

EPA REQUIREMENTS FOR STATIONARY BATTERIES – YOU CAN'T NAVIGATE THIS TOXIC SWAMP WITHOUT A MAP!

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ABSTRACT

If you have – or plan to have - a large installed base of batteries in a single location, you need to know that Uncle Sam and a few of his nephews are looking over your shoulder. In anticipation of a disaster or a chemical accident, you must have an emergency preparedness plan... and the local government – and the state government – want to know what it is! Batteries have hazardous materials in them, so you might have to tell them every year how much of each substance you have. And uh-oh! if you should have a spill, well... Forms, rules and regulations - you'd better know what they are or it could cost you a lot of money. This paper tells you what you need to do, and when, where, how and why to do it.

INTRODUCTION

People who have stationary battery systems sometimes realize that there could be hazardous materials in the batteries. Battery manufacturers know what they must do, so this paper is focused on battery users in the United States. Most users are wise enough to know that they need to have “material safety data sheets (MSDS)” on file, but many are uncertain or unaware of other filing requirements by various government agencies. The truth is that most facilities will not have to declare their battery systems. But users with lots of batteries or with really big battery systems might cross over that line. This paper explains where that line is. Failure to report – not the batteries themselves, but the hazardous substances that make up the batteries – can result in fines.

WHY ARE THE FEDS IN MY BATTERY ROOM?

EPA Emergency Preparedness Organization

The Occupational Safety and Health Agency (OSHA) has a thing or two to say about MSDS sheets, but it is really the Environmental Protection Agency (EPA) that sets the requirements. EPA wants to know the types and quantities of substances in your facility that could be dangerous to employees or neighbors. For example, a site with a few hundred battery containers full of lead and sulfuric acid is certainly a likely candidate. Those who have had dealings with any regulations & regulators in the past already know that there is never a single place to go to get an answer to anything, and this will certainly be no exception. However, the best starting place to learn about this subject is www.epa.gov.

At the highest level there are two types of reporting:

- Pro-active: reporting the hazardous materials present in the batteries at your site
- Re-active: reporting accidents (i.e., spills or “releases”)

These can be broken down into four, more specific types of activities:

- Emergency planning and emergency response plans
- Hazardous chemical storage reporting
- Toxic chemical release inventory
- Emergency release notification

Emergency Planning and Emergency Response Plans

EPA has identified over 350 “extremely hazardous substances”(EHS). If any of these substances are on site at any one time, there is always a possibility of a spill or accidental release. If the building catches fire, these substances might contribute to the severity of the fire or increase the hazard to fire fighters. For example, some materials become highly explosive when heated and then hit with water. Lithium batteries could be one such example. Others can potentially release toxic chemicals into the air. Vaporized sulfuric acid comes to mind.

A law known as the *Emergency Planning and Community Right-to-know Act (EPCRA)* was created following some highly publicized catastrophes. Hundreds of citizens living downwind of factories that had accidents were killed or severely injured. If there was a factory with deadly poisonous gas upwind of where you live, wouldn't you want to know about it? So the U.S. Government created a reporting system to notify both residents and emergency response organizations. The reports must be filed yearly when the amounts on site exceed a *Threshold Planning Quantity (TPQ)*. Curiously... and in a fashion logical only to government officials... the TPQ is reported in weight (pounds) no matter if the chemical exists in solid or liquid form. So you will be required to report pounds of liquid acid in your lead-acid battery.

Most U.S. government rules can be found in the *Code of Federal Regulations (CFRs)*. The 1000's of pages of CFRs are divided into 50 “Titles.” OSHA is covered under Title 29, whereas EPA rules fall under **Title 40, Chapter I, Subchapter J** covers Superfund, Emergency Planning, and Community Right-to-Know programs in Parts 300 - 399. EPCRA is covered in **Parts 350 - 372**. Only the Parts that correspond to the above and are relevant for stationary storage batteries are described in this paper.

Part 355, Subpart B of the CFR covers Emergency Planning and Notification.

Two levels of government might be called upon to respond to a disaster, so each might require reports or establish rules:

- State level - The governor of each state designates a State Emergency Response Commission (SERC) that is responsible for implementing EPCRA provisions within the state.
- Local level - Under the supervision of the SERCs are some 3,500 emergency planning districts, and within each of those is a Local Emergency Planning Commission (LEPC). LEPCs members usually include representatives of local fire department, police, civil defense, public health, transportation and environmental agencies, as well as representatives of affected large facilities, community groups and media. LEPCs must develop an emergency plan, review it annually, and provide information about chemicals that are present in the community to its citizens. If the fire department shows up to fight a fire at your site, they want to be prepared with equipment and methods applicable to the hazards inside. Environmentalists want to know what hazardous substances could find their way into the soil, air, or water supplies. Surface water (creeks, rivers, ponds, lakes) contamination would most likely be the first concern..

What are the hazardous substances?

A “hazardous chemical” is any chemical that exhibits a physical or health hazard and requires an MSDS. The potentially hazardous substances listed on a material safety data sheet in a **lead-acid battery** are:

- Electrolyte – Electrolyte in a lead-acid battery is roughly 1/3 sulfuric acid (CASRN # 7664-93-9) and 2/3 water. Sulfuric acid is considered an “Extremely Hazardous Substance” [EHS]. It is also important to know if the electrolyte is in a free-flowing liquid state (used in so-called “vented” or “flooded” batteries), or if it is immobilized (as in a Valve-Regulated Lead-Acid [VRLA] battery).
- Lead [Pb] – CASRN # 7439-92-1 – Battery plates and posts contain solid lead, most of which is encased inside the container. The concern is for tiny particles of lead that could be suspended in the liquid electrolyte.

NOTE:

- Report the amount of hazardous material in the electrolyte – not the amount of electrolyte itself
- Report the amount by weight, not by volume

- Lead Dioxide [PbO₂] – CASRN # 1309-60-0 – Lead Dioxide is pasted onto the positive plates encased inside the battery. It can only be exposed if the container is ruptured.
- Lead Sulfate [PbSO₄] – CASRN # 7446-14-2 – Lead sulfate is formed at both the positive and negative plates during discharge. It normally is present only in insignificant amounts.

The potentially hazardous substances listed on a material safety data sheet in a **nickel cadmium battery** can include:

- Electrolyte – Electrolyte in a Ni-Cd battery is approximately ¼ Potassium Hydroxide in solution [KOH] (CASRN # 1310-58-3). KOH is a corrosive substance, and is flammable when not in dilute solution, but it is *not* considered to be an “extremely hazardous substance”
- Cadmium (CASRN # 7440-43-9) – EPA has classified cadmium as a probable human carcinogen, categorized as high acute toxicity. It is primarily dangerous when inhaled or consumed in drinking water. Its use is restricted in the U.S.A. Other agencies (e.g., World Health Organization, National Toxicology Program) have also classified cadmium as a known human carcinogen. See: http://www.atsdr.cdc.gov/csem/cadmium/cdpathogenic_changes.html.
- Nickel (CASRN # 7440-02-0)
- Cobalt - (CASRN # 7440-48-4)

Manufacturers of small **Lithium-Ion batteries** disagree about whether they should be counted or not, but most argue that their batteries are considered an “article” under OSHA definitions and, as such, do not require MSDS... although they do acknowledge concerns about federal and international transportation regulations for Li-Ion batteries. Large format Li-Ion batteries are classified as “non-hazardous waste” for disposal purposes by the EPA. For purposes of this paper, we shall assume that Li-Ion is “under the radar” and no reporting is required.

What are the threshold planning quantities (TPQs)?

As indicated above, large quantities of hazardous material must be reported annually to help local emergency teams plan disaster response. Despite the presence of hazardous substances described above, the quantities of some are so minute that they need not be reported. As some substances vary depending upon the state of charge, MSDS sheets should give the percentage of any reportable substance in a battery that is always constant. Here are the ones you need to be concerned about.

- **Lead-Acid Batteries**

- **500 pounds of sulfuric acid** (CASN # 7664-93-9)
- 10,000 pounds of anything else listed on the MSDS

Note: Under statute, the threshold planning quantity in 40 CFR 355-Appendix A for sulfuric acid is 1,000 pounds. However, a footnote directs the reader to 40 CFR 370.20 (b)(1) which says, “The minimum threshold for reporting for extremely hazardous substances is 500 pounds... or the TPQ, whichever is lower.” As sulfuric acid is classified as EHS, its reportable quantity is 500 pounds.

Per recent changes in the law, you now have the option of reporting the weight of the solution, water and sulfuric acid (H₂SO₄), or just the specific hazardous substance (H₂SO₄). If you are not even close to the threshold, it is probably easiest to just report the amount of electrolyte. But if you are close to the threshold, you should consider reporting the hazardous substance only.

! For sulfuric acid inventory, don't forget to include any lead-acid batteries in forklift batteries (if forklifts are located at the site).

The main concern for lead is particulate matter that could get into drinking water, either in powder form or in solution. Reporting is rarely required for lead in batteries because, per 40 CFR 370.2 exemption (2), excluded is “any substance present as a solid in any manufactured item to the extent exposure to the substance does not occur under normal conditions of use.”

- **Nickel-cadmium batteries**

- 10,000 pounds of anything listed on the MSDS

When do reports have to be submitted?

If yours is one of the few facilities that exceeds the TPQ described above, you must submit a report before **March 10** of each year. If you have never submitted a report before, then you must submit an inventory report within 60 days after your facility exceeds the planning threshold or 30 days after any change in status. Reports must be submitted by your designated “facility emergency coordinator.”

Who gets the reports?

Submit **MSDS** to:

- the Local Emergency Planning Commission (LEPC),
- State Emergency Response Commission (SERC), and
- the local fire department

Provide MSDS to any person in the community who requests one in writing from the LEPC

Prepare and submit “**Tier 1**” *Emergency and Hazardous Chemical Inventory Forms* when hazardous materials have been present in the facility during the preceding calendar year above the threshold limits;

-or-

Prepare and submit “**Tier 2**” **inventory reports** upon request by the LEPC, SERC, or local fire department. In practice, most jurisdictions require Tier 2 reports because they require more detail than a Tier 1 report. It is possible that *both* Tier 1 and Tier 2 could be required.

Provide Tier 2 reports to any person in the community who requests one in writing from the LEPC.

Where are the forms?

MSDS sheets must be provided by the battery manufacturer. If the batteries are provided by a third party (such as a distributor or integrator), the MSDS must be passed on to the end user. Most battery manufacturers include MSDS sheets on their web sites.

Forms and instructions for both Tier 1 and Tier 2 reports can be downloaded from the EPA web site.

<http://www.epa.gov/emergencies/content/epcra/tier2.htm>

This site includes links to the requirements of every state, some of which have additional requirements. Most now accept electronic submittals. The site also includes a link to a software program designed to export Tier II Chemical inventory data into emergency planning software.

An example of Tier 2 form is included at the end of this paper.

What are the consequences of not filing a report?

- Failure to provide MSDS sheets: \$10,000 per day for each violation
- Failure to provide Tier 1 or Tier 2 inventory reports: \$25,000 per day for each violation

Consequences get worse for repeat offenders.

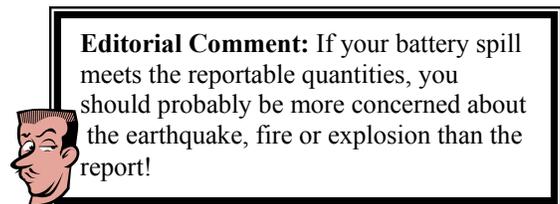
When is it necessary to report a spill or a release?

Part 355, Subpart C of the CFR covers Emergency Releases.

The good news is that a battery user will probably *never* have to report a spill unless a calamity of seismic proportions occurs. You do not have to provide emergency release notification under this subpart for any release that results in exposure to persons solely within the boundaries of your *facility*. So unless your battery creates such a large spill that electrolyte is flowing out into the street (or possibly down the city sewer system), you probably will never have a reportable event.

But in the interest of full disclosure, let's cover the rules... just in case. Substances that must be reported are the extremely hazardous substances (EHS) previously discussed, or those listed by CERCLA. (CERCLA is the "Comprehensive Environmental Response, Compensation and Liabilities Act," also known as "Superfund.") Reportable quantities (RQs) for CERCLA hazardous substances are listed in Table 302.4 of 40 CFR 302.4 in the column labeled "final RQ." Substances of interest to battery users include:

- | | |
|--|----------------------|
| • Cadmium..... | 10 pounds (4.54 kg)* |
| • Lead..... | 10 pounds (4.54 kg)* |
| • Sulfuric acid (H ₂ SO ₄)..... | 1000 pounds (454 kg) |
| • Potassium Hydroxide (KOH).... | 1000 pounds (454 kg) |



Editorial Comment: If your battery spill meets the reportable quantities, you should probably be more concerned about the earthquake, fire or explosion than the report!

* No reporting is required if the diameter of the pieces of the solid metal released is larger than 100 micrometers (0.004 inches)

It is conceivable that a spill of such magnitude could occur during transportation, in which case two reports would have to be filed by whoever has control over the batteries at that time (lawyers – check your terms and conditions!).

1 - *Immediate notification* to the community emergency coordinator for the LEPC of any area likely to be affected by the release, "as soon as possible." The immediate notice should be oral (telephone, public address system, etc.).

- 2 - *Follow-up emergency notification* should be submitted – in writing – “as soon as possible.” More than one report may be required if information is not readily available. There is no specific follow-up form, but the LEPC may require the information in a particular format. Information includes such things as date, time, duration, location, chemical name or identification (CAS #), EHS designation, estimated quantity, contact information, & other information typically found on MSDS.

What constitutes a “facility?”

Facility means all buildings, equipment, structures, and other stationary items that are located on a single site or on contiguous or adjacent sites and that are owned or operated by the same person (or by any person that controls, is controlled by, or under common control with, such person). *Facility* includes manmade structures, as well as all natural structures in which chemicals are purposefully placed or removed through human means such that it functions as a containment structure for human use. For purposes of emergency release notification, the term includes motor vehicles, rolling stock, and aircraft.

SUMMARY

Most commercial applications of stationary batteries fall well below the reporting thresholds established by EPA. So-called “flooded” batteries are more likely than sealed or immobilized electrolyte batteries to require reporting, whether for inventory reporting or emergency release reporting.

The following is an example of the steps one would take for inventory reporting of lead-acid batteries under EPCRA rules:

1. Take an inventory of all batteries in the facility
2. Contact the battery manufacturer or supplier and provide the model/catalog number of every battery type. Ask for:
 - a. material safety data sheets (MSDS)
 - b. Spec sheets on each batter, specifically:
 - i. Amount (weight) of lead in each battery
 - ii. Amount (weight) of acid in each battery
 - iii. Amount (weight) of lead dioxide in each battery
3. Calculate the aggregate (total) amount of each hazardous substance that is present in the entire facility (if on a campus, include all buildings). For example, calculate the weight of sulfuric acid in your lead-acid batteries

- When the weight of acid in each container is known (provided by the battery manufacturer or supplier)

Total = weight of acid in the container x number of containers in a string x number of battery strings

- When the weight of acid in each container is not known, calculate the total weight using the following formula

Total = weight of battery container x percentage of electrolyte in the container (from the MSDS or estimated using the formula in the next bullet) x the percentage of acid in the container x the number of containers in a string x the number of battery strings

- If the percentage of electrolyte in each container is unknown, estimate it using the following formula and plug it into the formula above:

Estimated weight of electrolyte = weight of battery container x 0.18

4. Determine if the aggregate amount exceeds the minimum threshold for reporting
 - a. 500 pounds of sulfuric acid or electrolyte with sulfuric acid in solution
If the total amount of sulfuric acid in all the batteries is above 500 pounds, the sulfuric acid must be reported as a separate chemical entry under the Chemicals in Inventory screens. For this entry, you may note on the Storage Locations screen / Locations field(s) that the sulfuric acid is stored in lead acid batteries, and then you can provide the storage location description of those batteries.
 - b. 10,000 pounds of lead
 - c. 10,000 pounds of lead sulfate
5. If any of the thresholds is exceeded
 - a. contact the facility's Emergency Response Coordinator (ERC)
If no ERC exists, appoint one
 - b. Contact the local Emergency Planning Commission (LEPC)
 - c. Determine the type of report required (usually a Tier 2 report)
 - d. Pull down the forms from the EPA web site and fill them out
The owner, operator, or officially designated representative must certify the accuracy of data
6. Submit the forms plus the MSDS within 60 days after receipt of batteries that cause the facility to exceed the reporting amount (or as soon as possible if the batteries are already on site)
7. Submit updates
 - a. Annually by March 1 for inventory of the previous year
 - b. Within 30 days of any significant change
8. Permit on-site inspections upon request by the Fire Department having jurisdiction
9. Submit Tier 1, Tier 2, and/or MSDS within 30 days of a request by the SERC, LEPC, or Fire Department
10. Get help at:
 - a. EPCRA Hotline: 800-294-9356 or (703) 412-0810 (M-Th, 9:00 – 3:00 EST)
 - b. EPA Emergency Management website
<http://www.epa.gov/emergencies/index.htm>
[or]
<http://www.epa.gov/emergencies/content/epcra/index.htm>

ATTACHMENT A

Typical Tier Two Emergency and Hazardous Chemical Inventory Form

ADDITIONAL READING

APC White Paper # 32, "Battery Technologies for Data Centers and Network Rooms: Environmental Regulations,"
<http://www.apc.com/go/promo/whitepapers/index.cfm?tsk=s897y>

DISCLAIMER

The information in this paper is informational only; it is not an official summary and does not contain the complete information. Because federal government rules change from time to time, and because every state and/or local government may have the option to modify the regulations, the reader is advised to determine the rules in any particular jurisdiction. The web site addresses provided in this paper are a good place to start.

ABOUT THE AUTHOR

Stephen McCluer is a Senior Manager for external codes and standards at APC by Schneider Electric. He has over 25 years of experience in the power protection industry. He serves on NFPA Technical Committees 75 (Information Technology Equipment), 110 (Emergency and Standby Power) and 111 (Stored Electrical Energy). He chairs several task groups within the IEEE stationary Battery Committee, and he serves on two BICSI standards development committees. He is a frequent speaker at Battcon and has authored many articles. stephen.mccluer@apc.com

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<p>Tier Two EMERGENCY AND HAZARDOUS CHEMICAL INVENTORY</p> <p><i>Specific Information by Chemical</i></p>	<p>Facility Identification</p> <p>Name _____</p> <p>Street _____</p> <p>City _____ County _____ State _____ Zip _____</p> <p>NAICS Code _____ Dun & Brad Number _____</p>	<p>Owner/Operator Name</p> <p>Name _____ Phone () _____</p> <p>Mail Address _____</p>
	<p>FOR OFFICIAL USE ONLY</p>	<p>Emergency Contact</p> <p>Name _____ Title _____</p> <p>Phone () _____ 24 Hr. Phone () _____</p> <p>Name _____ Title _____</p> <p>Phone () _____ 24 Hr. Phone () _____</p>
<p>ID # _____</p> <p>Date Received _____</p>		

Important: Read all instructions before completing form Reporting Period From January 1 to December 31, 20 _____ Check if information below is identical to the information submitted last year.

Chemical Description	Physical and Health Hazards <i>(check all that apply)</i>	Inventory	Container Type	Pressure	Temperature	Storage Codes and Locations (Non-Confidential) <i>Storage Locations</i>	Optional												
<p>CAS _____ Trade Secret _____</p> <p>Chem. Name _____</p> <p><i>Check all that apply</i> <input type="checkbox"/> Pure <input type="checkbox"/> Mix <input type="checkbox"/> Solid <input type="checkbox"/> Liquid <input type="checkbox"/> Gas <input type="checkbox"/> EHS</p> <p>EHS Name _____</p>	<p><input type="checkbox"/> Fire</p> <p><input type="checkbox"/> Sudden Release of Pressure</p> <p><input type="checkbox"/> Reactivity</p> <p><input type="checkbox"/> Immediate (acute)</p> <p><input type="checkbox"/> Delayed (chronic)</p>	<p>Max. Daily Amount (code) _____</p> <p>Avg. Daily Amount (code) _____</p> <p>No. of Days On-site (days) _____</p>	<table border="1" style="width:100%; height: 40px;"> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> </table>															<p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p>	<p><input type="checkbox"/></p>
<p>CAS _____ Trade Secret _____</p> <p>Chem. Name _____</p> <p><i>Check all that apply</i> <input type="checkbox"/> Pure <input type="checkbox"/> Mix <input type="checkbox"/> Solid <input type="checkbox"/> Liquid <input type="checkbox"/> Gas <input type="checkbox"/> EHS</p> <p>EHS Name _____</p>	<p><input type="checkbox"/> Fire</p> <p><input type="checkbox"/> Sudden Release of Pressure</p> <p><input type="checkbox"/> Reactivity</p> <p><input type="checkbox"/> Immediate (acute)</p> <p><input type="checkbox"/> Delayed (chronic)</p>	<p>Max. Daily Amount (code) _____</p> <p>Avg. Daily Amount (code) _____</p> <p>No. of Days On-site (days) _____</p>	<table border="1" style="width:100%; height: 40px;"> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> </table>															<p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p>	<p><input type="checkbox"/></p>
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<p>Certification (Read and sign after completing all sections)</p> <p>I certify under penalty of law that I have personally examined and am familiar with the information submitted in pages one through _____, and that based on my inquiry of those individuals responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete.</p> <p>_____ Name and official title of owner/operator OR owner/operator's authorized representative</p> <p>_____ Signature</p> <p>_____ Date signed</p>	<p>Optional Attachments</p> <p><input type="checkbox"/> I have attached a site plan</p> <p><input type="checkbox"/> I have attached a list of site coordinate abbreviations</p> <p><input type="checkbox"/> I have attached a description of dikes and other safeguards measures</p>
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