Hazardous Waste Roundtable

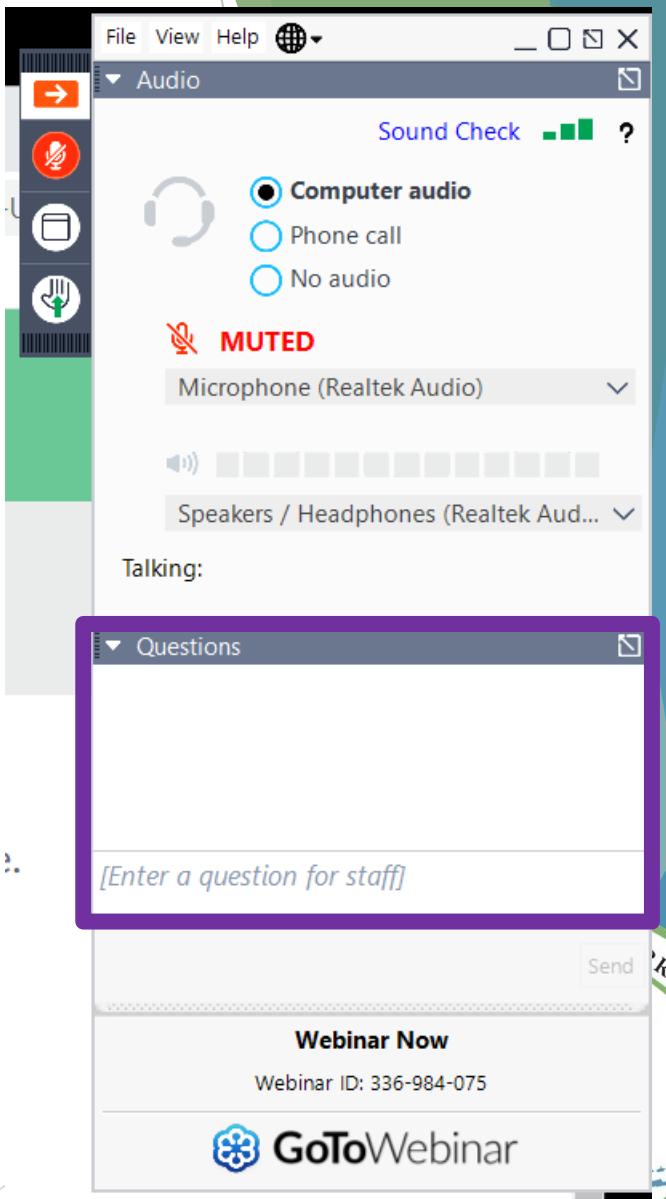
ASTSWMO Virtual Mid-Year Meeting
April 29, 2021

Agenda

- EPA Updates:
- Opening Remarks
- National Permitting Oversight Policy (NPOP)
- National RCRA Permitting Priorities
- Incident Tracking
- Corrective Action 2020 Goals Results and 2030 Goals Implementation Planning
- PFAS Petitions
- e-Manifest Program and Implementation
- Generator Compendiums
- Generator Improvements Rule Citation Crosswalk
- SQG Re-Notification
- Pharms Rule FAQs
- Lithium-Ion Battery Webpages
- RCRA Environmental Justice Community of Practice

Before we start

- All attendees will be muted throughout the webinar.
- **Questions:** Use the **Questions Panel** in the dashboard to send questions to the speakers during the webinar.
- **Note who the question is directed to in your submittal.**
- Questions will be answered at the end of the webinar.
- The webinar is being recorded and will be made available on the ASTSWMO website.



Paula Bansch, IN

Chair, ASTSWMO Hazardous Waste Subcommittee

Welcome

Greg Sullivan

Acting Deputy Office Director
EPA Office of Resource Conservation and Recovery (ORCR)

Opening Remarks

Amanda Kohler

Chief, Permits Branch

ORCR Program Implementation and Information Division

EPA National Permitting Oversight Policy

Amanda Kohler
Lilybeth Colon
Permits Branch
ORCR Program Implementation and Information Division

National RCRA Permitting Priorities

National RCRA Permitting Priorities Update

AMANDA KOHLER | LILYBETH COLON

PERMITS BRANCH | OFFICE OF RESOURCE CONSERVATION AND RECOVERY

Ongoing Permitting Priorities

Public Notice in Newspaper/Mail – Seek interpretation for using modern technology alternatives for public notice on case-specific basis, including public hearings. (FY 2020/2021 Priority) (POC: Tab Sommer)

CostPro – Assess current status of CostPro software (and alternatives). Determine if it should be updated (or alternative), proceed if funds are available. (FY 2020/2021 Priority) (POC: Mike Pease and Anna Krueger)

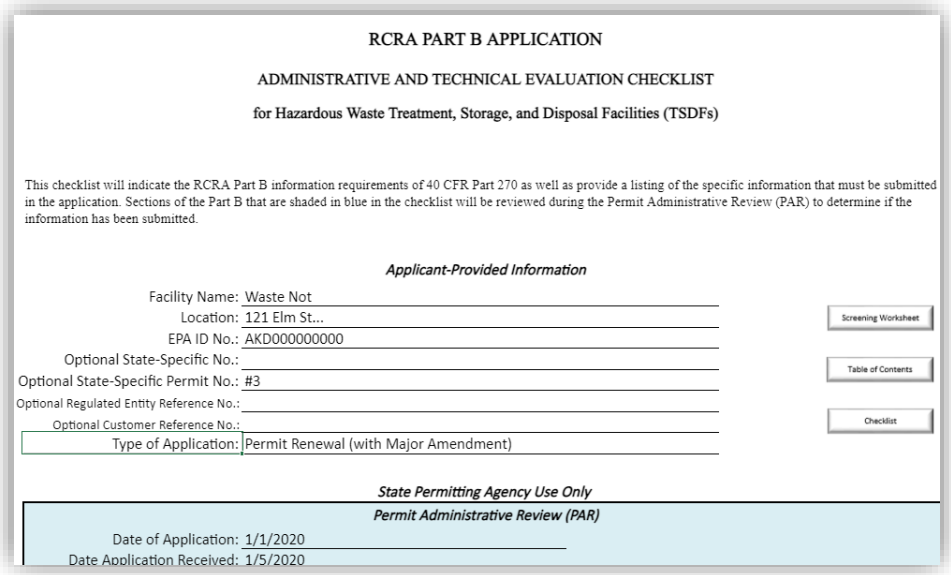
Waste Analysis Plans Compliant with Land Disposal Restrictions – Seek to address seemingly chronic issues with WAPs that allow practices that do not align with LDR requirements. (FY 2018/2019 Priority) (POC: Jeff Gaines)

Post-Closure Care (PCC) Implementation – Identify and implement best option(s) to assist states and Regions making decisions regarding post-closure care. (FY 2020/2021 Priority) (POC: Lilybeth Colón)

Completed Permitting Priorities

Tools for Expediting Permit Issuance – Create and share tools and processes that expedite permit issuance. (POC: Tab Sommer)

- The RCRA Permit Application Checklist was completed in late 2020 and is available in the Permit Writers SharePoint site.
- Gathered additional ideas from permit writers as consideration for potential future priorities.
- Discussions at RCRAInfo and Permit Writer calls on how to begin uploading completed permits into RCRAInfo for purposes of sharing across community.



RCRA PART B APPLICATION

ADMINISTRATIVE AND TECHNICAL EVALUATION CHECKLIST

for Hazardous Waste Treatment, Storage, and Disposal Facilities (TSDFs)

This checklist will indicate the RCRA Part B information requirements of 40 CFR Part 270 as well as provide a listing of the specific information that must be submitted in the application. Sections of the Part B that are shaded in blue in the checklist will be reviewed during the Permit Administrative Review (PAR) to determine if the information has been submitted.

Applicant-Provided Information

Facility Name: Waste Not
Location: 121 Elm St...
EPA ID No.: AKD000000000
Optional State-Specific No.:
Optional State-Specific Permit No.: #3
Optional Regulated Entity Reference No.:
Optional Customer Reference No.:
Type of Application: Permit Renewal (with Major Amendment)

Screening Worksheet
Table of Contents
Checklist

State Permitting Agency Use Only

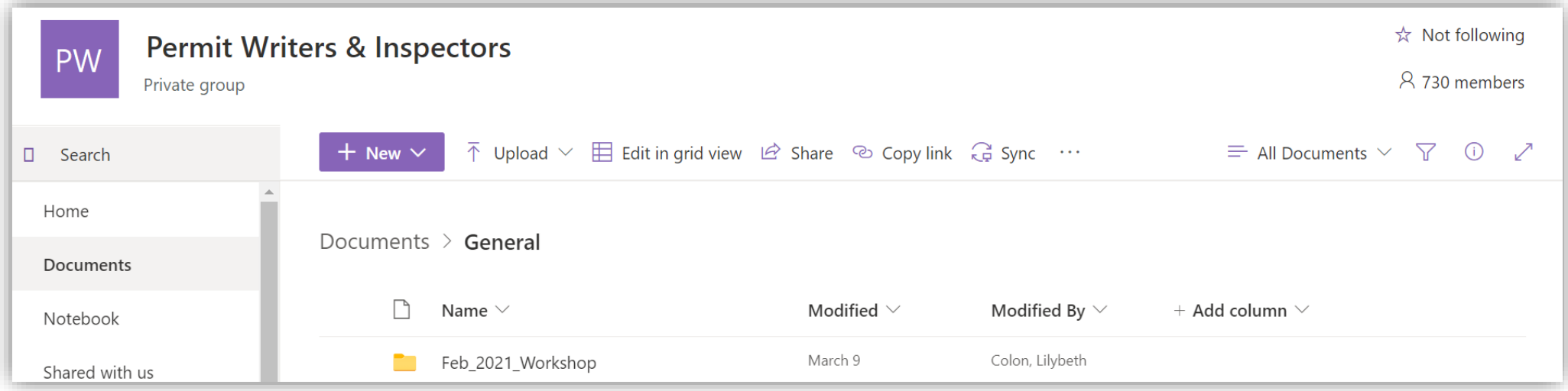
Permit Administrative Review (PAR)

Date of Application: 1/1/2020
Date Application Received: 1/5/2020

Completed Permitting Priorities (cont.)

Improved Coordination between RCRA Permit Writers and Inspectors – Implement permit writer and inspector workshops nationwide. (POC: Lilybeth Colón and Justin Young)

- The first national Permit Writer and Inspector Collaboration Workshop was held on 2/25/21 by ORCR, OECA and ASTSWMO.
- Workshop presentations are available in the Permit Writers and Inspectors SharePoint site
- Planning to host workshops regularly (once or twice a year).

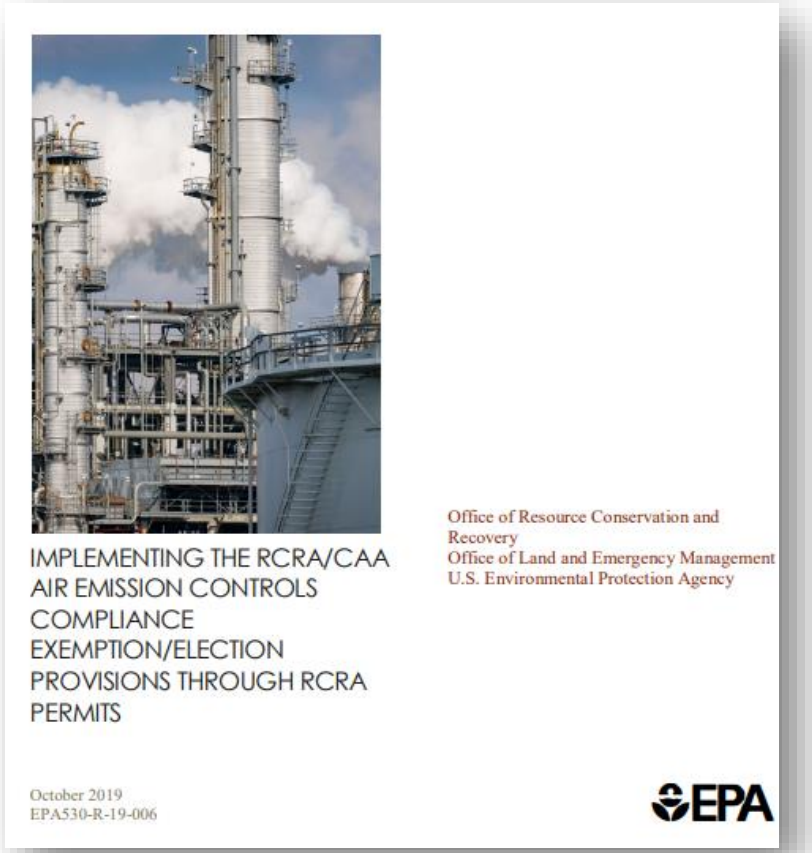


Poll Questions

Completed Permitting Priorities

RCRA Organic Air Emissions (POC: Lilybeth Colón)

- In October 2019, launched a new webpage that brings together content, resources, and tools aimed at assisting permit writers and the regulated community with understanding the RCRA Organic Air Emission Standards.
- Developed a set of tools for permit writers to help implement the existing RCRA/CAA compliance exemption/election provisions; including model language and a checklist.
- Presentation on the RCRA/CAA compliance exemption/election provisions was conducted at the February 2021 Permit Writer and Inspector Workshop; a copy of the presentation is available in the Permit Writers and Inspectors SharePoint site.



Sonya Sasseville

Director, ORCR Program Implementation
and Information Division

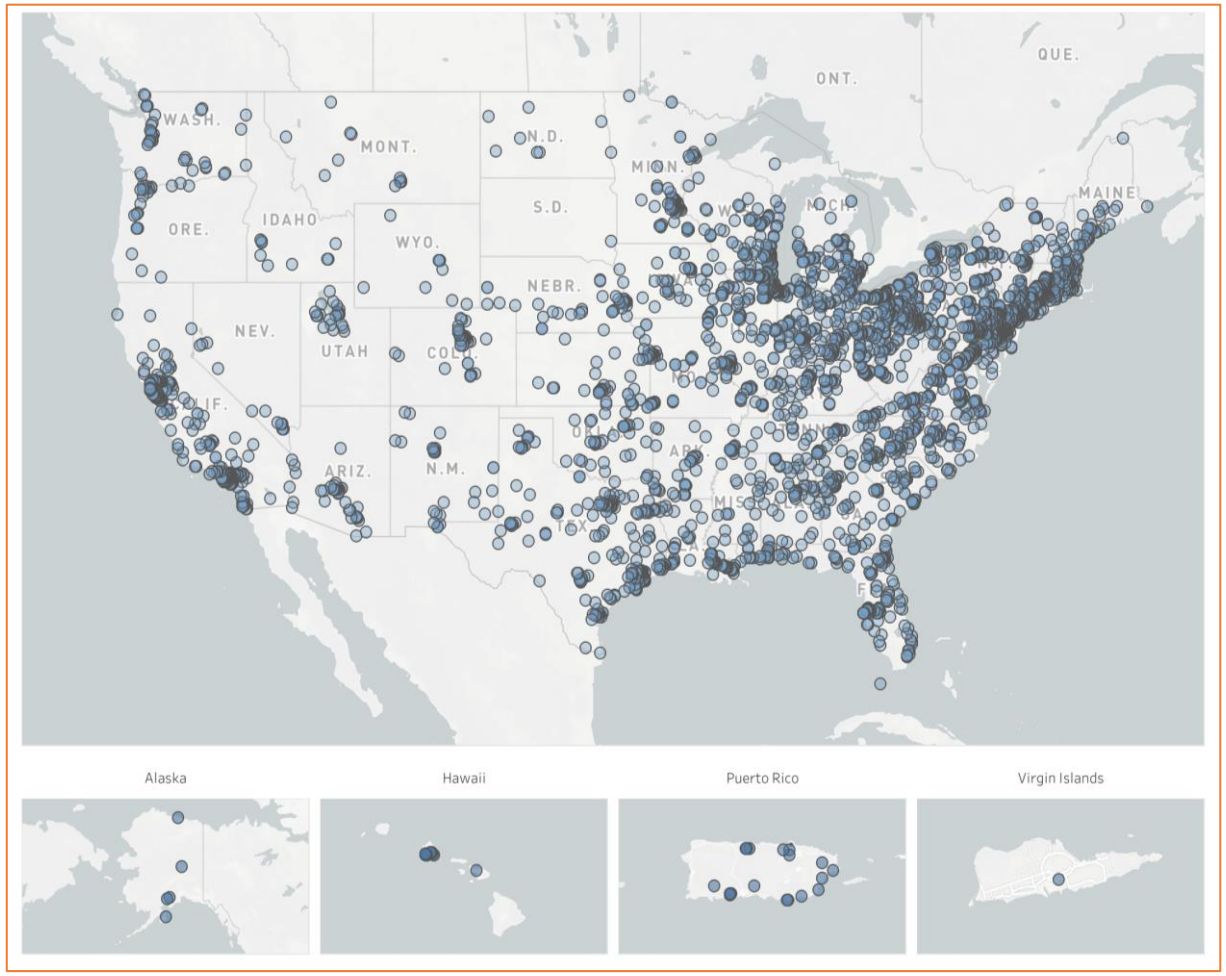
Corrective Action 2020 Goals Results and 2030 Goals Implementation Planning

2020 Goals Closeout Corrective Action

Overview for ASTSWMO

April 29, 2021

Corrective Action Facilities



2020 Goals

- The 2020 Goals targeted achieving 95% completion at 2020 baseline facilities for three important milestones:
  - Human Exposures Under Control (CA725)
  - Migration of Contaminated Groundwater Under Control (CA750)
  - Remedy Construction (CA550)

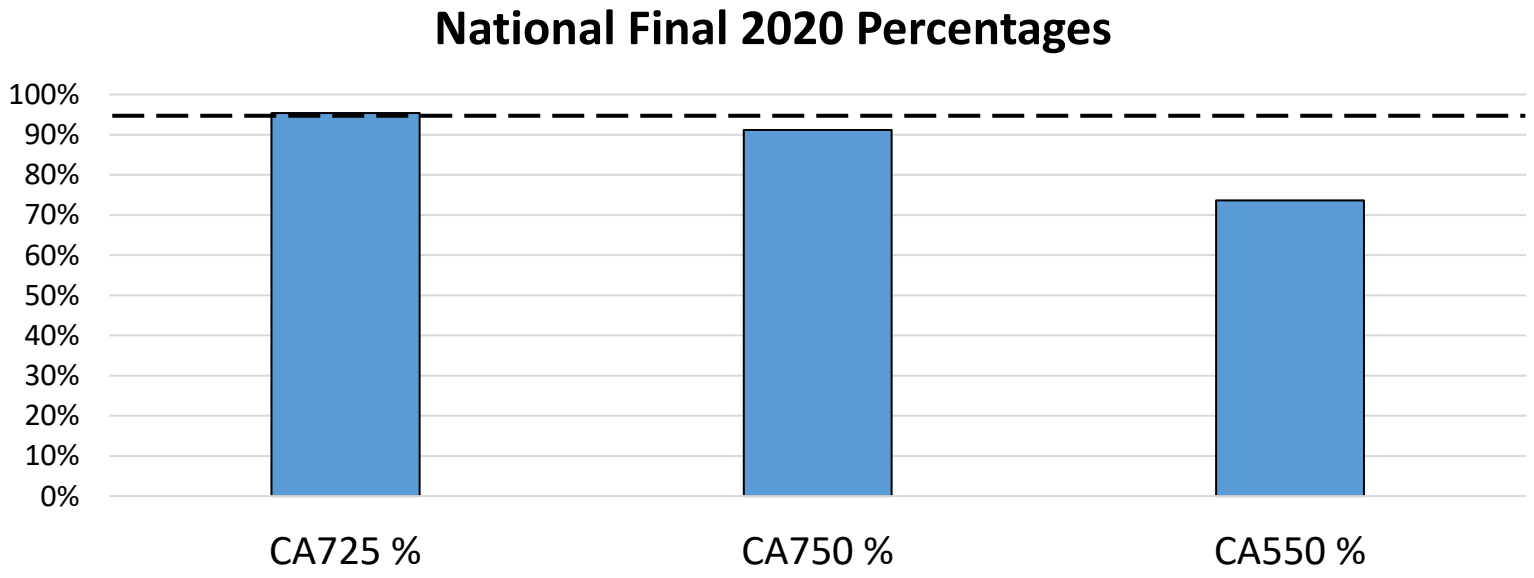
Slider map

Human Exposures Under Control
Control of Contaminated Groundwater Migration
Remedy Construction
Performance Standards Attained
Move slider ↘
1985
1990
1995
2000
2005
2010
2015
2020
Achieved Goals: _____ facilties

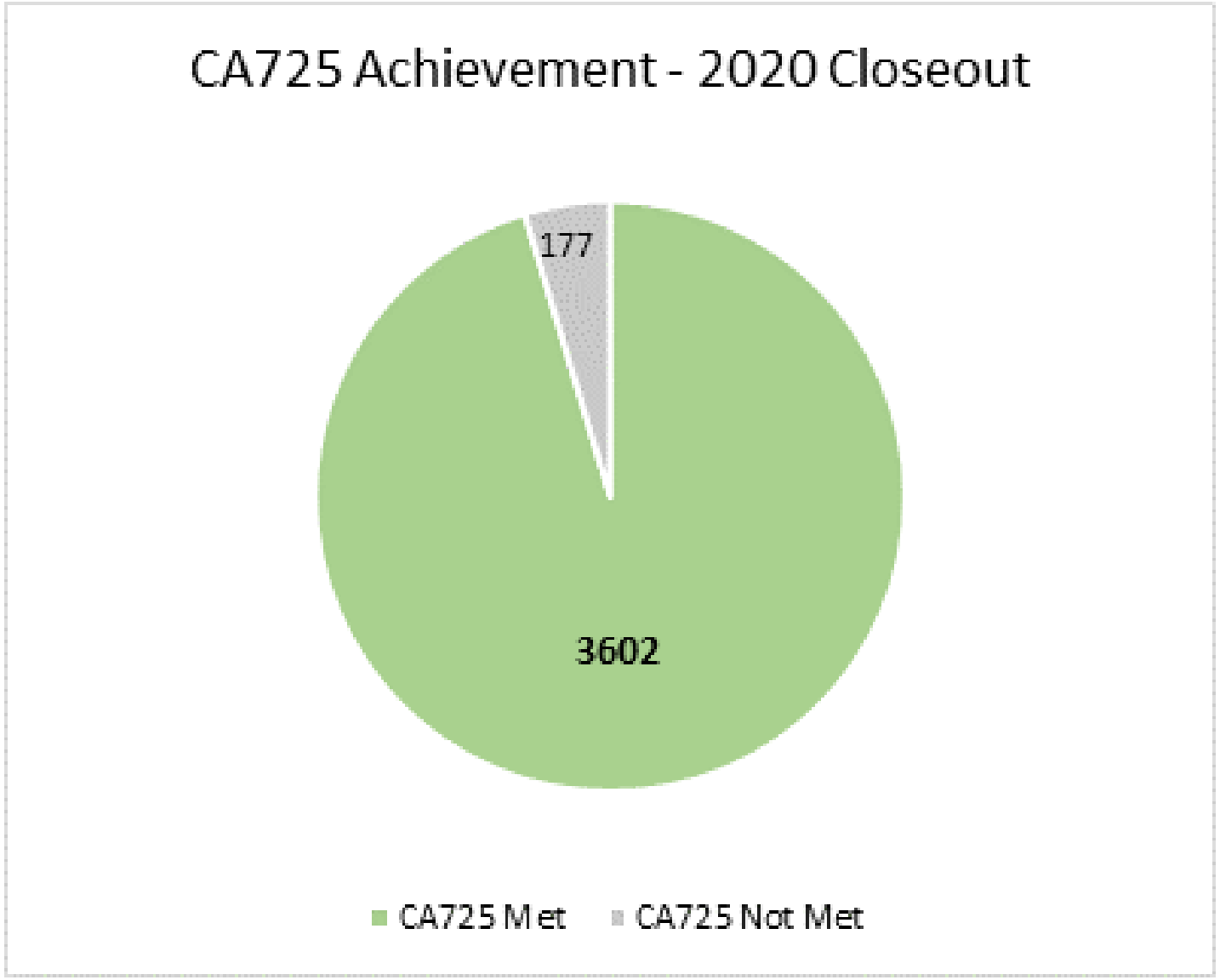
THANK YOU!

2020 RESULTS

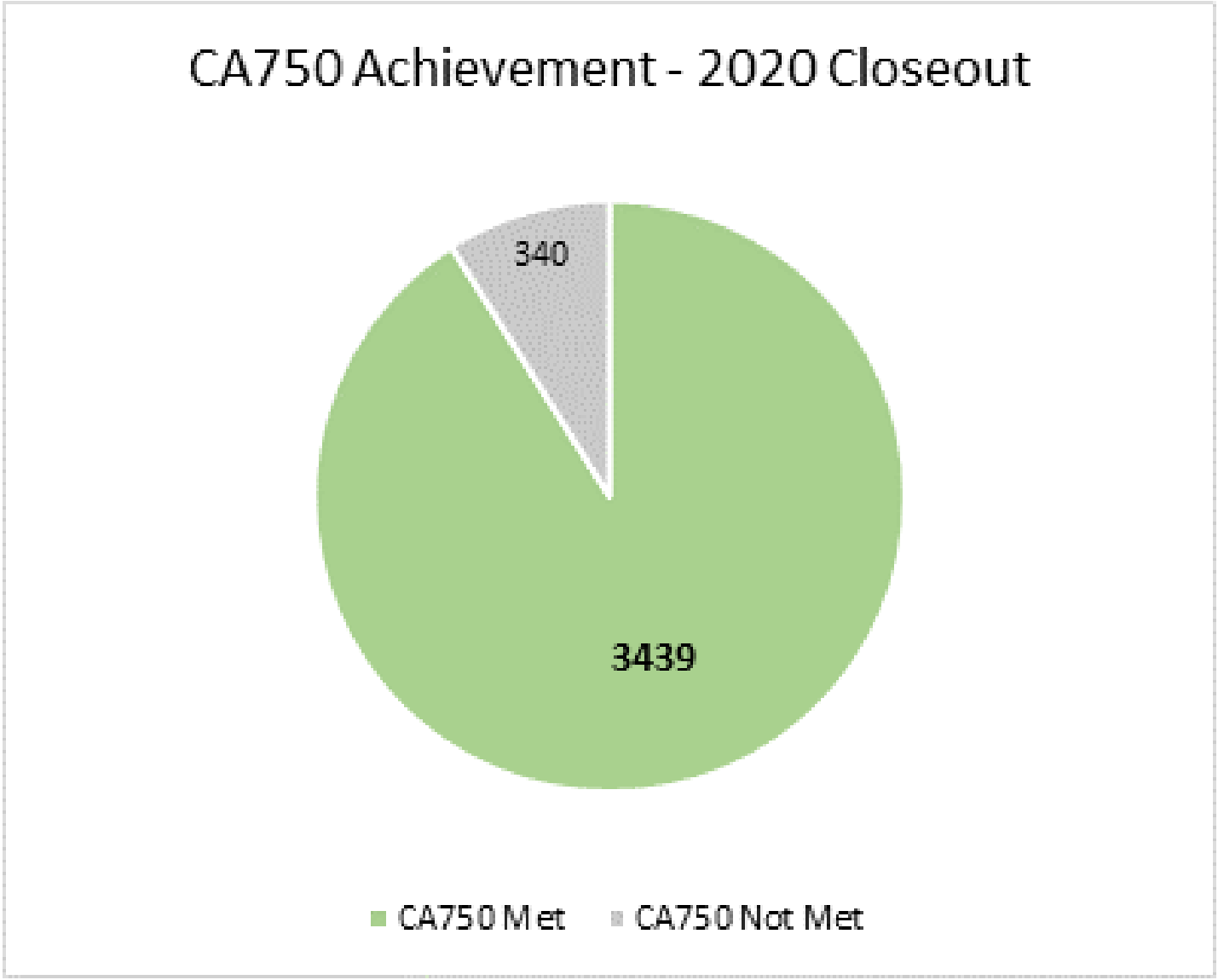
- The program met by the end of 2020 (out of the 3,779 2020 Baseline priority facilities):
  - Human Exposures Under Control (CA725) – met at 95% of facilities (3,605)
  - Migration of Contaminated Groundwater Under Control (CA750) – met at 91% of facilities (3,445)
  - Remedy Construction (CA550) – met at 74% of facilities (2,783)



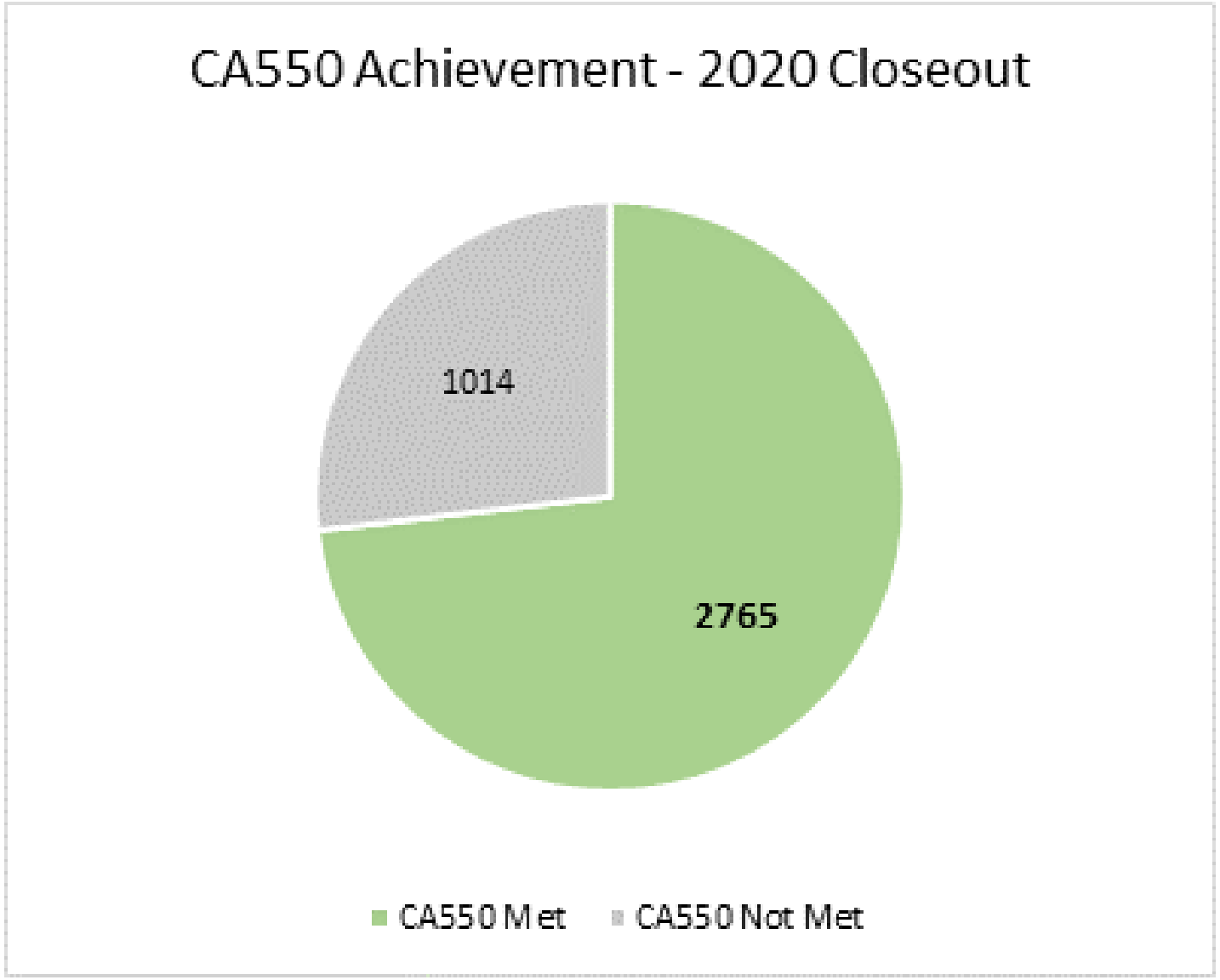
Human Exposures Under Control



Migration of Contaminated Groundwater Under Control



Remedy Construction



RCRA Corrective Action Technical Call

Purpose

- A unique opportunity to **connect** individuals with varied expertise, experience, and perspectives in field of CA;
- To **share** and **address** issues experienced at cleanup sites.

Attendees

- EPA offices and Regions, States, and Tribal partners (manager and staff level) involved in CA activities.

Meeting details

- Every third Thursday of each month at 3 pm ET;
- Accessible through MS Teams invite sent to your email.

Contact: Dr. Klara Crincoli | US Environmental Protection Agency | OLEM/ORCR/PIID/CPB | crincoli.klara@epa.gov

Ross Elliott

Associate Director, ORCR Materials Recovery &
Waste Management Division

PFAS Petitions

Steve Donnelly

Information Collection and Analysis Branch

ORCR Program Implementation and Information Division

e-Manifest Program and Implementation

Jessica Young

Chief of the Recycling and Generator Branch
ORCR Materials Recovery and Waste Management Division

Generator Compendiums
Generator Improvements Rule Citation Crosswalk
SQG Re-Notification
Pharms Rule FAQs
Lithium-Ion Battery Webpages

HW Generator Updates

ASTSWMO HW Roundtable

April 29

Jessica Young – EPA ORCR

HW Generator Compendiums

- New user-friendly reference to assist in locating resources addressing specific regulatory issues within the federal hazardous waste generator program
- The Compendium is divided into volumes by topic
- First 6 topics are posted here: https://www.epa.gov/hwgenerators/hazardous-waste-generator-regulations-compendium

    - Volume 1: Satellite Accumulation Areas (PDF)(15 pp, 242 K, March 2021)
    - Volume 2: Generators – EPA Identification Numbers (PDF)(11 pp, 243 K, March 2021)
    - Volume 3: Co-Generation (PDF)(10 pp, 208 K, March 2021)
    - Volume 4: Household Hazardous Waste (PDF)(13 pp, 240 K, March 2021)
    - Volume 5: Personnel Training at Small and Large Quantity Generators (PDF)(12 pp, 212 K, March 2021)
    - Volume 6: Generator Treatment in Tanks and Containers (PDF)(16 pp, 259 K, March 2021)

- The resources include EPA RCRAOnline memos, Federal Register rules, and the Code of Federal Regulations (CFR) regulatory language

Example of SAA Generator Compendium – Resources by Document Category Table

Resources by Document Category

Return to: Main Index

Document Category	RCRA Online/ Resource	Resource Title	Document Date	Keyword(s)	Notes
Memoranda	12859	Satellite Accumulation Area and Regulations	2/11/1987	Volume of Accumulation; Containers	Partially superseded. Three days means three consecutive calendar days. See 81 FR 85764 – 85765; 11/28/16.
	11373	Hazardous Waste Training Under 40 CFR 262.34	10/27/1988	Training	

Example of SAA Generator Compendium – Resources by Document Category Table (cont)

Document Category	RCRA Online/ Resource	Resource Title	Document Date	Keyword(s)	Notes
	Weblink	Frequent Questions About Hazardous Waste Generation	Last Updated 10/07/2020	Large Quantity Generators (LQGs); Small Quantity Generators (SQGs); Container Requirements; Move to Central Accumulation Areas	
Federal Register Notices	48 FR 118	Hazardous Waste Management System; Standards Applicable to Generators of Hazardous Waste; Proposed Rule	1/3/1983	Volume of Accumulation; Accumulation Time; Containers; Point of Generation; Laboratory Wastes	
	49 FR 49568	Hazardous Waste Management System; Standards Applicable to Generators of	12/20/1984	Volume of Accumulation; Accumulation Time; 72-Hour Requirement	

Example of CFR Index for SAA Compendium

CFR View Index

Return to: Main Index

CFR Location	Title/Topic
262.15(a)	Overview of SAA Conditions
262.15(a)(1-5)	Container Requirements at SAAs
262.15(a)(6)	Requirements for Excess Amounts at SAAs
262.15(a)(7)	Emergency Preparedness and Prevention at SAAs at Small Quantity Generators
262.15(a)(8)	Emergency Preparedness and Prevention at SAAs at Large Quantity Generators

Example of CFR View – Regulatory Text

CFR View

Return to: Main Index

NOTE: The CFR language may have been excerpted, reformatted and appended with subheadings and explanations/terms in brackets.

§ 262.15 Satellite accumulation area regulations for small and large quantity generators.

§ 262.15(a) Overview of SAA Conditions

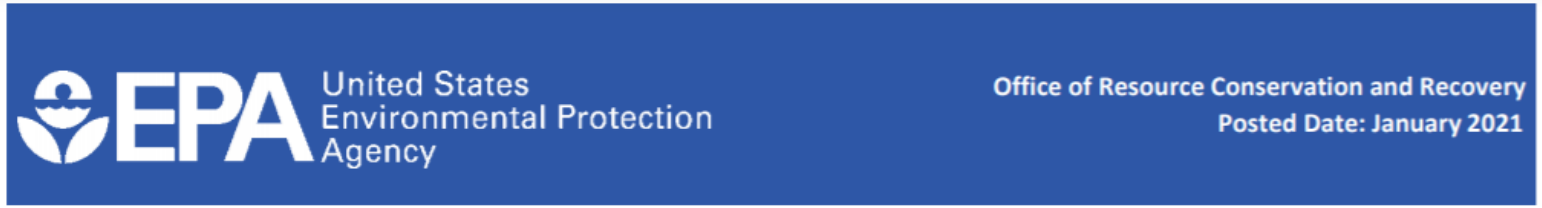
View Resources | Go to *e-CFR* | Return to: CFR Index | Resource View | Main Index

A generator may accumulate as much as 55 gallons of non-acute hazardous waste and/or either one quart of liquid acute hazardous waste or 1 kg (2.2 lbs) of solid acute hazardous waste in containers at or near any point of generation where wastes initially accumulate which is under the control of the operator of the process generating the waste, without a permit or interim status and without complying with the requirements of parts 124, 264 through 267, and 270 of this chapter, provided that all of the conditions for exemption in this section are met. A generator may comply with the conditions for exemption in this section instead of complying with the conditions for exemption in § 262.16(b) or §

Generator Improvements Rule (GIR) Regulatory Crosswalk

- This document identifies the changes that were made to the regulatory citations in the 2016 Hazardous Waste Generator Improvements Rule
  - One primary goal of GIR was to reorganize the regulations to make them more user friendly and straightforward
  - Many of the regulations that apply to generators were either reorganized within 40 CFR part 262 or were copied into part 262 from other parts of the RCRA regulations
  - To make it easier for users to determine how the new citations correspond to the old ones, EPA published several tables in the GIR preamble that detail the old citations and their corresponding new locations in the regulations. EPA has compiled them into a single reference document and made them available here: https://www.epa.gov/hwgenerators/hazardous-waste-generator-regulations-crosswalk

Screenshot of GIR Regulatory Crosswalk Table



Crosswalk of Previous Regulations to Reorganized Regulations

Generator Improvements Rule: November 28, 2016

Title 40 of the Code of Federal Regulations

Table 1—Definitions and General Standards

Regulation	Previous Citation	New Citation	Comment
Definitions of Generator Categories	§§ 260.10, 261.5 and 262.34	§ 260.10	Previous definition of SQG in § 260.10 was outdated. Generator categories were based on §§ 261.5 and 262.34.
Hazardous Waste Limits for VSQGs	§ 261.5(a) and (e)	§ 260.10	Included in the new definition of VSQG
Purpose, Scope, and Applicability	§ 262.10	§ 262.10	Not moved, but expanded significantly
Hazardous Waste Determination and Recordkeeping	§§ 262.11 and 262.40(c)	§ 262.11	Content in § 262.11 is expanded and § 262.40(c) is incorporated
Generator Category Determination	§ 261.5(c), (d), and (h)–(j)	§ 262.13	New section that explains how to count hazardous waste to determine generator category

SQG Re-notification – Upcoming Deadline

- 40 CFR 262.18(d) states:

  Re-notification. (1) A small quantity generator must re-notify EPA starting in 2021 and every four years thereafter using EPA Form 8700-12. This re-notification must be submitted by September 1st of each year in which re-notifications are required

- First deadline is coming up: **September 1, 2021** in states and territories where this provision/2016 Generator Improvements Rule is in effect
- Then the next deadline will be September 1st of 2025, 2029, 2033, etc.
- Currently the rule is in effect in a total of 38 states and territories including 31 authorized states

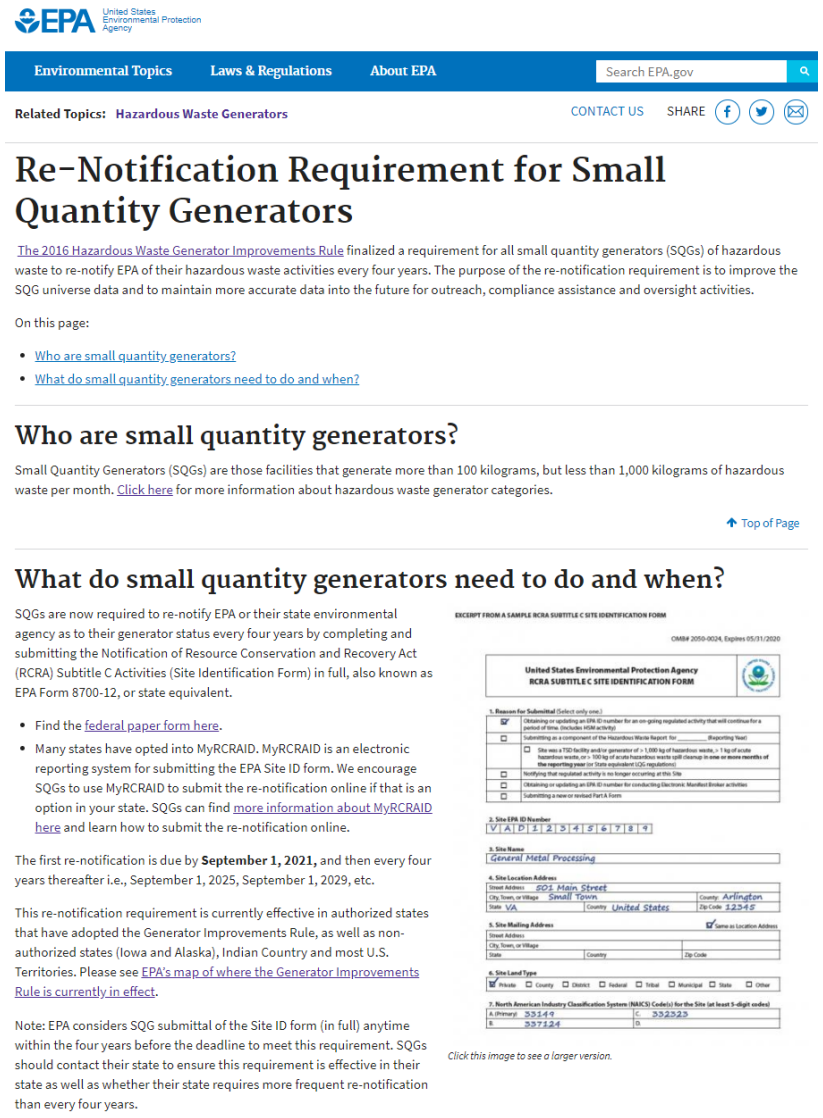
SQG Re-notification Policy Memo

Covers 4 questions/areas

1. What is the window for re-notification before the deadline?
   - Any notification within the 4 years before the re-notification deadline counts
   - Example: For the first cycle, SQG notifications between September 1, 2017 through September 1, 2021 (re-notification deadline) counts
2. Only notifications using Site ID form 8700-12 or State Equivalent can be used (but other 8700-12 notifications count, such as notifying as a health care facility under subpart P)
3. If using data alone to clean-up old/historical notifications, EPA believes a reasonable timeframe is 10 years
4. Reminder that the SQG re-notification data must be inputted into RCRAInfo

Memo is posted on the SQG re-notification webpage and on RCRAOnline

SQG Re-notification Webpage



EPA United States Environmental Protection Agency

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Related Topics: Hazardous Waste Generators | CONTACT US | SHARE

Re-Notification Requirement for Small Quantity Generators

The 2016 Hazardous Waste Generator Improvements Rule finalized a requirement for all small quantity generators (SQGs) of hazardous waste to re-notify EPA of their hazardous waste activities every four years. The purpose of the re-notification requirement is to improve the SQG universe data and to maintain more accurate data into the future for outreach, compliance assistance and oversight activities.

On this page:

- Who are small quantity generators?
- What do small quantity generators need to do and when?

Who are small quantity generators?

Small Quantity Generators (SQGs) are those facilities that generate more than 100 kilograms, but less than 1,000 kilograms of hazardous waste per month. Click here for more information about hazardous waste generator categories.

Top of Page

What do small quantity generators need to do and when?

SQGs are now required to re-notify EPA or their state environmental agency as to their generator status every four years by completing and submitting the Notification of Resource Conservation and Recovery Act (RCRA) Subtitle C Activities (Site Identification Form) in full, also known as EPA Form 8700-12, or state equivalent.

- Find the federal paper form here.
- Many states have opted into MyRCRAID. MyRCRAID is an electronic reporting system for submitting the EPA Site ID form. We encourage SQGs to use MyRCRAID to submit the re-notification online if that is an option in your state. SQGs can find more information about MyRCRAID here and learn how to submit the re-notification online.

The first re-notification is due by **September 1, 2021,** and then every four years thereafter i.e., September 1, 2025, September 1, 2029, etc.

This re-notification requirement is currently effective in authorized states that have adopted the Generator Improvements Rule, as well as non-authorized states (Iowa and Alaska), Indian Country and most U.S. Territories. Please see EPA's map of where the Generator Improvements Rule is currently in effect.

Note: EPA considers SQG submittal of the Site ID form (in full) anytime within the four years before the deadline to meet this requirement. SQGs should contact their state to ensure this requirement is effective in their state as well as whether their state requires more frequent re-notification than every four years.

EXCERPT FROM A SAMPLE RCRA SUBTITLE C SITE IDENTIFICATION FORM

OMB# 2050-0024, Expires 05/31/2020

United States Environmental Protection Agency
RCRA SUBTITLE C SITE IDENTIFICATION FORM

1. Reason for Submittal (Select only one.)

2. Site EPA ID Number: V A D 1 2 3 4 5 6 7 8 9

3. Site Name: General Metal Processing

4. Site Location Address: Street Address 501 Main Street; City, Town, or Village Small Town; County Arlington; State VA; Country United States; Zip Code 12345

5. Site Mailing Address: Same as Location Address

6. Site Land Type: Private

7. North American Industry Classification System (NAICS) Code(s) for the Site (at least 5-digit codes): A. (Primary) 33149; B. 337124; C. 332323; D.

Click this image to see a larger version.

https://www.epa.gov/hwgenerators/re-notification-requirement-small-quantity-generators

Additional Outreach Resources Available on EPA's SQG Re-Notification Webpage

- Customizable postcards for states to use to mail to SQGs to remind them of the upcoming deadline
- Model email language to send to SQGs to remind them of the upcoming deadline
- Flyer for TSDFs to send to their SQG customers to remind them of the upcoming deadline
- Instructions for running SQG "in business" reports in Metabase

GIR Implementation Tools

- On the GIR webpage: https://www.epa.gov/hwgenerators/final-rule-hazardous-waste-generator-improvements

Additional Resources

- Frequent questions about implementing the final rule
- Fact sheet about the final rule
- Frequent questions about the final rule
- Where is the final rule in effect?
- Generator Improvements Rule citation changes

Trainings

In Depth, Three Part Workshop

- Presentation Slides for the Workshop

The following links exit the site EXIT

Click the "View Archive" button on the following pages to access the recording of each Workshop part:

- Recording of Part 1, which covers the goals and background of the rule, hazardous waste determinations, counting, mixing, and marking and labeling.
- Recording of Part 2, which covers episodic generation, consolidation of VSQG waste and closure for large quantity generators.
- Recording of Part 3, which covers satellite accumulation areas, emergency planning and preparedness, reporting and recordkeeping, and state adoption.

Overview of the Final Rule

- Recording of the November 30, 2016 webinar about this rule
- Slides for the November 30, 2016 webinar
- Slides for the January 9, 2017 webinar

EPA's Generator Team

- Jessica Young – Chief of the Recycling and Generator Branch
  - Young.Jessica@epa.gov

- Kathy Lett – Lett.Kathy@epa.gov
- Mary Beth Sheridan – Sheridan.MaryBeth@epa.gov
- Brian Knieser – Knieser.Brian@epa.gov
- Phoebe O'Connor – OConnor.Phoebe@epa.gov
- Patrick Wise – Wise.Patrick@epa.gov

Hazardous Waste Pharmaceuticals Rule - Update

ASTSWMO HW Roundtable

April 29, 2021

Jessica Young- EPA ORCR

Recent Efforts

Focused on developing implementation and best practice information

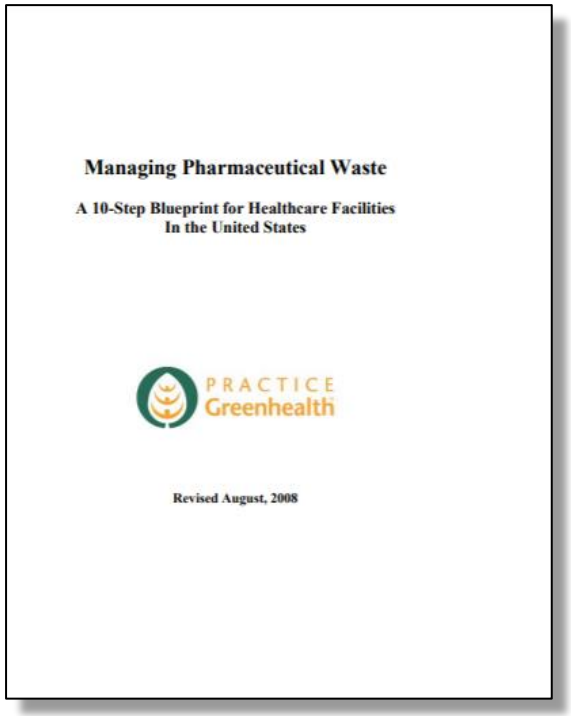
- Added Frequent Questions
- Updating the 10-step Blueprint for Managing Pharmaceutical Waste.
- New web area for unwanted household pharmaceuticals

New Frequent Questions

- Vape shops
  - Created a stand-alone section of FQs called “Vape Shops.”
  - Added seven new FQs that address the regulatory status of e-cigarettes and vape shops under RCRA and subpart P.
  - Geared mostly toward the regulated community and assumes little or no prior RCRA knowledge, but helpful for regulators too.
- HW discharges to POTWs – In Progress
  - Does the sewering prohibition apply to pharmaceutical manufacturers, and what regs prevent HW discharges to a POTW?
  - Goal is to bring awareness of the existing RCRA and CWA restrictions on discharging any HW to a POTW
  - OW fact sheet regarding required notifications to POTWs by generators who want to sewer HW: https://www.epa.gov/sites/production/files/2016-11/documents/fastsheet-reporting_requirements-ius-r.pdf

10-Step Blueprint Update – In Progress

- Helps healthcare facilities develop a comprehensive HW pharmaceuticals management plan that combines regulatory compliance with best management practices.
- Original document published in 2006 and updated in 2008.
- Needs to be updated to reflect the regulatory changes in the Pharmaceuticals Rule and other relevant changes (e.g., DEA regulations).
- This document was developed via an EPA grant and we are doing the same for the update.



Unwanted Household Pharmaceuticals New Web Area – In Development

- Addresses unwanted household pharmaceutical disposal in a more holistic way
  - Not just focused on hazardous waste pharmaceuticals
- Currently working on a number of new webpages which address:
  1. Why drug take-back programs are needed
  2. What households should do with their unwanted medications
  3. What the collectors of household medications should do with the drugs that they have collected
- All pages will be housed in a new web area
  - Cross-cutting issues
  - Exposure beyond the hazardous waste audience

Further Outreach

- Resume in-depth training on the rule when in-person gatherings are safe
  - Particularly for Regions where states are close to adopting or have already adopted.
- Outreach to small facilities
  - Targeted trainings
  - Develop outreach materials

- Feel free to share any ideas/requests on outreach content.

Contacts

- Jessica Young- Chief of the Recycling and Generator Branch
  - Young.jessica@epa.gov

- Kristin Fitzgerald – fitzgerald.kristin@epa.gov
- Brian Knieser- knieser.brian@epa.gov

Lithium-ion Batteries and Solar Panels

ASTSWMO HW Roundtable

April 29

Jessica Young – EPA ORCR

Background on Lithium-ion Batteries (LIBs)

- LIBs are in a large, and growing, number of products:
  - Consumer electronics (headphones, cell phones, tablets, etc.)
  - Electric vehicles
  - Energy storage
- LIBs are also a growing component of the waste stream
- LIBs have been causing fires at MRFs and other waste management facilities
  - This is partially due to consumers disposing of LIBs in household trash and recycling.
  - Consumers should instead drop off LIBs at household hazardous waste collection sites or dedicated battery or electronics recyclers.

Fire at a recycling facility in Larimer County, CO, likely caused by a cell phone battery (August 2018)

Recycling LIBs

- Recycling market is growing in the US
- Two main methods for recycling: pyrometallurgy (smelting) and hydrometallurgy (chemical leaching)
- LIB Recyclers:
  - Retriev (Kinsbursky Bros). Lancaster, OH and Trail, British Columbia
  - Li-Cycle, Rochester, NY, and Kingston, Ontario
  - Redwood Materials, Carson City, NV
- Collection and Transportation Companies:
  - Call2Recycle
  - Big Green Box
- Some recyclers have RCRA permits
  - However, one recycler planned to operate with no prior storage, and site their recycling facility down the road from their LQHUW handler which stored the batteries.

Conflicting symbols on an LIB

Recycling LIBs (continued)

- Economically, cobalt is the driver of LIB recycling*
  - Pyrometallurgy recycling yields cobalt and sometimes nickel
  - Lithium often ends up in the slag or used for non-battery applications
  - Most cobalt comes from Democratic Republic of Congo, where there can be significant unrest
  - Manufacturers are seeking effective cobalt substitutes, which could negatively affect recycling market
  - New recyclers are developing hydrometallurgical recycling and other methods to extract lithium and other metals
- Reuse in stationary applications is another option for LIBs at the end of life
- February 24, 2021, President Biden issued Executive Order 14017, ''America's Supply Chains" part of which looks at advanced batteries and critical minerals which will likely increase focus on the need for recycling of batteries
- LIBs have a few critical minerals in them such as lithium, cobalt, graphite, and manganese

* Source: Harvey, Jan. "Metal recyclers prepare for electric car revolution." Nov. 17, 2017. Reuters

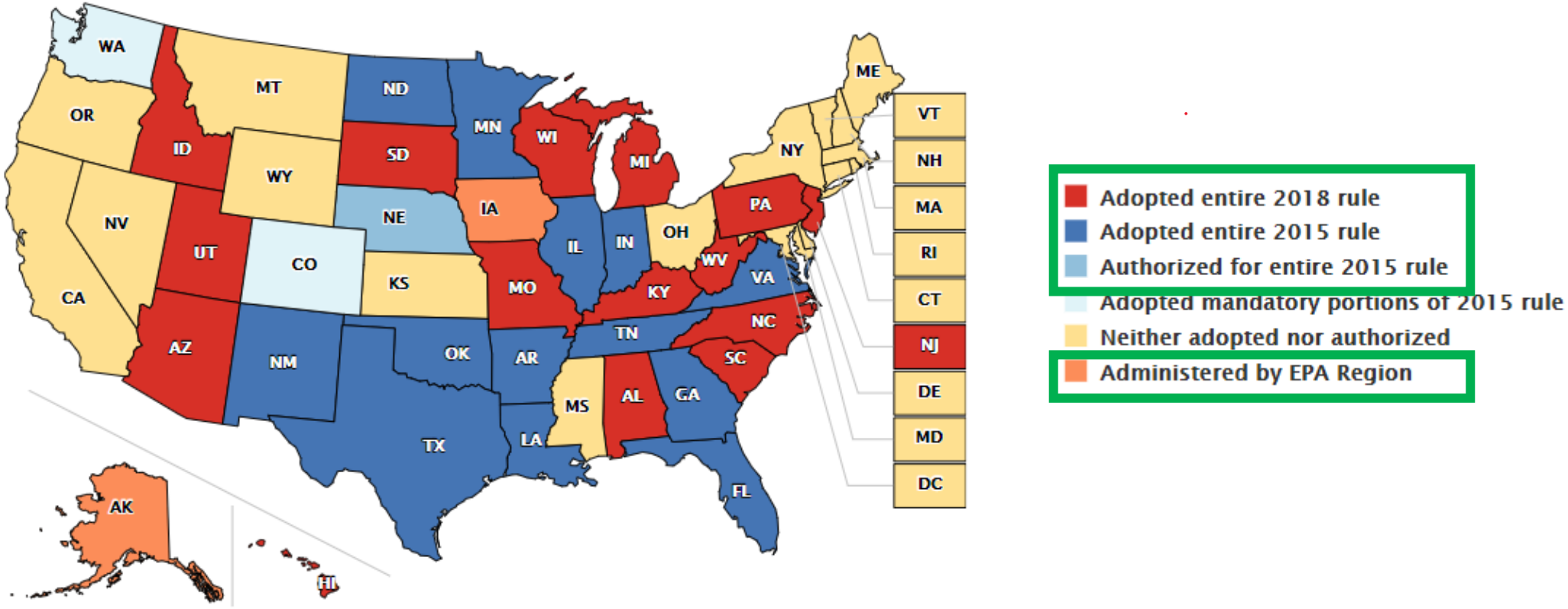
Are LIBs Hazardous Waste? What Regulations Apply?

- Most LIBs are likely hazardous due to ignitability and/or reactivity, given the damage case incidents.
  - EPA has not made a blanket statement on this issue.
  - There is no current test method for reactivity.
- EPA recommends managing LIBs as universal waste (UW) and applying the standards found at 40 CFR Part 273.
  - BMPs for packaging batteries for accumulation include individually bagging and taping terminals.
- For household sources of LIBs, there is the household hazardous waste exclusion (261.4(b)(1)) that would likely exclude batteries from hazardous waste regulation, though not all states have this exclusion.

Regulatory Exclusions for Recycling LIBs

- If LIBs are characteristically hazardous, the transfer-based recycling exclusion for hazardous secondary material (261.4(a)(24)) can be used.
- This exclusion allows the transfer of hazardous secondary materials to third parties for recycling:
  - Materials covered under this exemption are excluded from the definition of solid waste (and hazardous waste).
  - Certain requirements must be met, including:
    - Material must go to a facility with a RCRA permit, or a facility that will pass the reasonable efforts environmental desk audit
    - Material cannot be speculatively accumulated
    - Material must be legitimately recycled
    - Material must be contained to prevent releases to the environment
    - Recordkeeping and emergency preparedness requirements for the generator
    - Reclaimer and intermediate sites must have financial assurance
    - Notification requirements
  - https://www.epa.gov/hw/final-rule-2018-definition-solid-waste-dsw-response-court-vacatur

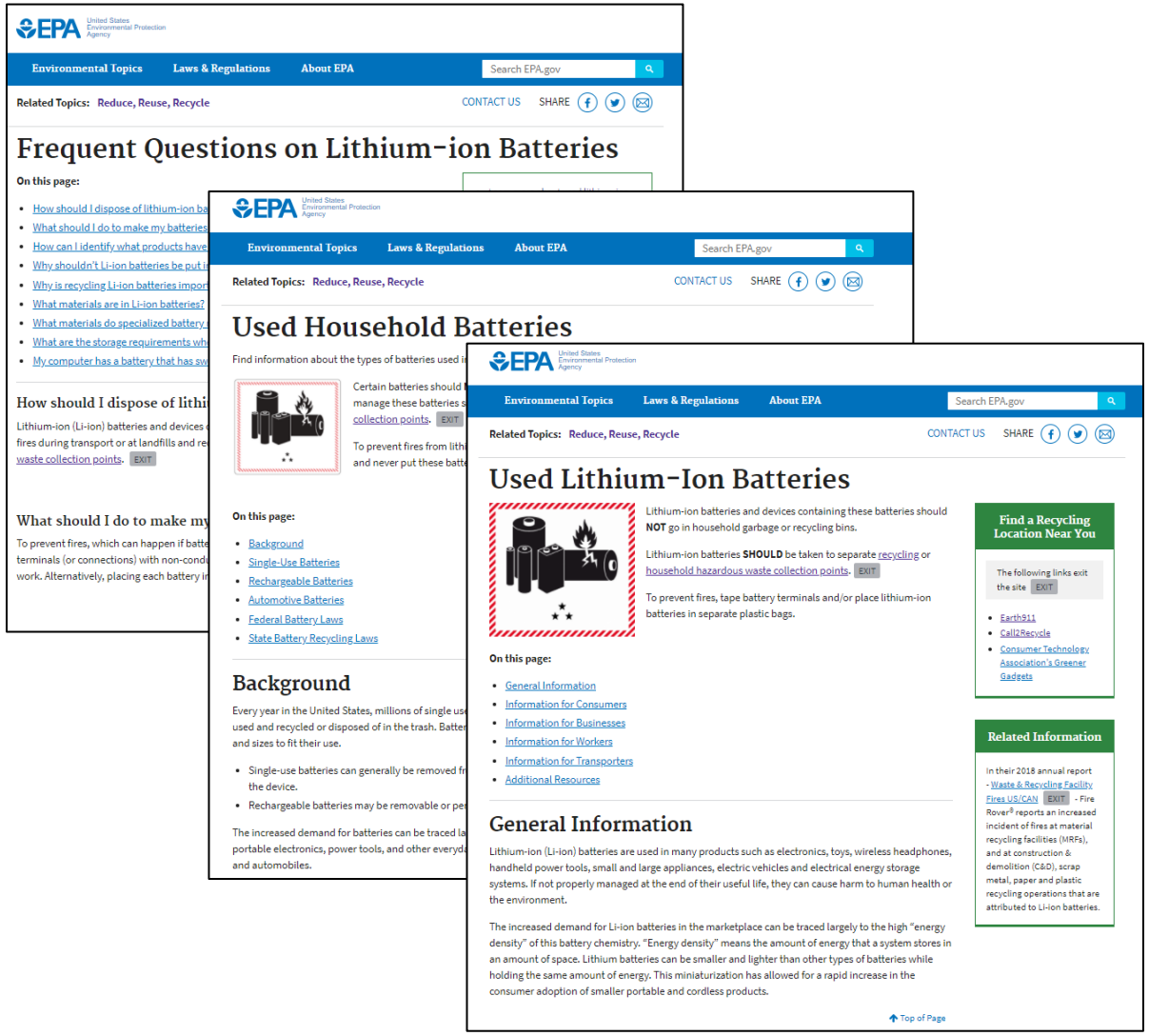
Where the DSW rule (including the transfer-based exclusion) is in effect



Last updated on March 8, 2021
Source: https://www.epa.gov/hw/where-2018-definition-solid-waste-rule-effect

EPA LIB Updates

- New battery webpages under www.epa.gov/recycle:
  - Used LIBs
    - https://www.epa.gov/recycle/used-lithium-ion-batteries
  - Used household batteries
    - https://www.epa.gov/recycle/used-household-batteries
  - Frequent questions on LIBs
    - https://www.epa.gov/recycle/frequent-questions-lithium-ion-batteries

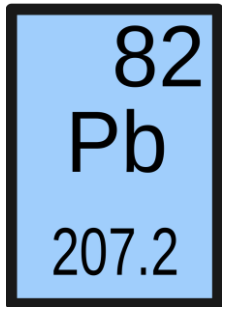


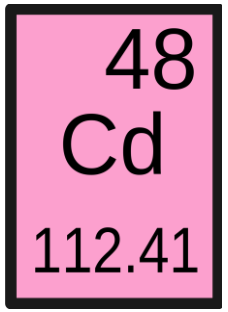
Upcoming EPA LIB Actions

- Damage Case Report
  - Compilation of incidents where LIBs have started fires in the waste management process.
  - To be published ~June 2021
- Upcoming SMM Web Academy Webinars: “Safe Transportation of Lithium Batteries: What You Need to Know in 2021” https://www.epa.gov/smm/sustainable-materials-management-smm-web-academy-webinar-safe-transportation-lithium-batteries
- Stakeholder Workshop
  - Bringing together recycling industry, waste management industry, LIB manufacturers, NGOs, and regulators to discuss the problem and potential solutions.
- Potential Future Actions
  - EPA’s role and actions will be informed by results of stakeholder workshop.
- Let us know if there are additional resources that would be useful

Are Solar Panels Hazardous Waste?

- Generally, if solar panels are considered hazardous waste, they would be hazardous under the toxicity characteristic.
- Depends on the concentration of the toxic constituents in the specific panel in question.
  - Some panels are considered hazardous waste and some are not, even within the same model and manufacturer.
  - Solar panels that are hazardous waste commonly exhibit the toxicity characteristic from lead in the solder and/or cadmium in the panels.
- Aluminum from the frame is not hazardous waste and can be removed and recycled separately.





Toxic Constituents in Solar Panels

- Different varieties of solar panels have different amounts of the toxic metals
- Crystalline-silicon solar PV
  - Lead solder in junction box and in cell connections
- Cadmium-telluride solar PV
  - Cadmium in semiconductor
- Emerging Technology: Perovskite solar cells
  - Lead in semiconductor
- Solar panels exhibit the characteristic of toxicity if concentrations of toxic constituents are above the RCRA thresholds found in [40 CFR Part 261.24]

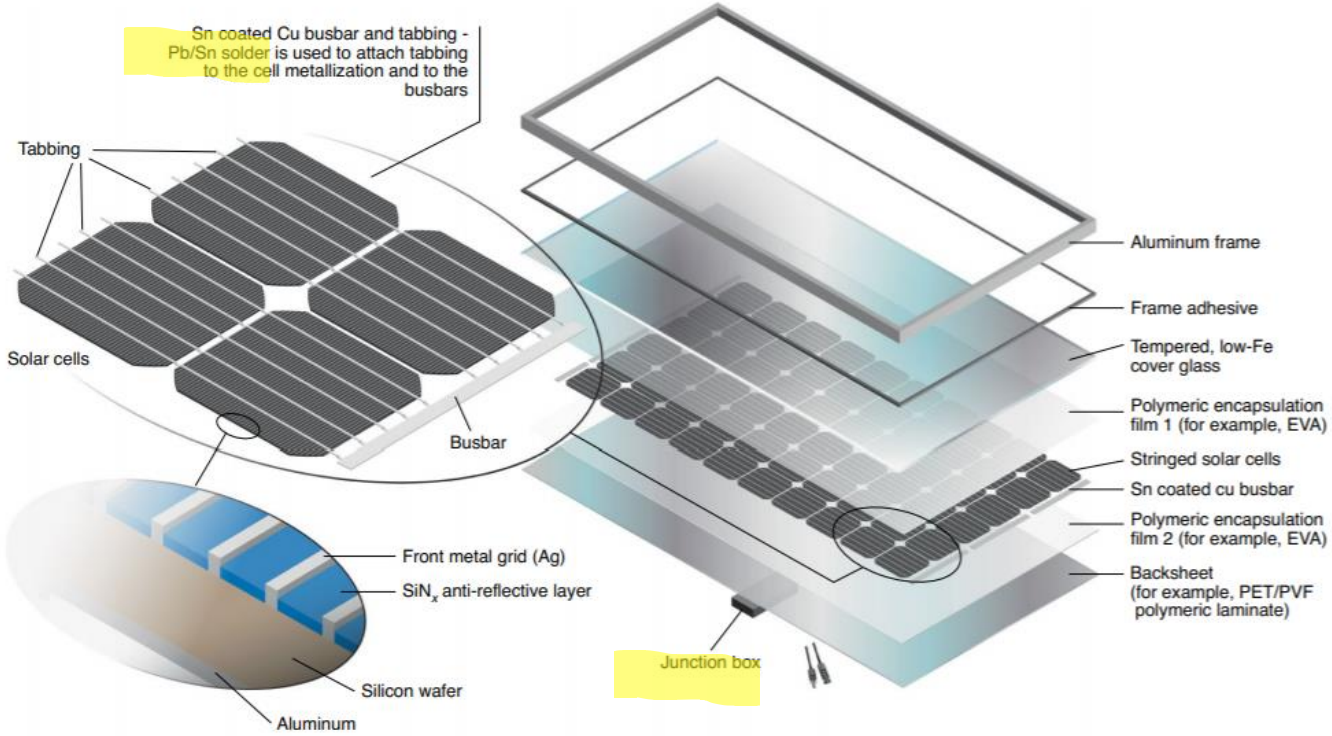


Diagram of a crystalline-silicon panel.
Source: https://www.nature.com/articles/s41560-020-0645-2.pdf

Recycling Solar Panels*

- Current recycling practices can only recover the glass, aluminum, and copper.
  - About $3 of revenue per panel, but costs about $30 per panel to recycle (Dr. Meng Tao, 2021).
  - Low demand for recycled glass.
- With new technology, revenue could increase to $10 per panel
  - Chemical leaching methods can recover silver, which has the highest material value in a solar panel, and other metals.
  - However, the technology is not yet commercially available.
  - Manufacturers are also decreasing the silver content in new panels, which hurts recycling economics.

Material	Weight	Price ($/kg)	Value
Glass	13.5 kg	0.05	$0.68
Al	1.83 kg	0.84	$1.53
Cu	0.11 kg	6.79	$0.75
Total			$2.96

Material	% Recovery	Weight	Price ($/kg)	Value	% Total
Glass	100	13.5 kg	0.10	$1.35	14.1
Al	100	1.83 kg	0.84	$1.53	15.9
Polymers	0	1.18 kg		0	0
Si	90	0.56 kg	1.50	$0.93	9.7
Ag	100	6 g	818.61	$4.91	51.1
Cu	100	0.11 kg	6.79	$0.75	7.8
Pb	100	18.3 g	1.28	$0.02	0.2
Sn	100	21.9 g	4.96	$0.11	1.1
Total				$9.60	100

Source: Dr. Meng Tao, Arizona State University, Major Challenges and Opportunities in Solar Module Recycling Webinar, March 2021

*All information on this slide comes from Dr. Meng Tao of Arizona State University.

Solar Panel Waste Regulation

- For hazardous waste solar panels, the hazardous waste generator regulations found at 40 CFR Part 262 apply.
- Requirements depend on the quantity of HW generated per month, and can include:
  - Obtaining an EPA ID number
  - Personnel training
  - On-site management requirements
  - Manifesting the waste
  - Sending the hazardous waste to a RCRA permitted treatment, storage, or disposal facility
- Additional information is available on the EPA Hazardous Waste Generator Regulatory Summary webpage.
- Solar panels that are recycled can also use the transfer-based exclusion (261.4(a)(24)) mentioned earlier in the presentation.

Actions on Solar Panel Waste

Source: National Renewable Energy Laboratory

- EPA Actions
  - Answering questions as they come in
    - Pointing to transfer-based exclusion
  - Upcoming: solar panel webpages
- State actions
  - California added solar panels as a state UW in January 2021.
    - Hawaii is considering adding solar panels as a state UW and held a public hearing in February 2021.
  - Washington enacted a product stewardship and takeback program for solar panels purchased after July 1, 2017.

DOE's National Renewable Energy Laboratory

- Two recent NREL papers written by Taylor L. Curtis, Heather Buchanan, Ligia Smith, and Garvin Heath are useful resources:
  - "A Circular Economy for Lithium-Ion Batteries Used in Mobile and Stationary Energy Storage: Drivers, Barriers, Enablers, and U.S. Policy Considerations." https://www.nrel.gov/docs/fy21osti/77035.pdf
  - "A Circular Economy for Solar Photovoltaic System Materials: Drivers, Barriers, Enablers, and U.S. Policy Considerations." https://www.nrel.gov/docs/fy21osti/74550.pdf

EPA's End-of-Life Battery Team

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*Contacts for solar panel questions

RCRA Environmental Justice Community of Practice

For additional information please contact:

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Hazardous Waste Subcommittee

Upcoming Task Force Membership Openings

Compliance Monitoring and Enforcement:	Region 6
Corrective Action and Permitting:	Regions 7, 9 and 10
Program Development and Data:	Regions 3, 4 and 8

New Member Form Available at:
http://astswmo.org/get-involved-and-become-a-member/

Upcoming ASTSWMO Webinar

Michigan's Long-Term Stewardship Program

May 18, 2021

3:00 – 4:15 PM Eastern

Register at:
https://attendee.gotowebinar.com/register/8337103407349858574

The End.

Thank You!
Please respond to the Feedback Survey.