



PHOTOVOLTAIC (PV) MODULES - UNIVERSAL WASTE MANAGEMENT REGULATION

February 4, 2021



23rd California Unified Program Annual
Training Conference
February 2 – March 18, 2021

Rulemaking timeline

- SB 489 (Monning, Chapter 419) authorizes DTSC to adopt regulations to designate end-of-life PV modules that are identified as hazardous waste as a universal waste and subject those modules to universal waste management on October 1, 2015.
- Final regulation package was approved by Office of Administrative Law on September 28, 2020.
- Regulation is effective starting January 1, 2021.



Poll Question #1

What industry best describes your occupation?

Answers:

1. Solar panel manufacturing
2. Recycling
3. Waste management
4. Legal
5. Inspection and enforcement
6. Other



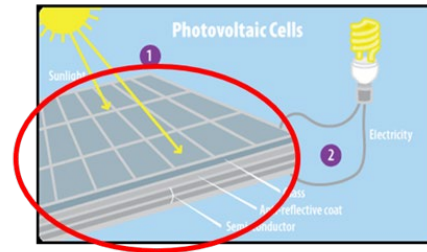
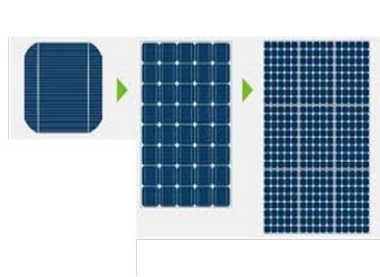
Topics under PV Modules Regulation

- What is a PV module / What is not a PV module
- Who are the handlers
- Notification (handling, treatment, disposal)
- Labeling
- Containment
- Accumulation
- Annual reporting
- Training
- Authorized treatment activities
- Disposal
- Transportation



Regulatory definition of PV module

- Photovoltaic cells designed to convert solar radiation into electrical energy
- Includes integrated components that cannot be separated without breaking the photovoltaic module glass (e.g. protective glass, metal frames..)
- Composition (xSi, semiconducting materials)
- One cell or multiple cells
- Roof top solar panels, thin film, PV module with integrated components



CCR Sections 66260.10 and 66273.9

Examples of PV module

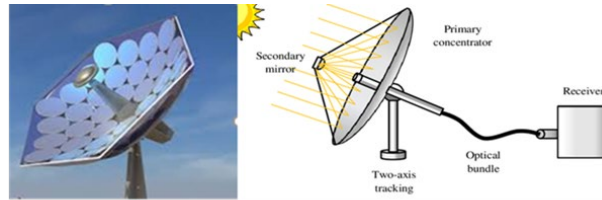
- Solar cells/panels
- Solar garden lights
- Solar powered devices

"...integrated components include ... housing or pocket holding the photovoltaic cells/modules ..."



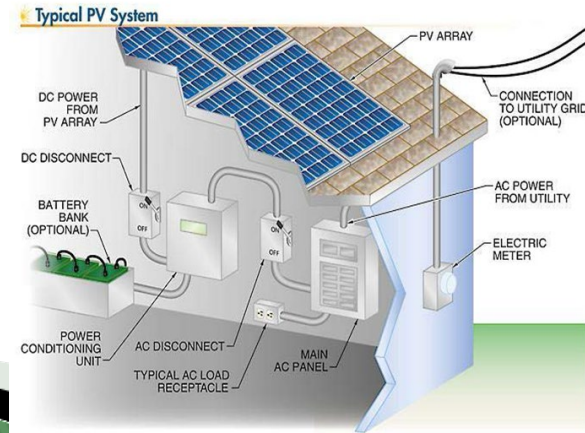
Examples of not a PV module

- Solar concentrators
- Solar powered electronic devices



PV module vs. PV system

- PV system is a set of ancillary components including PV modules.
- Ancillary components that can be taken apart from PV module without breaking the PV module glass are not considered a PV module.
- E.g. batteries, junction box, inverters, wires
- UW regulations apply only to PV modules, not the entire PV system.



CCR Sections 66260.10 and 66273.9

PV modules vs. electronic devices

- Two different universal waste categories

To differentiate:

- Device is not an electronic device and has PV module, then it is a PV module. (e.g. solar powered backpack, garden lamps, bikes)



PV modules vs. electronic devices (continued)

- Two different universal waste categories

To differentiate:

- Device functions as an electronic device and has PV module, then it is an electronic device. (e.g. calculator, wireless keyboard)

Electronic Device



Hazardous constituents in PV modules

Test Methods

FEDERAL	CALIFORNIA
<ul style="list-style-type: none">▪ Toxicity Characteristic Leaching Procedure (TCLP)	<ul style="list-style-type: none">▪ Total Threshold Limit Concentrations (TTLC)▪ Waste Extraction Test (WET)<ul style="list-style-type: none">✓ Soluble Threshold Limit Concentrations (STLC)

- Lead
- Cadmium
- Chromium
- Antimony
- Gallium
- Selenium
- Tellurium
- Other metals

When do universal waste regulations apply to PV modules?

- When PV module is discarded and becomes a waste*.
- When you know PV module is hazardous:
 - ✓ Analytical test results that show that the module is hazardous
 - ✓ Using generators' knowledge of the materials in the panel



When do universal waste regulations apply to PV modules? (Continued)

- All PV module waste can be managed as universal waste without requiring a hazardous waste determination.
- Universal waste management standards do not apply to PV modules that are refurbished or reused.



Poll Question #2

When can PV modules waste be managed as universal waste?

Answers (select one):

1. When the waste is hazardous
2. Only when the waste is hazardous
3. When there is no hazardous waste determination
4. All of the above
5. 1 & 3

Universal waste handlers of PV modules

- Generators
- Installers*
- Manufacturers
- Distributers/Warehouses
- Storage facilities
- Recyclers
- Treatment facilities

* Installers may take part in removal of solar panels



CCR Section 66273.9

Authorized treatment activities

- **Removal activities**

- ✓ Removing discrete assemblies from the PV system that are typically removed for replacement during normal operation and maintenance

- **Dismantling activities**

- ✓ Dismantle, remove, segregate components of a PV module but does not break the PV module glass

- **Processing activities**

- ✓ Treat PV modules by intentionally breaking the PV module glass

CCR Sections 66273.71 – 66273.73



Treatment activities NOT allowed

- Treatment method that involves use of chemicals or heat is **not allowed** under universal waste regulations.
- Requires a permit

CCR Sections 66273.72(a) and 66273.73(d)(2)



Notifications

- **Initial**

Handlers that accept or accumulate from offsite ANY quantity of PV module waste

- **For Treating PV modules**

Handlers that intend to treat the waste

- **For UW PV modules disposal**

Handlers that decide to discard the waste



CCR Sections 66273.32(e), 66273.72, and 66273.74

Notifications (to handle and to treat)

- Department notification
- One-time requirement and never expire
- **Site specific***
- Applies to handlers
 - ✓ that accept or accumulated from offsite ANY quantity of PV module waste
 - ✓ that treat PV modules

* Handler's business facility; not the location where the handler uninstalls solar panels

CCR Sections 66273.32(e) and 66273.74



Notifications – to handle and to treat (continued)

- Submit a written notification to DTSC 30 days prior to accepting or accumulating the waste
- Can submit starting January 1, 2021.
- Notification forms are available on DTSC UW PV webpage.
- The forms DTSC provides are optional to use.

CCR Sections 66273.32(e) and 66273.74



Notifications to handle

- Includes:
 - ✓ Handler's name
 - ✓ ID if available
 - ✓ Contact info
 - ✓ PV types if available
 - ✓ PV source if available
 - ✓ Indication if 5,000 kg or more accumulation at one time



CCR Sections 66273.32(e)

Notifications to treat

- Includes:
 - ✓ Same info as notice of intent to handle
- Additionally,
 - ✓ List of authorized treatment activities handlers plan to conduct
 - ✓ Documentation that the facility operator has notified the facility property owner
 - ✓ Closure plan and cost estimate*
 - ✓ Financial responsibility for liability and assurance for closure*
- Certify the notification

** Processing treatment activities only*

CCR Sections 66273.74 and 66273.76



Notification for disposal

- UW PV modules can only go from one UW handler to UW handler or to the disposal facility
- UW PV modules become a hazardous waste the moment handlers decide to discard them
- Nothing prohibits a facility from sending the waste to hazardous waste disposal; the waste must be managed according to all applicable HW regulations
- Make hazardous waste determination



CCR Section 66273.72(f)(3)

Notification for disposal (continued)

- Submit a written notification to DTSC 15 days prior to disposal
- Include in the notification:
 - ✓ The ID number for the universal waste handler's facility where the PV modules were generated;
 - ✓ A description of the authorized treatment method(s) used; and
 - ✓ The name, address, and ID number of the hazardous waste disposal facility where the PV modules will be disposed of.
- Disposal notice form is available on DTSC's UW PV webpage.
- The form DTSC provides is optional to use.

CCR Section 66273.74(a)(5)



Where to send the notifications

Department of Toxic Substances Control
Universal Waste Notification and Reporting Staff
P.O. Box 806
Sacramento, CA 95812-0806
ATTN: Universal Waste Handling Activities



Poll Question #3

How often do you notify DTSC of your intent to accept and accumulate PV modules as universal waste?

Answers (select one):

1. One time only
2. For every job site I go to remove solar panels from



Labeling

- Label as “**Universal Waste-PV module(s)**”
- Each PV module, or container or pallet in or on which PV module(s) is contained, needs to be labeled.
- PV module(s) or a container or pallet of PV modules need to be placed within a designated area.
- Commingling PV modules with other universal wastes is NOT allowed.

CCR Section 66273.34



Labeling treatment residuals

- Based on waste classification of the residuals
- Example: metal frames
- Make hazardous waste determination to properly manage PV module treatment residuals after dismantling and processing activities
- Comply with labeling requirements for the residuals that are reused and recycled



Accumulation time limit

- A facility can accumulate PV modules for up to **one year** from the date they were generated or received from another handler
- PV module handler has to demonstrate the length of time the waste is accumulated from the date it became a waste (or was received)
 - ✓ Place label and earliest date when the waste is received
 - ✓ Inventory at the facility

CCR Section 66273.35



Recordkeeping

- Requirements are the same as other universal wastes
- Incoming:
 - ✓ Receipt of shipments (Example: log, invoice, bill of lading, etc.)
 - ✓ Name of UW handler that sent the shipment
 - ✓ Quantity of waste received (waste goes from handler to handler)
 - ✓ Date of shipment received
- Outgoing:
 - ✓ Shipments (Example: log, invoice, bill of lading, hw manifest, etc.)
 - ✓ Name of the destination facility
 - ✓ Quantity of waste shipped
 - ✓ Date of waste shipped
- Keep logs of record for at least three years

Recordkeeping for PV modules treatment

- A copy of the notifications
- A copy of the most recent annual report
- A current copy of any local air district permit and/or other relevant permit(s) required for the facility.



CCR Section 66273.74(c)(3)

Transporting and containment

- Same as other universal waste requirements
- If transport more than 100 kilograms (220 pounds) of PV modules at any one time, contain the PV modules
 - ✓ 220 pounds (100 kilograms) is about 4-6 big panels
 - ✓ Weight of a rooftop panel is about 40 pounds (18 kilograms)
 - ✓ Weight of a thin-film sheet is about 5 pounds (2.2 kilograms)



CCR Section 66273.51

Containment

- Manage PV modules in a way that prevents releases of any constituent of a PV module to the environment
 - ✓ Prevent breakage, (leakage, spillage)
 - ✓ Containment could be on a pallet, in a container, wrapping with stretch film, etc.
 - ✓ Clean up immediately if PV module(s) break accidentally or unintentionally



CCR Section 66273.3.6

Accidental breakage - Response to releases

- Requirements are the same as other universal wastes
- Clean up immediately if PV module(s) break accidentally and contain all residues in a container that is structurally sound and is compatible with PV modules

CCR Section 66273.37



Labeling accidental breakage – Response to releases

- How should the accidentally broken PV module waste be labeled?

*A universal waste handler shall **determine whether any material resulting from such a release is a hazardous waste**, and if so, shall manage the hazardous waste in compliance with all applicable requirements...*

- Can the accidentally broken waste be placed together with intact PV modules?

*Hazardous waste consisting **only of residues** of leaking, broken, or otherwise damaged universal waste **may be managed as universal waste**...*



CCR Section 66273.37

Annual reporting

- Applies to
 - ✓ Handlers that accept more than 100 kilograms (220 pounds) from an external source;
 - ✓ Handlers that generate more than 5,000 kilograms (11,000 pounds) of PV module waste
 - ✓ Handlers that treat PV modules
- Due on February 1 of the following year for the activities done in the previous year



CCR Sections 66273.32 and 66273.74

Annual reporting (continued)

- Not a part of Universal Waste Electronic Device Reporting system
- Includes
 - ✓ Handler's contact info and ID
 - ✓ PV types handled
 - ✓ Total quantity of PV modules handled
 - ✓ PV source
 - ✓ Info of where PV modules were shipped, quantity shipped, and intention
- From is in development

CCR Sections 66273.32 and 66273.74



Universal waste handler training

- Same as other universal wastes
- Familiar with UW management and emergency response procedures
- Initial training and annual training:
 - ✓ Type of hazards associated with UW
 - ✓ Proper disposition of UW
 - ✓ Response to releases
 - ✓ Labelling, collecting, handling, shipping, recordkeeping, any prohibitions, etc.

CCR Sections 66273.36

Treatment facility closure

- Only applies to handlers that do processing treatment by intentionally breaking the PV module glass, CCR Section 66273.73
- Required to have Financial Assurance/Financial Responsibility, a Closure Plan, and a Closure Cost Estimate
- When such facilities close, they must notify DTSC, implement their Closure Plan, and undergo a closure inspection

CCR Sections 66273.76 and 66273.77



Department of Toxic Substances Control

UW PV Modules:

<https://dtsc.ca.gov/photovoltaic-modules-pv-modules-universal-waste-management-regulations/>

Final Regulation:

<https://dtsc.ca.gov/dtsc-final-regulations/>

Emails:

PVmodules@dtsc.ca.gov

DTSC E-list:

<https://dtsc.ca.gov/dtsc-e-lists/>





Any Questions?

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Thank you

