions or concerns about the information provided in the notification.

**Add subsection (b)(3)(F) to section 66273.74.** This subsection is added to require the annual report to include the email address of the contact person or organization, if available. The information is necessary for DTSC to have a method in addition to telephone to reach the contact person listed in the notification regarding any questions or concerns about the information provided in the notification.

**Add subsection (b)(3)(G) to section 66273.74.** This subsection is added to require the annual report to include the Identification Number of the universal waste handler that treated PV modules, if issued. This information is necessary for DTSC to prepare for

inspections and to be able to verify compliance with the hazardous waste generator standards, if applicable.

**Add subsection (b)(3)(H) to section 66273.74.** This subsection is added to require the annual report to include the number of days the universal waste handler that treated PV modules operated in the previous calendar year. This information is necessary for DTSC to evaluate the potential impact the universal waste handler had at their facility based on the number of days they treated in the previous calendar year.

**Add subsection (b)(3)(I) to section 66273.74.** This subsection is added to require the annual report to include a description of the authorized treatment method(s) used by the universal waste handler that treated PV modules during the previous calendar year. This information is necessary for DTSC inspectors to know the universal waste treatment activities that occur throughout the year at times when DTSC inspectors are not able to be present at the handlers' location and to assure that they are in compliance with the authorized treatment activities specified in article 7. This information is also necessary for state administrative purposes, such as estimating the size of the statewide PV module waste stream, determining DTSC's future inspection workload, and evaluating the effectiveness of DTSC's regulations.

**Add subsection (b)(3)(J) to section 66273.74.** This subsection is added to require the annual report to include the total number of PV modules handled by the universal waste handler that treated PV modules during the previous calendar year. The quantity of universal waste treated can indicate the potential risk posed to human health and the environment, which may dictate DTSC's future inspection priority and workload. Also, because handlers that treat large quantities of universal waste PV modules pose a greater risk of release, and DTSC could identify and prioritize locations that accumulate large quantities of PV modules.

**Add subsection (b)(3)(K) to section 66273.74.** This subsection is added to require the annual report to include a list of the locations which PV modules were shipped and the total number of PV modules shipped to that location. This information is necessary to allow DTSC to understand which facilities receive PV modules and the amounts of PV modules shipped throughout the year, providing DTSC inspectors a method of assuring compliance with the requirements of chapter 23.

**Add subsection (b)(3)(K)1 to section 66273.74.** This subsection is added to require the annual report to include a list of the names, addresses, and telephone numbers for each location to which the PV module handler shipped PV modules during the previous calendar year. This information is necessary for DTSC to track which facilities receive PV modules and ensure that they comply with the requirements of chapter 23.

**Add subsection (b)(3)(K)2 to section 66273.74.** This subsection is added to require the annual report to include the number (by count or weight) of PV modules shipped to each location during the previous calendar year, and what type of location it is (i.e., a glass manufacturer, a reclamation facility, or a destination facility). This information is necessary to allow DTSC to track the quantity of PV modules shipped throughout the

year and to understand the universal waste management activities that occur throughout the year at times when DTSC inspectors are not able to be present at the handlers' locations.

**Add subsection (b)(3)(L) to section 66273.74.** This subsection is added to require a universal waste handler that uses a mass-based inventory system to quantify the PV modules to provide an appropriate conversion factor to convert the mass data to count data. This subsection requires the facility to be transparent in how it purports to count PV module units when using a mass-based inventory by providing a conversion factor that can be verified by DTSC.

**Add subsection (c)(3) to section 66273.74.** This subsection is added to establish the recordkeeping requirements for universal waste handlers of PV modules. The recordkeeping requirements are necessary to ensure that the required information is present onsite at all times, thereby allowing DTSC staff to perform inspections of the universal waste handler's facility. Records that are kept at the location where treatment occurs also allows DTSC inspectors to verify the activities that take place when inspectors are not present and prevents important records from leaving the facility where they can become damaged or lost.

**Add subsection(c)(3)(A) to section 66273.74.** This subsection is added to specify which documents are required to be maintained on file at the universal waste handler's facility. This is necessary to ensure that the required information is present onsite at all times, and records are kept at the location where treatment occurs to allow DTSC inspectors to verify the activities that take place when inspectors are not present.

**Add subsection (c)(3)(A)1 to section 66273.74.** This subsection is added to include that a copy of the notification submitted to DTSC as required by subsection 66273.74(a)(5) is required to be maintained on file by the universal waste handler that treats PV modules. This is necessary as proof of notification completed by the handlers of universal waste PV modules for DTSC inspection and enforcement activities.

**Add subsection (c)(3)(A)2 to section 66273.74.** This subsection is added to maintain a copy of the most recent annual report submitted to DTSC as required in subsection 66273.74(b) and requiring the copy to made available beginning no later than February 1 of the following the calendar year in which the universal waste handler treated PV modules at the handler's facility. This is necessary as a form of proof of compliance with this requirement during DTSC's inspection and enforcement activities.

**Add subsection (c)(3)(A)3 to section 66273.74.** This subsection is added to require universal waste handlers to keep a current copy of any local air district permits and/or other relevant permit(s) required for the facility. The permits must begin no later than the date on which the local air district and/or other relevant permitting authority required the universal waste handler to possess the permit. This is necessary as a form of proof of compliance with this requirement during DTSC's inspection and enforcement activities, and allows DTSC to review operational requirements imposed by other jurisdictions.

**Add subsection (c)(3)(B) to section 66273.74.** This subsection is added to specify that a copy of the forms as described in subsection 66273.74(c)(3)(A)1 through (c)(3)(A)3 must be made available upon request, to any representative of DTSC, U.S. EPA, or a local governmental agency having jurisdiction over the facility. This is necessary so that governmental agencies which have jurisdiction over the universal waste handler's facility can review copies of the described documents for the purposes of inspection and enforcement activities.

**Add subsection (c)(3)(C) to section 66273.74.** This subsection is added to specify that universal waste handlers of PV modules are required to deliver, when requested in writing by DTSC, a copy of any relevant document identified in subsection 66273.74(c)(3)(A)3, either in person or using certified mail. This subsection also specifies that the written requests from DTSC specify the identities which copies of the documents are required, the place to deliver the copies, and the date by which the copies are required to be submitted. This is necessary so that DTSC can review copies of the described documents for the purposes of inspection and enforcement activities. This subsection also provides a necessary process for DTSC to communicate what documents facilities must provide, and how, and when.

**Amend subsection (e) of section 66273.74.** This subsection is amended to renumber subsection (e) to subsection (e)(1). This is necessary to accommodate additional requirements for electronic submission of notifications and annual reports.

**Add subsection (e)(2) to section 66273.74.** This subsection is added to clarify that universal waste handlers that have submitted a written notification and/or annual report to DTSC are not required to also submit the same information electronically. This subsection is necessary to avoid duplication of the universal waste handler reporting efforts.

**Add subsection (e)(3) to section 66273.74.** This subsection is added to clarify that if the DTSC web-based reporting system is unavailable and cannot accommodate electronic submittals of notifications or annual reports, the universal waste handlers are required to submit their notifications and/or annual reports in writing. This subsection is necessary to ensure that DTSC receives the information it needs to identify and track universal waste handlers and to clarify to universal waste handlers that lack of availability of the electronic reporting system is not a rationale for not submitting a notification and/or annual report to DTSC.

**Amend subsection (f) of section 66273.74.** This subsection is amended to renumber subsection (f) to subsection (f)(1). This is necessary to accommodate additional requirements for written submission of notifications and annual reports.

**Add subsection (f)(2) to section 66273.74.** This subsection is added to clarify that universal waste handlers that have submitted a notification and/or annual report to DTSC electronically are not required to also submit the same information in writing. This subsection is necessary to avoid duplication of the universal waste handler reporting efforts.

**Amend section 66273.75.** This preamble is amended to include PV modules in the treatment (processing) standards that a universal waste handler is required to comply with. This amendment is necessary to ensure that universal waste handlers that conduct treatment activities on PV modules understand that they are required to adhere to standards in this section and to provide DTSC inspectors with the standards that they are expected to enforce against.

**Amend subsection (a)(1) of section 66273.75.** This subsection is amended to clarify the express limit of treatment methods allowed for electronic devices, residual printed circuit boards, and/or CRTs, and to clarify the express limit of treatment methods for PV modules to ensure that the universal waste handler only conducts treatment activities with low risk. The amendments are also necessary to specify the subsections of section 66273.73 that apply to each of the relevant types of universal waste.

**Amend subsection (a)(10) of section 66273.75.** This subsection is amended so that it also references PV modules on the list of universal waste that a universal waste handler shall not accept for treatment if they are to be managed as a hazardous waste pursuant to chapters 10 through 16, 18, 20, and 22. This amendment is necessary to prevent universal waste handlers from managing PV modules as universal waste that should be managed as hazardous waste in accordance with chapters 10 through 16, 18, 20, and 22. The authorization that is granted under chapter 23 does not extend to fully regulated hazardous waste.

**Amend subsection (b)(1) of section 66273.75.** This subsection is amended to include PV modules on the list of universal wastes whose residuals produced from treatment must be contained to prevent the release of hazardous wastes to the environment. The subsection is further amended to prevent the release of constituents of electronic devices, residual printed circuit boards, PV modules, and CRTs. Constituents are different than components. In this context, components of manufactured equipment such as electronic devices, residual printed circuit boards, PV modules, and CRTs are understood to be a physical part of a mechanical or electrical system. A constituent in this context is understood to be the chemicals or materials that make up the electronic devices, printed circuit boards, PV modules, and CRTs, including the toxic metals (e.g., lead, copper, cadmium) for which these wastes are identified as hazardous wastes. Including a reference to constituents in this subsection ensures consistency throughout chapter 23, and ensures that universal waste handlers that treat electronic devices, residual printed circuit boards, PV modules, or CRTs prevent the release of hazardous wastes into the environment.

**Amend subsection (b)(2) of section 66273.75.** This subsection is amended to include PV modules on the list of universal wastes whose residuals produced from treatment must be contained in a manner that prevents release of hazardous residuals to the environment under reasonably foreseeable conditions in order to protect human health and the environment. In such cases, the universal waste handler must be prepared to prevent any release to the environment of hazardous residuals derived from the treatment of PV modules.

**Amend subsection (b)(3) of section 66273.75.** This subsection is amended to include PV modules on the list of universal wastes that must immediately be cleaned up and placed in a container if a PV module is accidentally or unintentionally broken and may cause a release to the environment under reasonably foreseeable conditions. Additionally, the containers used to contain broken PV modules must be structurally sound, compatible with the contents, and must prevent releases under reasonably foreseeable conditions. This is necessary to ensure that universal waste handlers of PV modules that treat PV modules clean up and contain any broken PV modules adequately to prevent any potential hazardous waste release to the environment.

**Amend subsection (d)(1) of section 66273.75.** This subsection is amended to ensure the owner and operator at a universal waste handling facility that treats PV modules are aware of the hazards associated with each treatment activity and have access to proper procedures and protective equipment necessary to conduct treatment activities pursuant to this section to protect the health and well-being of the workers who dismantle PV modules. This is necessary to ensure that universal waste handlers take necessary precautions to protect their employees who dismantle PV modules.

**Amend subsection (d)(2) of section 66273.75.** This subsection is amended to ensure that a universal waste handler treating PV modules complies with all applicable health and safety laws and regulations to protect the health and well-being of the workers who dismantle PV modules. This is necessary to ensure that the universal waste handlers take necessary precautions to protect their employees who conduct dismantling activities of PV modules.

**Amend subsection (e)(1) of section 66273.75.** This subsection is amended to require that a universal waste handler treating PV modules complies with local zoning and land use patterns applicable to the universal waste handler's facility. This amendment is necessary to ensure the treatment activities are conducted in compliance with local zoning requirements. This subsection clarifies that universal waste management standards do not act as a regulatory shield against local zoning requirements and land use patterns.

**Amend subsection (a) of section 66273.76.** This subsection is amended to include handlers that physically treat PV modules pursuant to subsection 66273.73(d) on the list of universal waste handlers that must notify DTSC with specific information outlined in subsections (a)(1) through (d) of this section. This amendment makes the closure requirements for physically treating PV modules consistent with those of other universal wastes, such as electronic devices, CRTs, and CRT glass. The closure plan and closure cost estimate are necessary to ensure handlers that perform these types of treatment on PV modules fully evaluate the consequences of the activity and prepare and budget in advance of closure for decontamination of equipment and the facility.

**Amend subsection (a)(4) of section 66273.76.** This subsection is amended to include universal waste handlers of PV modules to submit a closure plan at the same time that they notify DTSC of their intent to conduct more than one treatment activity on PV

modules pursuant to section 66273.73(d). This subsection is necessary to allow DTSC to determine whether a handler that treats PV modules has an adequate closure plan to decontaminate equipment and the facility, among other requirements.

The subsection was further amended to remove reference to an obsolete date, instead specifying that the required closure plan is to be submitted at the same time the universal waste handler notifies DTSC of its intent to conduct one or more of the specified treatments.

**Amend subsection (b)(5) of section 66273.76.** This subsection is amended to require universal waste handlers of PV modules to submit a closure cost estimate as a part of their closure plan at the same time that they notify DTSC of their intent to conduct more than one treatment activity on PV modules pursuant to section 66273.73(d). This cost estimate defines the amount of financial assurance the universal waste handler must set aside or make available for closing the facility. This subsection is necessary to ensure that the handlers that become authorized under these proposed regulations adequately identify the cost of the closure activities, defining the amount of financial resources they must make available to cover those costs.

The subsection was further amended to remove reference to an obsolete date, instead specifying that the required closure cost estimate is to be submitted at the same time the universal waste handler notifies DTSC of its intent to conduct one or more of the specified treatments.

**Amend subsection (a) of section 66273.77.** This subsection is amended to include handlers that treat PV modules pursuant to subsection 66273.73(d) to the list of universal wastes handlers that must comply with specific requirements regarding universal waste treatment facility closure notifications. As proposed, a handler of PV modules that performs authorized treatment (beyond disassembly and dismantling) is required to notify DTSC when their activities cease. These notifications are necessary to provide DTSC with accurate information on the operational status (i.e., active or inactive) of the entities that treat universal waste PV modules. This information will be used to track the operations of the universal waste handlers that treat PV modules for enforcement purposes. The closure notice is also necessary so that DTSC may release the handler's financial assurance mechanism when it is no longer necessary and so that DTSC may perform an inspection to ensure that closure activities were performed properly. The notification also assists DTSC broadly in tracking the number of facilities continuing to treat PV modules in the state.

**Amend subsection (a)(1)(A) of section 66273.77.** This subsection is amended to include handlers that conduct treatment of universal waste PV modules pursuant to subsection 66273.73(d). This amendment would require a handler of PV modules that performs authorized treatment pursuant to article 7 to include in its notification to DTSC the date of the last day on which the universal waste handler intends to conduct treatment (i.e., the date their treatment activities are anticipated to cease). This

information is necessary for DTSC to corroborate the specifics of the closure requirements as indicated in the handler's notification.

**Amend subsection (a)(1)(B) of section 66273.77.** This subsection is amended to include handlers that conduct handling activities of universal waste PV modules other than those treatment activities specified in subsection 66273.73(d). This amendment would require a handler of PV modules that performs authorized handling activities pursuant to article 7 to include in its notification to DTSC the date of the last day on which the universal waste handler intends to conduct any universal waste handling activities other than treatment activities (i.e., the date its universal waste handling activities are anticipated to cease). This information is necessary for DTSC to corroborate the specifics of the closure requirements as indicated in the handler's notification.

### **III. ECONOMIC IMPACT ANALYSIS**

In accordance with Government Code section 11346.3(b), DTSC has made the following assessments regarding the proposed regulation.

#### **Evidence Supporting a Determination that the Proposal Will Have No Adverse Economic Impact on Business**

As required by Government Code section 11346.3(b), DTSC completed an economic impact assessment and determined that the proposed regulation will not have a significant adverse economic impact on business.<sup>18</sup> DTSC's initial determination is that the proposed regulations will not have a significant adverse economic impact on business, including the ability of California business to compete with businesses in other states.

#### **Creation or Elimination of Jobs within California**

As discussed above, because of the increasing number of hazardous waste PV modules that will be generated in the future, there is likely to be an increase in the number of businesses created that will be able to handle hazardous waste PV modules. These created businesses will need to hire more employees to manage the additional waste PV modules. The types of occupations employed by these businesses are sorters, shredder operators, materials coordinators, and recycling specialists, as well as business support positions. At this time, it is impossible for DTSC to estimate the number of additional jobs that might be created. DTSC does not expect elimination of jobs as a result of this rulemaking.

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<sup>18</sup> See DTSC's ECONOMIC AND FISCAL IMPACT STATEMENT (STD Form 399).



## **Creation of New Businesses or Elimination of Existing Businesses within California**

The use of PV modules is projected to continue to grow as demands for alternative forms of electricity in California increase. This will lead to an increase in waste PV modules in the future as previously installed PV modules are taken out of service. Existing regulations require waste PV modules that are hazardous waste to be managed as fully regulated hazardous waste.

DTSC anticipates that the number of hazardous waste PV modules that will be generated in the future will be the same whether DTSC adopts the proposed regulations or not. These hazardous waste PV modules are required to be managed as hazardous waste and may only be sent to businesses that possess permits from DTSC to accept and manage them. As of 2018, there are no businesses in California that specialize in waste PV module management likely due to the limited number of hazardous waste PV modules and businesses that generate waste PV modules.

The proposed universal waste management requirements for PV modules will be significantly less burdensome than hazardous waste management requirements for universal waste handlers to receive and handle or treat hazardous waste PV modules. Because of this, DTSC anticipates more businesses will either be created or expanded that can manage hazardous waste PV modules. At this time, it is impossible for DTSC to estimate the number of businesses that might be created.

DTSC does not anticipate the proposed regulation to result in the elimination of businesses in California.

## **Expansion of Current California Businesses**

As discussed above, because of the increasing number of hazardous waste PV modules that will be generated in the future, there is likely to be an increase in the number of businesses necessary to handle hazardous waste PV modules. With electronic devices, another universal waste that is already managed as universal waste, DTSC observed the creation of nearly 25 electronic device treatment facilities. In workshops that DTSC held with stakeholders regarding the proposed PV module regulations, some of the electronic device treatment facilities expressed interest in also managing PV modules once they become universal waste. It is also possible that some businesses that currently manufacture, install, or provide maintenance services for PV modules may expand their operations to include some type of PV module treatment. At this time, it is impossible for DTSC to estimate the number of businesses that might be expanded.

## **Anticipated Benefits**

DTSC has determined that the proposed regulations will increase protection of the states' public health and the environment by reducing the mismanagement of waste PV modules and the number disposed of as solid waste. Incorporating PV modules as a

universal waste into the existing universal waste standards will streamline the collection, transportation, and treatment of PV modules and deter the abandonment of hazardous waste PV modules in California. DTSC witnessed similar improved waste management and public health and environmental protection in the management of electronic devices and other types of universal wastes after they were included in DTSC's universal waste regulations. The proposed regulation also ensures the safety and well-being of workers that manage waste PV modules by specifying that universal waste handlers of PV modules must comply with specific employee training standards.

In addition, as described in DTSC's economic and fiscal impact statement (STD Form 399), DTSC estimates that the proposed regulations will save PV module generators and handlers significant costs in comparison to regulation and management of PV modules as a fully regulated hazardous waste.

#### **IV. REPORTS RELIED ON**

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## **V. MANDATED USE OF SPECIFIC TECHNOLOGIES OR EQUIPMENT**

The proposed regulations do not mandate the use of a specific technology or equipment.

## **VI. REASONABLE ALTERNATIVES CONSIDERED**

DTSC held two public workshops in Sacramento to present the regulatory concepts under consideration and solicit comments from stakeholders and the public. The workshops were held on July 19, 2016, and August 22, 2017. After the second workshop, the draft regulations were distributed for further public review and comment. Additionally, DTSC held an informational seminar on March 25, 2019, to educate stakeholder's on DTSC's universal waste program and the proposed regulations prior to public notice, although revisions were not made to the regulation. A broad range of interested parties, including environmental advocates, industry representatives, and distributors/contractors participated in these discussions. The alternatives considered are discussed below.

Chosen Alternative: Establish universal waste management standards for PV modules in regulations to foster collection and recycling or appropriate disposal of waste PV modules. The regulations establish a new management approach for PV modules in the same way as other universal wastes. Limited treatment (e.g., removal of the frames, the junction boxes, and junction cables from the PV module) is allowed without authorization. Disposal in a hazardous waste landfill is allowed, but PV modules

destined for disposal must be managed as hazardous waste (i.e., must be manifested) if they are not recycled and can no longer be managed under universal waste standards. The requirements for most handlers are minimal in an effort to achieve equivalent protection of public health and the environment, and greater compliance. The regulations do not allow further treatment of PV modules outside of specified treatment without a hazardous waste permit or other authorization granted from DTSC.

DTSC has determined that no reasonable alternative considered or that has otherwise been identified and brought to the attention of DTSC would be more effective in carrying out the purpose for which the action is proposed, would be as effective and less burdensome to affected businesses than the proposed action, or would be more cost-effective to affected businesses and equally effective in implementing the statutory policy or other provision of law.

### **Rejected Alternatives**

**Alternative 1. No action.** Under existing hazardous waste control laws, all PV modules that exhibit a hazardous waste characteristic are hazardous waste when discarded. This existing law subjects generators of these wastes to the hazardous waste generator standards, subjects transporters to the manifesting and registration requirements, and subjects receiving facilities to the hazardous waste permit standards. Although theoretically this alternative ensures the greatest protection of the environment, the regulatory requirements that this alternative places on generators and transporters of PV modules could be construed as a disincentive to proper collection, safe management practices, and recycling or disposal.

This alternative also fails to establish waste management standards for PV modules that are commensurate with the risks of these materials. DTSC has concluded that because PV modules are low risk and generated by a wide segment of society, the application of universal waste management standards for these wastes provides appropriate protection of the environment. Additionally, there is the potential that continued management as fully regulated hazardous waste will discourage the use of solar energy as an alternative form of energy due to end-of-life management costs.

**Alternative 2.** DTSC evaluated an alternative to establish a conditional exemption for PV modules being reclaimed by the PV module manufacturer. Under this alternative, DTSC would create an exemption through regulation, similar to the exemption for scrap metal, requiring PV modules to be sent for reclamation. Reclamation is a form of recycling that requires the PV modules be recycled to recover usable material and hazardous constituents which caused the PV module to be classified as hazardous waste. This alternative could reduce or remove the regulatory requirements placed on the handlers and transporters of PV modules if they intend to recycle PV modules. The success of an exclusion of this type would depend on the identification of a sustainable

recycling market for PV modules. The PV module industry has not provided any evidence to DTSC that a sustainable recycling market exists for waste PV modules.

Additionally, DTSC is unaware of PV module manufacturers in California or in other states that are currently recovering usable material and hazardous constituents from PV modules. DTSC is also unaware of any third-party businesses that are providing the same type of service. In addition, this approach would be difficult for DTSC to enforce shipments out of state, potentially resulting in these PV modules being improperly handled, managed, and disposed of in out-of-state solid waste landfills. As such, this alternative was not considered by DTSC.

## **VII. DUPLICATION OR CONFLICTS WITH FEDERAL REGULATIONS**

The proposed regulation will neither duplicate nor conflict with the federal hazardous waste regulations. Currently, PV modules are not designated as universal waste under the federal universal waste rule. DTSC's inclusion of RCRA regulated PV modules in this rulemaking would, on its face, make DTSC's regulations less stringent than federal hazardous waste management requirements. However, federal law and regulations allow DTSC to add RCRA wastes to its list of universal waste requirements if authorized to do so. As discussed in its analysis of PV modules and the criteria found in 40 CFR Part 273.81, DTSC has determined that PV modules meet the criteria for inclusion as a universal waste.