

# THIRD PUBLIC COMMENT PERIOD: RESPONSE TO COMMENTS

OCTOBER 18, 2019 – NOVEMBER 2, 2019

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## I. Overview and Organization

This document summarizes and responds to public comments submitted to the Department of Toxic Substances Control (DTSC) on the proposed rulemaking titled *Photovoltaic modules (PV modules) – Universal Waste Management*, which was released to the public on October 18, 2019. The timeline for DTSC interaction with the public with regard to this proposed rulemaking was as follows:

- The proposal was released to the public on April 19, 2019 for a public comment period of fifty-two (52) days which ended on June 10, 2019;
- A public hearing was held on June 10, 2019;
- A second proposal was released to the public on September 9, 2019 for a 15-day public comment period which ended on September 24, 2019;
- A third proposal was released to the public on October 18, 2019 for a 15-day public comment period which ended on November 2, 2019; and

- A fourth proposal was released to the public on December 24, 2019 for a 15-day public comment period which ended on January 8, 2020.

This Response to Comments document addresses the comments received during the public comment period that ended on November 2, 2019. There were three (3) written comment letters received during this comment period. A list of commenters and their affiliations, in alphabetical order, and the number assigned to their correspondence is included in **Table 1**.

For a list of commenters and response to comments received on the proposed regulations, please refer to the following:

- First Public Comment Period: Response to Comments, April 19, 2019 – June 10, 2019;
- Second Public Comment Period: Response to Comments, September 9, 2019 – September 24, 2019; and,
- Fourth Public Comment Period: Response to Comments, December 24, 2019 – January 8, 2020.

Each comment letter was issued a number starting with “3.” DTSC subsequently numbered each of the comments contained in the letter and collated similar comments together. For example, the designation “3-1-1” means October 18, 2019 - November 2, 2019 comment period comment, comment letter number 1, comment number 1, and so forth.

For the purpose of orderly presentation, the comments have been categorized by the article in the regulation that they address. The comments that are general in nature or have overarching applicability have been addressed under “General.” For all other comments related to a specific article or section, please refer to the respective article or section.

All referenced section numbers are found in division 4.5 of title 22 of the California Code of Regulations, unless otherwise specified.

**Table 1. List of Commenters**

<b>#</b>	<b>Name of Entity</b>	<b>Commenter</b>	<b>Number of comments</b>
1	Rural Counties Environmental Services Joint Powers Authority	Larry Sweetser	21
2	Solar Energy Industries Association; National Stewardship Action Council	Evelyn Butler; Heidi Sanborn; Rick Umoff	19
3	Solar Energy Industries Association; California Solar Storage Association; National Stewardship Action Council; California Product Stewardship Council	Evelyn Butler; Benjamin Davis; Rick Umoff; Heidi Sanborn; Doug Kobold	19

## **II. Definitions**

### **A. APPROVAL FOR REMOVAL OF THE TERM PV MODULE INTEGRATED DEVICE**

#### **Comment Summary:**

The comments appreciate the removal of the term “Photovoltaic module integrated device” from the definitions in sections 66260.10 and 66273.9 to avoid confusion between photovoltaic and electronic devices and provide clarity on management of these integrated devices. The comments also apply to the definition of "Photovoltaic module integrated device" in section 66260.10, the removal of definitions in section 66273.9, and the associated references throughout the document.

**Comments:** 3-1-4, 3-1-9

#### **Response:**

DTSC reviewed the comments and has determined that no regulatory change is necessary. The comments express approval for the removal of “Photovoltaic module integrated device” from the definitions in sections 66260.10 and 66273.9 and the associated references throughout the proposed regulatory text.

### **B. APPROVAL FOR THE REVISED DEFINITION OF PV MODULE**

#### **Comment Summary:**

The comment supports the changes made to the definition of term "Photovoltaic module" in sections 66260.10 and 66273.9 because it clarifies that integrated components that cannot be separated are to be managed as PV modules.

**Comment:** 3-1-10

#### **Response:**

DTSC reviewed the comment and has determined that no regulatory change is necessary. The comment expresses approval for the changes made to the definition of the term "Photovoltaic module" in sections 66260.10 and 66273.9 because it clarifies that integrated components that cannot be separated are to be managed as PV modules.

## **C. INTENT OF SENATE BILL 489**

### **Comment summary:**

The comment states that Senate Bill (SB) 489 (Chapter 419, Statutes of 2015) authorized DTSC to develop regulations for PV modules, not PV systems.

**Comment:** 3-2-4, 3-3-4

### **Response:**

DTSC reviewed the comments and has determined that no regulatory change is necessary. DTSC respectfully disagrees with the comment regarding the scope of authority SB 489 provided to DTSC. According to SB 489, DTSC was given the authority to develop regulations for end-of-life PV modules. DTSC is not outside the scope of this authority in capturing a PV system in the proposed regulations because a PV system is comprised of PV modules. Therefore, DTSC is within the intended scope of SB 489 in developing regulations for the different PV materials, such as, PV cells, modules, and systems. Therefore, no regulatory text change is made to address this comment.

## **D. DISAPPROVAL FOR THE DEFINITIONS OF PV MODULE AND PV SYSTEM**

### **Comment Summary:**

The comments state that the proposed definition of “Photovoltaic system” does not align with what is known in the marketplace and scientific community and is confusing to industry, recyclers, and the general public. The comments state that DTSC’s proposed definition of “Photovoltaic system” is actually the definition of “Photovoltaic module.”

The comments state that the Solar Energy Technologies Office (SETO), under the Office of Energy Efficiency and Renewable Energy, of the Department of Energy, has defined the terms “photovoltaic cell,” “photovoltaic module,” and a “photovoltaic system” as:

“Photovoltaic (PV) materials and devices convert sunlight into electrical energy. A single PV device is known as a cell. An individual PV cell is usually small, typically producing about 1 or 2 watts of power. To boost the power output of PV cells, they are connected together in chains to form larger units known as modules or panels. Modules can be used individually, or several can be connected to form arrays. One or more arrays is then connected to the electrical grid as part of a complete PV system.”

The comments assert that the DTSC’s definition of “Photovoltaic system” is the equivalent to what SETO calls a “Photovoltaic module.” PV modules are one part of an overall PV system installed to provide clean-energy electricity. SETO’s definitions are provided as follows:

#### “PHOTOVOLTAIC SOLAR ENERGY SYSTEMS

PV modules and arrays are just one part of a PV system. Systems also include mounting structures that point panels toward the sun, along with the components that take the direct-current (DC) electricity produced by modules and convert it to the alternating-current (AC) electricity used to power all of the appliances in your home.”

The comments recommend that DTSC either 1) combine what is currently described in the draft regulations as “photovoltaic system” which includes the frame, connector, and junction box with the “photovoltaic module” definition above it, or 2) replace the PV system definition with the one from SETO which more accurately describes the “balance-of-systems” equipment, such as an inverter, mounting equipment, and/or energy storage, to help avoid confusion as to what is actually covered in these regulations and align with the scope of what DTSC is authorized to draft.

**Comments:** 3-2-5, 3-2-6, 3-2-7, 3-2-8, 3-2-9, 3-3-4, 3-3-5, 3-3-6, 3-3-7, 3-3-8, 3-3-9

#### **Response:**

DTSC reviewed the comments and has determined that no regulatory change is necessary. DTSC respectfully disagrees with the comments stating that DTSC’s proposed definitions of “Photovoltaic module” and “Photovoltaic system” do not align with the definitions defined by SETO. DTSC’s proposed definition for PV system and SETO’s description of PV solar energy systems both describe PV modules as part of a PV system.

In the initial version of the proposed regulation, DTSC proposed the definition of “Photovoltaic module” to be the entire PV system, which includes components, such as inverters and batteries, that are not integrated into the module/cells which convert solar radiation to electrical energy. DTSC received multiple comments that disapproved of this initial proposed definition because it posed the problem of having to manage components, such as batteries and inverters, which already have their own management requirements in place, as universal waste PV modules, thus resulting in a lack of clarity of how these components should be managed. The comments also suggested excluding components that are not integrated into the modules/cells which convert solar radiation to electrical energy from the definition of PV module. DTSC agreed with these comments regarding the initial proposed definition of “Photovoltaic

module” and revised the definition to exclude components that are not integrated into the PV module.

DTSC, therefore, created a new definition of “Photovoltaic system,” that includes both the PV module and components that make up the PV system. The definition for PV system is needed in the proposed regulation in order to isolate PV modules from the PV system, of which the modules are a part. Although PV system is defined in the proposed regulation, the universal waste requirements outlined in the proposed regulatory text specifically applies to PV modules, not the system.

According to the SETO definition provided in the comments, an individual PV cell is connected with other PV cells and sandwiched between protective materials in a combination of glass and/or plastics to form a larger unit known as modules or panels. DTSC’s definition for a PV module is similar to that of SETO in that a module consists of PV cells and integrated components, such as, protective glass, metal framing the PV cells, housing or pocket holding the PV cells/modules, and the top and back layers. These are the same components described in SETO’s PV module definition where they speak of the “protective materials.”

According to SETO’s website, from where the commenter quoted the PV solar energy systems definition, a PV solar energy system is comprised of many parts, including, mounting structures, inverters, storage (batteries), and PV modules. Similarly, DTSC’s definition for a PV system also includes inverters, batteries, PV modules, metal frames used to support the PV module, and other components. The two definitions are very similar in what components are included in a “system.”

By distinguishing a PV module from a PV system, the proposed regulation is clear that universal waste management of PV modules only applies to PV modules that contain semiconducting materials that exhibit the hazardous characteristic of toxicity. The differentiation between PV module and PV system also excludes parts and components that are outside the scope of this proposed regulation to be managed as universal waste PV modules, thereby eliminating the clarity issue it might otherwise pose from overlapping management requirements. Additionally, DTSC’s definitions of PV modules and PV system mean the same as those of SETO’s. Therefore, no regulatory text change was made to address these comments.

## **E. PV MODULE INTEGRATED INTO AN ELECTRONIC DEVICE**

### **Comment Summary:**

The comment states that allowing PV modules integrated into the structure of an electronic device to be managed as electronic devices simplifies the management of these integrated devices.



**Comment:** 3-1-5

**Response:**

DTSC reviewed the comment and has determined that no regulatory change is necessary. The comment addressed the provisions in the proposed regulation that did not change from the version which was released on September 9, 2019. Therefore, the comment is outside the scope of topics subject to public comment in the third public comment period, that was public noticed on October 18, 2019. DTSC summarized and responded to the comments that were submitted during the first and second comment periods in the responses to comments and are provided in the final rulemaking package submitted to the Office of Administrative Law. Therefore, DTSC did not make any changes to the regulation in response to this comment.

### **III. Notification and Reporting Requirements for Universal Waste Handlers**

#### **A. 30-DAY NOTIFICATION REQUIREMENTS**

**Comment Summary:**

The comments state that the requirement for notification to DTSC 30 days prior to accepting PV modules is problematic where PV modules are illegally disposed of. Solid waste facilities and roadside cleanup may encounter abandoned PV modules, and the collection of those modules to protect health and safety would be considered a violation by DTSC if the collecting program had not notified DTSC in advance. Compliance with this standard would require thousands of solid waste facilities, public works departments, and litter cleanup crews to notify DTSC even if these organizations do not intend to accept PV modules during the collection. The comments state that this massive notification, and the associated mandated annual report, is a waste of local and state resources. The comments request DTSC to allow notification only after the collection of PV modules when these organizations encounter abandoned PV modules to be collected. The comments recommend adding the following to section 66273.32(e) regarding notification requirements:

“(1) Any universal waste handler who might accept and accumulate, but not treat, any PV modules from an offsite source shall submit to the Department, at the address given in subsection (h) of this section, a written notification containing the information specified in subsection (e)(2) of this section no later than 30 calendar days prior to accepting any PV modules or no later than 30 calendar days after acceptance of abandoned PV modules or PV cells.”

**Comments:** 3-1-6, 3-1-11, 3-1-12, 3-1-13

**Response:**

DTSC reviewed the comments and has determined that no regulatory change is necessary. The comments addressed the provisions in the proposed regulation that did not change from the version which was released on September 9, 2019. Therefore, the comments are outside the scope of topics subject to public comment in the third public comment period that was public noticed on October 18, 2019. DTSC summarized and responded to the comments that were submitted during the first and second comment periods in the response to comments and are provided in the final rulemaking package submitted to the Office of Administrative Law. Therefore, DTSC did not make any changes to the regulation in response to the comments.

**B. IMPACT OF ANNUAL REPORT THRESHOLD ON BUSINESSES THAT TRANSPORT PV MODULES TO INSTALLATION SITES**

**Comment Summary:**

The comments state that the 100-kilogram (220 pounds) annual reporting threshold will have a significant impact on thousands of businesses that use tens of thousands of vehicles and employees to transport PV modules to installation sites and to business operation sites.

**Comments:** 3-2-13, 3-3-13

**Response:**

DTSC reviewed the comments and has determined that no regulatory change is necessary. The comments addressed the provisions in the proposed regulation that did not change from the version which was released on September 9, 2019. Therefore, the comments are outside the scope of topics subject to public comment in the third public comment period that was public noticed on October 18, 2019. DTSC summarized and responded to the comments that were submitted during the first and second comment periods in the response to comments and are provided in the final rulemaking package submitted to the Office of Administrative Law. Therefore, DTSC did not make any changes to the regulation in response to the comments.

## **C. ANNUAL REPORTING THRESHOLD DELAYS PV MODULES DESTINIED FOR RECYCLING**

### **Comment summary:**

The comments state that annual threshold restriction may cause PV modules destined for recycling to be held for long periods of time until the properly permitted handler, vehicle, collection location, or other means to transport the product to a recycling treatment site is able and available and to comply with the 30-day prior notification required by DTSC. This delay may leave PV modules at the installation or site of origination, vulnerable or unprotected from damage or other consequences, which in turn may reduce the recovery of material due to glass breakage, partial removal or damage to the frame or wiring and/or encourage or employ inappropriate storage and handling processes.

**Comments:** 3-2-19, 3-3-19

### **Response:**

DTSC reviewed the comments and has determined that no regulatory change is necessary. Regardless, the comments addressed the provisions in the proposed regulation that did not change from the version which was released on September 9, 2019. Therefore, the comments are outside the scope of topics subject to public comment in the third public comment period that was public noticed on October 18, 2019. DTSC summarized and responded to the comments that were submitted during the first and second comment periods in the response to comments and are provided in the final rulemaking package submitted to the Office of Administrative Law. Therefore, DTSC did not make any changes to the regulation in response to the comments.

## **IV. Labeling/Marking**

### **A. COMINGLING WITH OTHER UNIVERSAL WASTES**

#### **Comment Summary:**

The comments suggest that commingling photovoltaic modules and electronic devices into the same container should be reinstated in section 66273.34(h) regarding labeling/marketing of electronic devices and cathode ray tubes (CRTs) since it is likely that the same vendors that manage electronic devices will also accept photovoltaic modules once classified as universal wastes. The comments suggest adding to section 66273.34(h) regarding labeling/marketing of electronic devices and CRTs as follows:

“(h) In lieu of labeling individual electronic devices, CRTs, PV modules, and/or containers of CRT glass pursuant to subsections (d) through (f) of this section, a universal waste handler may combine, package, and accumulate those universal wastes in appropriate containers or within a designated area demarcated by boundaries that are clearly labeled with the applicable portion(s) of the following phrase: “Universal Waste-Electronic Device(s)/CRT(s)/CRT Glass/PV module(s)”.”

**Comments:** 3-1-7, 3-1-14, 3-1-15

**Response:**

DTSC reviewed the comments and has determined that no regulatory change is necessary. The comments addressed the provisions in the proposed regulation that did not change from the version which was released on September 9, 2019. Therefore, the comments are outside the scope of topics subject to public comment in the third public comment period that was public noticed on October 18, 2019. DTSC summarized and responded to the comments that were submitted during the first and second comment periods in the response to comments and are provided in the final rulemaking package submitted to the Office of Administrative Law. Therefore, DTSC did not make any changes to the regulation in response to these comments.

## **V. Response to Releases**

### **A. APPROVAL**

**Comment Summary:**

The comment approves the proposed language for expanding the existing allowance to broken photovoltaic modules for leaking, broken, or otherwise damaged universal wastes to be managed as universal waste in section 66273.37(c) regarding response to releases.

**Comment:** 3-1-16

**Response:**

DTSC reviewed the comment and has determined that no regulatory change is necessary. The comment addressed the provisions in the proposed regulation that did not change from the version which was released on September 9, 2019. Therefore, the comment is outside the scope of topics subject to public comment in the third public comment period that was public noticed on October 18, 2019. DTSC summarized and responded to the comments that were submitted during the first and second comment periods in the response to comments and are provided in the final rulemaking package

submitted to the Office of Administrative Law. Therefore, DTSC did not make any changes to the regulation in response to the comment.

## **VI. Recordkeeping/Tracking Universal Waste Shipments**

### **A. TRACKING INCOMING UNIVERSAL WASTES SERVE NO USEFUL PURPOSE**

#### **Comment Summary:**

The comments state that the tracking requirements in section 66273.39 already exist for other universal wastes; however, tracking incoming universal wastes is excessive, serves no useful purpose, and imposes an unreasonable burden for handlers, such as household hazardous waste facilities and solid waste facilities. These types and amount of wastes are recorded when the wastes are shipped. There is no justification or benefit for tracking these wastes on an incoming basis.

**Comment:** 3-1-17

#### **Response:**

DTSC reviewed the comment and has determined that no regulatory change is necessary. The comment regarding requirements for other universal wastes is outside the scope of this proposed regulation. DTSC did not make any changes to the regulation in response to the comment.

### **B. REMOVE TRACKING INCOMING SHIPMENT REQUIREMENTS FOR PV MODULES**

#### **Comment summary:**

The comment suggests removing incoming tracking requirements for PV modules from section 66273.39.

**Comment:** 3-1-19

#### **Response:**

DTSC reviewed the comment and has determined that no regulatory change is necessary. The comment suggesting removing requirements to track incoming shipments for photovoltaic modules addressed the provisions in the proposed regulation that did not change from the version which was released on September 9, 2019. Therefore, the comment is outside the scope of topics subject to public comment in the

third public comment period that was public noticed on October 18, 2019. DTSC summarized and responded to the comments that were submitted during the first and second comment periods in the response to comments and are provided in the final rulemaking package submitted to the Office of Administrative Law. Therefore, DTSC did not make any changes to the regulation in response to the comments.

### **C. REMOVE TRACKING INCOMING SHIPMENT REQUIREMENTS FOR ALL OTHER UNIVERSAL WASTES**

#### **Comment summary:**

The comment suggests that incoming tracking requirements be removed for all other universal wastes and recommends removing subsection 66273.39(a) regarding receipt of universal waste shipments as follows:

~~“(a) Receipt of shipments. A universal waste handler shall keep a record of each shipment of universal waste received at the universal waste handler's facility. The record may take the form of a log, invoice, manifest, bill of lading, or other shipping document. The record for each shipment of universal waste received shall include the following information:~~

~~(1) The name and address of the originating universal waste handler from which the universal waste was sent;~~

~~(2) The quantity [count or weight, consistent with, for example, section 66273.32, subsection (d)] of each type of universal waste received (e.g., batteries, thermostats, lamps, electronic devices, CRTs, CRT glass, PV modules); and~~

~~(3) The date of receipt of the shipment of universal waste.”~~

**Comment:** 3-1-21

#### **Response:**

DTSC reviewed the comment and has determined that no regulatory change is necessary. The comment suggesting removing requirements to track incoming shipments for all other universal wastes is outside the scope of this proposed regulation because DTSC does not have the authority to make changes regarding other universal wastes in this rulemaking. Therefore, DTSC did not make any changes to the regulation in response to the comment.

## D. REMOVAL OF ADDITIONAL TRACKING REQUIREMENTS

### Comment Summary:

The comment states that subsection 66273.39(b), which allows the use of a generic generator term and for aggregating the quantity of universal waste, is excessive and should be removed as follows:

~~“(b) For purposes of compliance with subsection (a) of this section, a universal waste handler who receives universal wastes from household generators and conditionally exempt small quantity universal waste generators, as defined in section 66273.9, may~~

~~(1) in lieu of the originating universal waste handler's name and address, record “household generator” and/or “CESQUWG”, and~~

~~(2) record the total quantity of each type of universal waste as an aggregate from households and/or conditionally exempt small quantity universal waste generators, as defined in section 66273.9.”~~

**Comment:** 3-1-20

### Response:

DTSC reviewed the comment and has determined that no regulatory change is necessary. The comment is outside the scope of this proposed regulation for managing photovoltaic modules as universal waste because DTSC does not have the authority to make regulatory changes regarding other universal wastes in this rulemaking process. Therefore, DTSC did not make any changes to the regulation in response to the comment.

## E. TRACKING PV MODULES BY TYPE IS EXCESSIVE AND BURDENSOME

### Comment summary:

The comment states that having to track incoming PV modules by type in section 66273.39 is excessive and a burdensome requirement.

**Comment:** 3-1-18

### Response:

DTSC reviewed the comment and has determined that no regulatory change is necessary. The comment addressed the provisions in the proposed regulation that did

not change from the version which was released on September 9, 2019. Therefore, the comment is outside the scope of topics subject to public comment in the third public comment period that was public noticed on October 18, 2019. DTSC summarized and responded to the comments that were submitted during the first and second comment periods in the response to comments and are provided in the final rulemaking package submitted to the Office of Administrative Law. Therefore, DTSC did not make any changes to the regulation in response to this comment.

## **VII. Processing Activities**

### **A. RESTRICTION ON THE USE OF CHEMICALS, WATER, OR HEAT**

#### **Comment summary:**

The comments state that the proposed language restricts the use of chemicals, heat, or water to recycle PV modules, thus allowing photovoltaic recyclers to only use existing technology of mechanical means as developed for printed circuit boards, TV displays, and other existing e-waste. The comments state that studies exist to identify the opportunities for increasing the overall cost-effectiveness for recycling PV modules and the relative location of recycling facilities to the geographic concentration of PV modules. While mechanical methods can address adjunct components such as junction box, copper wiring, and aluminum frame, the automated methods that include thermal treatment of polymerics and chemical treatment of silicon is necessary to optimize the separation of the laminate, crystalline silicon embedded cells and any other layers secured by bonding and soldering. The comments state that new technologies are being developed globally that blend mechanical processing methods with heat treatment to achieve cleaner separation of module component parts; however, processes like these may be left unpursued in territories governed by this legislation given the liability of innovating with these processes under this rule. References were provided in the comments associated with such recycling capabilities. The comments then state that modern, cost-effective, automated process-oriented facilities could not find a home in California where large amounts of solar are installed to meet clean energy and resilience goals of the state based upon the DTSC's current draft regulation.

**Comments:** 3-2-10, 3-2-11, 3-2-12, 3-3-10, 3-3-11, 3-3-12

#### **Response:**

DTSC reviewed the comments and has determined that no regulatory change is necessary. The comments addressed the provisions in the proposed regulation that did not change from the version which was released on September 9, 2019. Therefore, the comments are outside the scope of topics subject to public comment in the third public



comment period that was public noticed on October 18, 2019. DTSC summarized and responded to the comments that were submitted during the first and second comment periods in the response to comments and are provided in the final rulemaking package submitted to the Office of Administrative Law. Therefore, DTSC did not make any changes to the regulation in response to these comments. Addendum to the Initial Statement of Reasons (ISOR)

## **B. HAZARDOUS CHARACTERISTIC OF PV MODULES**

### **Comment summary:**

The comments state that in the addendum to the ISOR, DTSC references a study from 2001 which reflects at that time of publication, some materials in photovoltaic modules “may exceed the federal threshold levels for toxicity of regulated materials” upon which DTSC determined that the waste exclusive alternative was not considered as a viable alternative. It must be clarified that PV modules are not a U.S. EPA listed hazardous waste and do not appear on any of the relevant U.S. EPA Lists (F, K, P or U). As such, the appropriate characteristic testing must be conducted to determine the appropriate waste management method. As such, DTSC cannot presume nor construe that all PV modules would fail the federal hazardous waste criteria for toxicity.

**Comments:** 3-2-14, 3-3-14

### **Response:**

DTSC reviewed the comments and has determined that no regulatory change is necessary. The reference the comments pointed out, and other references used in the ISOR, are published by nationally and internationally accredited organizations and indicate that some, but not all, PV modules that were tested using federal and California hazardous waste test methods show that they exhibit the hazardous characteristic of toxicity. Additionally, references further indicate that PV modules contain substances, such as lead in solder, that have the potential for exhibiting the hazardous waste characteristic of toxicity at certain thresholds. Even with only the limited test data and knowledge of materials composition that indicate that some PV modules may be hazardous, a reasonable conclusion can be made that some PV modules may exceed federal or California thresholds under hazardous waste tests for toxicity (exceeding the threshold is referred to as “failing” the test).

DTSC agrees with the comments that PV modules are not a U.S. EPA listed hazardous waste and do not appear on any of the relevant U.S. EPA lists (F, K, P or U). PV industry communications and literature information indicate that some PV modules may exhibit the federal hazardous waste characteristic of toxicity. DTSC cannot exclude wastes that exhibit the federal hazardous waste characteristic of toxicity from hazardous

waste regulations because such an exclusion would mean imposing less stringent standards than what U.S. EPA requires. Since U.S. EPA does not exclude hazardous waste PV modules from hazardous waste management, any PV modules that fail the federal test for toxicity, the Toxicity Characteristic Leaching Procedure (TCLP), must be managed as Resource Conservation and Recovery Act (RCRA) hazardous waste. However, DTSC is authorized by U.S. EPA to add new waste streams to the universal waste management program as long as such wastes meet universal waste criteria outlined in section 66260.23.

It is reasonable to assume that older PV modules that fail TCLP identified in the references may still be in service due to their predicted product life of 20-30 years, as indicated in industry communications and literature information. Excluding hazardous waste PV modules would also capture PV modules that are RCRA hazardous waste. DTSC does not presume nor construe that all PV modules would exhibit the federal or California hazardous waste characteristic of toxicity. The proposed regulation does not apply to PV modules that do not exhibit the hazardous characteristic of toxicity; the proposed regulation specifically applies to PV modules that are RCRA or non-RCRA hazardous waste because DTSC only has jurisdiction over wastes that are hazardous.

### **C. NEW AND IMPROVED MATERIALS USED IN PV MODULES**

#### **Comment summary:**

The comments state that since the publication of the 2001 reference study, which DTSC used in the ISOR, indicates that some PV modules may fail the hazardous waste characteristic of toxicity, the PV industry has significantly innovated, having developed new methods to reduce or eliminate the use of any potentially hazardous materials, which include:

- Use of tin-silver, tin-bismuth or other nonlead-based solders
- Use of conductive backsheets (meaning no tabbing, ribbons wire, or solder)
- Using alternative solder paste (such as tin-silver) and by designing out the use of ribbon wires to connect cells.

The comments state that these materials listed above, and more innovations have been pursued by the PV industry. The comments further state that some PV module manufacturers have attained sustainability certifications, such as Cradle to Cradle (C2C), attesting to the non-hazardous nature of their products even during the recycling process. "Cradle to Cradle Certified is a globally recognized measure of safer, more sustainable products made for the circular economy."

**Comments:** 3-2-15, 3-2-16, 3-2-17, 3-3-15, 3-3-16, 3-3-17

**Response:**

DTSC reviewed the comments and has determined that no regulatory change is necessary. DTSC believes the comments to be informational and outside of the scope of the proposed PV module rulemaking. Thus, no regulatory change is necessary.

## **VIII. General**

### **A. INTRODUCTION**

**Comment Summary:**

The comments are introductory language of the comment letters that were submitted for the revised proposed regulation released for public notice on October 18, 2019.

**Comments:** 3-1-1, 3-2-1, 3-2-2, 3-3-1, 3-3-2

**Response:**

DTSC reviewed the comments and has determined that no regulatory change is necessary. The comments are introductory language of the comment letters indicating that the comments provided refer to the proposed regulation for the management of hazardous waste PV modules as universal waste in California.

### **B. SUPPORT AND ENCOURAGEMENT OF THE PROPOSED REGULATION**

**Comment Summary:**

The comments express support and encouragement of the proposed regulations for the management of hazardous waste PV modules as universal waste.

**Comments:** 3-1-8, 3-2-18, 3-3-18

**Response:**

DTSC acknowledges and appreciates the comments encouraging the proposed regulations for the management of hazardous waste PV modules as universal waste. DTSC made no changes to the proposed regulation or supporting documents in response to the comments.

## **C. DISAPPROVAL**

### **Comment Summary:**

The comments express disapproval of the changes DTSC made to the proposed regulation for the management of PV modules as universal waste. The comments also assert that some of the revisions DTSC made impose requirements that make the management of PV modules more difficult. The comments also state that DTSC did not fully address the requested rulemaking changes from the second public comment period, which was public noticed on September 9, 2019, which are critical to the PV module industry and the future of PV module recycling in California.

**Comments:** 3-1-3, 3-2-3, 3-3-3

### **Response:**

DTSC respectfully disagrees with the comments that the not all the comments submitted during the previous comment periods were sufficiently addressed. DTSC reviewed all the comments and revised the proposed regulation based on the comments that are within the scope of the rulemaking and in alignment with the universal waste management regulations in California. Comments that do not result in revision of the proposed regulation are provided reasons for not adopting such requests in the response to comments documents. Such comments that do not result in the revision of the regulation are:

- Comments that are outside the scope of the regulation as proposed;
- Comments that do not align with universal waste standards that are required for managing PV modules; and,
- Comments that address the supporting information, such as Economic & Fiscal Impact Analysis, of the proposed regulation text.

DTSC has reviewed and provided responses to all the above listed comment categories in the final response to comments.

## **D. THANK YOU**

### **Comment Summary:**

The comment expresses appreciation of the proposed regulations for the management of hazardous waste PV modules as universal waste.

**Comment:** 3-1-2

### **Response:**

DTSC acknowledges the comment as gratitude. DTSC made no changes to the proposed regulation or supporting documents in response to the comment.