

# Lessons Learned with School Inspections through the Years

Working with the Volusia County School Environmental team to fine-tune inspections

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## State of Florida Pilot Program

School Chemical Cleanout Campaign (SC3) in 2005 established a need for training and school inspections.

“The main goal for this program is to create a chemically safer school environment in which chemicals are purchased wisely, stored safely, handled by trained personnel, used responsibly, and disposed of properly.” SC3 quote.

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# Volusia County School Inspection History



2019 – identified issues



2019-2020 – first round of inspections



2022 – second round of inspections, adding transportation



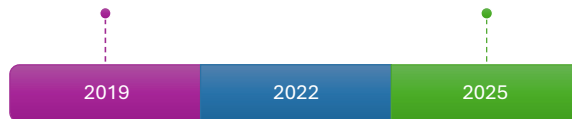
2025 – third round of inspections, adding all school board property

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## Inspections Overall

A lot of expired chemicals, oldest 1954. Many chemicals stored improperly, residue on many chemical containers, elemental mercury in schools, unknowns, and open containers. Many reinspections.

Minimal expired chemicals. Only one reinspection required to date. Vehicle maintenance locations are in much better shape.



Mainly high schools with expired chemicals, still improper storage, less reinspections.

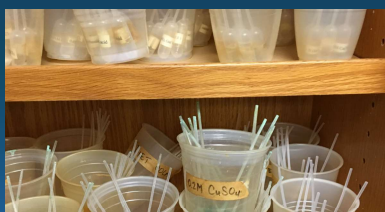
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## More facilities inspected

The list grew from about 75 locations in 2019 to 91 in 2025.

All locations are being inspected during the calendar year, which can be challenging working around the school's calendar and testing schedule.

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## Information provided in 2019

The first round I provided a science chemical spreadsheet that explains proper storage, shelf life, and safety ratings according to the chemical manufacturers to each Principal. This spreadsheet has two locations for teachers to add in their inventory for each chemical. I also provided used oil and fluorescent lamp flyers.

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# 2022 inspections

The chemical spreadsheet was provided to teachers and principals that requested a copy. A copy was emailed to each science chair.

Presentation made to chemistry teachers on how to use the spreadsheet and proper storage of chemicals.

Chemical Name	Risk	Storage Category	Hazards	Shelf Life	Number of Containers	Estimated Total Amount	Health	Flammability	Reactivity	Special Hazard
Acetaldelyde	3	O-3 Flamm	Suspect carcinogen, Highly flammable, Peroxide former							
Acetaminide	2	O-2	Severe irritant to eyes	DO NOT USE			2	4	2	
Acetic Acid, glacial	2	O-2	Suspect carcinogen	Limited, 24 months			2	1	1	
Acetic Acid, 98%	2	O-1 Organic	Corrosive				3	2	0	
Acetic Acid, Glacial	2	Acid	Corrosive	24 months			3	2	0	
Acetic Anhydride	2	O-1 Flamm	Corrosive, Combustible	24 months			3	2	0	
Acetic Chloride	2	O-1 Flamm	Corrosive, Flammable	DO NOT USE			3	2	3	
Acetic Cyanide	1	O-Misc	Corrosive	12 months			2	1	0	
Acetone	2	O-4 Flamm	Highly flammable	24 months			2	3	0	
Acetone Alcohol	2	O-4 Flamm	Flammable	24 months			2	3	0	
Acetonitrile	2	O-7 Flamm	Flammable, Toxic by skin absorption, inhalation & ingestion	2 weeks			2	3	0	
Acetyl Chloride	3	O-4 Acid	Corrosive, Reacts with water & alcohol	DO NOT USE			3	3	2	W
Acetone (peroxydialdehyde)	3	O-3 Flamm	Flammable, Inhalation toxic, Sewer irritant, Many incompatibilities, P-Hazard	DO NOT USE			4	3	3	
Acrylamide	3	O-3	Toxic by absorption, suspected carcinogen	DO NOT USE			2	2	2	
Acrylic Acid	3	O-4 Organic	Corrosive, Poison by inhalation & skin absorption	DO NOT USE			3	2	2	
Acrylonitrile	3	Acid	Flammable	DO NOT USE			4	3	2	
Adelone	1	O-2 Flamm	Flammable, Poison by inhalation, skin absorption	DO NOT USE			4	3	2	
Adelone Chloride	2	O-2	Toxic if swallowed	60 months			2	1	1	
Adelone Chloride	2	O-1 Organic	Corrosive, absorbs through skin, lachrymator	DO NOT USE			3	2	2	
Adrenaline (epinephrine)	3	Acid	Toxic, Thft risk, Drug Precursor	DO NOT USE			4	1	1	
Agar	1	O-Misc	Flammable	30 to 12 months			0	1	0	
Aluminum Ammonium Sulfate	1	I-2	Skin, eye, respiratory irritant	60 months			1	0	0	
Aluminum Chloride, amorphous	2	I-2	Water reactive, Corrosive	DO NOT USE			3	0	2	W
Aluminum Chloride, 6-hydrate	2	I-2	Body tissue irritant	24 months			3	0	0	
Aluminum Hydroxide	1	I-4 Base Cabinet	Corrosive when wet	24 months			2	1	0	
Aluminum Nitrate	1	I-3	Oxidizer	60 months			2	0	0	OX
Aluminum Oxide	1	I-4	Skin, eye, respiratory irritant	60 months			1	0	0	
Aluminum Potassium Sulfate	0	I-2	Non-hazardous	60 months			0	0	0	
Aluminum Sulfate	1	I-2	Skin, eye, respiratory, gastrointestinal tract irritant	60 months			2	0	1	
Aluminum, metal lamp	0	I-1	Non-hazardous	indefinite			0	0	0	
Aluminum, powder	1	I-1	Highly flammable as dust, indefinte if sealed				0	3	1	W
Ammonia, gas cylinders	3	Poison Gas	Corrosive lachrymator, intense irritant, thft risk	DO NOT USE			3	1	2	
Ammonia, liquid old liquid	1	I-4 Base Cabinet	Severe eye irritant, Moderately corrosive to skin	24 months			3	0	0	
Ammonium Acetate	1	I-2	Skin, eye, respiratory irritant	12 months			1	1	1	
Ammonium Bicarbonate	1	I-4	Skin, eye irritant	24 months			2	0	1	
Ammonium Dichromate/Dichromate	3	I-8	Powerful oxidizer, toxic, carcinogen	DO NOT USE			4	1	3	OX

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# 2025 inspections

Presentation on chemical storage and handling during pre-planning

Training for FMTs

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## Things learned...

If you don't give it to the teacher themselves, then they will probably not receive it.

Faculty and staff has a huge turnover, so each year there is a lot of training to do.

Even if you train the teachers, the custodians and the facility maintenance technicians need training too.

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## Knowledge brought to the program

I was a teacher, so I knew what it was like in the classroom.

Science teachers that do a lot of experiments buy most of their supplies out of their own pocket.

Teachers have a very full schedule and the only way to accomplish the initial organization system is to put in extra time, which is unpaid.

Professional Learning Centers (PLCs) are the best time for training and work time for teachers to accomplish their organization.

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## How do teachers get rid of expired chemicals?

Lab packs with kitty litter inside to prevent the bottles from breaking, spilling, and mixing.

Teachers need training on how to pack lab packs too.

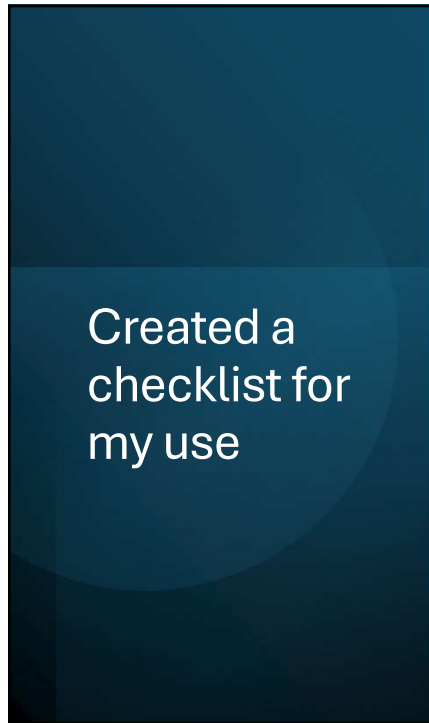


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## Issues identified this round of inspections

- Still problems with fluorescent lamps being stacked in corners or in open boxes. The school system switched to LEDVance lamps and thought they were LEDs. They are not. The bulbs are all marked as containing mercury.
- Mis-storage of chemicals. Supplying list with proper storage information and training.
- Unmarked and open containers.

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Checklist for schools

- NPIG - flammable
- NPLG - MEK, PVC Cement, caustic
- Scrap Metal and Electronics
- Science Chemicals
- Aerosols
- Batteries - Tool, AA etc, Lead Acid, AED
- Paint, Varnish, Polyurethane
- Pesticide Containers
- Coil Cleaner
- MEK
- Petroleum Distillates - Goo Gone, Stainless Steel Polish
- Acetone, Thinners, Mineral Spirits
- Oils
- Oil filters
- Oily absorbents - rags, pig mat, absorbents
- Fuels - gasoline, propane, butane
- Goo Gone
- Gum Remover (Butane)
- Muriatic Acid
- DeLimer
- Degreaser
- Xylene
- HCl Toilet cleaners
- Inks
- Fluorescents
- Vapes
- Pharmaceuticals
- Solar Panels

- Locations
- Screen Printing - inks, paints, cleaners
- Photography - developer, fixant, stop bath
- Agriculture - pharmaceutical, metal, oils
- Art - lead based, asbestos kilns, glazes
- Science rooms/chemical storage - chemicals and storage, dissection organisms, Electronics, metals, solar panels, batteries
- Maintenance receiving and rooms - general list
- Mechanical rooms - mis storage
- Electrical rooms - mis storage
- Storage rooms - general list
- Clinic - AED, pharmaceuticals, expired chemicals
- Office - Vapes

Question - sump, Gators/Golf Cart maintenance/repairs

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## A handy compatibility chart

In general:

- Reactive must be segregated from Ignitables
- Acids must be segregated from Caustics
- Corrosives should be segregated from Flammables
- Oxidizers should be segregated from EVERYTHING
- Many Corrosives are "Water Reactive"
- Most Organic Reactives must be segregated from Inorganic Reactives (metals)

Ignitables (Flammables/Combustibles)	Acids	Corrosives Caustics
Carburator Cleaners Engine Cleaners Epoxy, Resins, Adhesives, and Rubber Cements Finishes Fuels Lacquers Paints Paint Thinners Paint Wastes Pesticides that contain Solvents (such as Methyl Alcohol, Ethyl Alcohol, Isopropyl Alcohol, Toluene, Xylene) Petroleum Solvents (Drycleaning Fluid) Solvents: Acetone Benzene Carbon Tetrachloride (Carbon Tet) Ethanol (Ethyl Alcohol) Ethyl Benzene Isopropyl Alcohol Kerosene (Fuel Oil #1) Methanol (Wood Alcohol) Methyl Ethyl Ketone (MEK) Petroleum Distillates Tetrahydrofuran (THF) Toluene (Methacide, Methylbenzene, Methylbenzol, Phenylmethane, Toluol, Antiall 1A) White Spirits (White Spirits, Mineral Spirits, Naptha) Xylene (Xylol) Stains Shipping Agents Varnish Waste Fuels Waste Ink Wax Removers Wood Cleaners	Battery Acids Degreasers and Engine Cleaners Etching Fluids Hydrochloric Acid Hydrofluoric Acid (Muriatic Acid) Nitric Acid (40%)(Aquafortis) Phosphoric Acid Rust Removers Sulfuric Acid (Oil and Vitrol)	Asphylene Sludge Alkaline Battery Acids Alkaline Cleaners Alkaline Degreasers Alkaline Etching Fluids Lime and Wastewater Potassium Hydroxide (Caustic Potash) Rust Removers Sodium Hydroxide (Caustic Soda, Soda Lye)
	Reactive Metals	Reactive Organic Compounds and Solutions
	Lithium (Batteries) Aluminum Beryllium Calcium Magnesium Sodium Zinc Powder	Aldehydes Aldehydes Chromic Acids (from chrome plating, copper anodizing and aluminum anodizing) Cyanides (from electroplating operations) Hypochlorites (from water treatment plants, swimming pools, sanitizing operations) Organic Peroxides (including Hydrogen Peroxide) Perchlorates Permanganates Sulfides
	Oxidizers	
	Chlorine Gas Nitric Acid (>40%), aka Red Fuming Nitric Nitrates (Sodium Nitrate, Ammonium Nitrate) Perchlorates Perbromic Acid Peroxides Calcium Hypochlorite (>60%)	

### Hazardous Material/Hazardous Waste Storage Incompatibility Chart

Substances in bold have detailed example lists on the next page.

If the material contains:	It may not be stored with any of the following:
<b>Acid</b> (pH below 2.0)	<b>Caustics</b> (pH above 12.5) <b>Reactive Metals</b> Alcohol Water Aldehydes Halogenated, Nitrated, or Unsaturated Hydrocarbons <b>Reactive Organic Compounds and Solvents</b> Spent Cyanide and Sulfide Solutions <b>Oxidizers</b>
<b>Caustic</b> (pH above 12.5)	<b>Acid</b> (pH below 2.0) <b>Reactive Metals</b> Alcohol Water Aldehydes Halogenated, Nitrated, or Unsaturated Hydrocarbons <b>Reactive Organic Compounds and Solvents</b> <b>Oxidizers</b>
<b>Reactive Metals</b>	<b>Caustics</b> <b>Acids</b> Alcohol Aldehydes Halogenated, Nitrated, or Unsaturated Hydrocarbons <b>Reactive Organic Compounds and Solvents</b> <b>Oxidizers</b>
<b>Reactive Organic Compounds and Solvents</b>	<b>Caustics</b> <b>Acids</b> <b>Reactive Metals</b>
<b>Spent Cyanide and Sulfide Solutions</b>	<b>Acids</b>
<b>Oxidizers</b>	<b>Acetic or Other Organic Acids</b> Concentrated Mineral Acids <b>Reactive Metals</b> <b>Reactive Organic Compounds and Solvents</b> <b>Ignitable (Flammable/Combustible) Wastes</b>

"Ignitable" in this context refers to substances with a flashpoint below 140°F and includes:  
Combustible substances, with a flashpoint below 140°F.  
Flammable substances, with a flashpoint below 100°F.

#### Some Deadly Combinations

Acids + Oil or Grease = Fire	Flammable Liquids + Hydrogen Peroxide = Fire/Explosion
Acids + Caustics = Heat/Spattering	Aluminum Powder + Ammonium Nitrate = Explosion
Caustics + Epoxies = Extreme Heat	Sodium Cyanide + Sulfuric Acid = Lethal Hydrogen Cyanide
Chlorine Gas + Acetylene = Explosion	Ammonia + Bleach = Noxious Fumes

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# Scrap Metal and Electronics

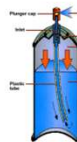
Volusia County School Board has a recycling program for all scrap metal and electronics.



# Aerosols

## Aerosol Can Management for Businesses

According to the Environmental Protection Agency (EPA) a typical aerosol can consists of many parts including: (1) the can or container storing both propellant and the product; (2) an actuator or button at the top of the can that is pressed to deliver the product; (3) a valve, which controls delivery or flow of the product; (4) the propellant (a compressed gas or liquefied gas), which provides the pressure in the container to expel or release the product when the actuator is pressed to open the valve; (5) the product itself; and (6) a dip tube, which is connected to the valve to bring the product up through the can to be released when the actuator is pressed.



According to the EPA, an aerosol can is defined as a non-refillable receptacle containing a gas compressed, liquefied or dissolved under pressure, the sole purpose of which is to expel a liquid, paste, or powder and fitted with a self-closing release device allowing the contents to be ejected by the gas.

Under the Universal Waste Rule provisions, VSQGs may choose to manage their hazardous waste aerosol cans in accordance with either the VSQG regulations under 40 CFR 262.14 or as a universal waste under 40 CFR 273.8a2.

A universal waste handler that meets the definition of a small quantity generator or a large quantity generator in 40 CFR 260.10 for its other hazardous wastes will be subject to the hazardous waste generator regulations in part 262.

OR

### Option 2

A SQG or a VSQG must manage universal waste aerosol cans in a way that prevents releases of any universal waste to the environment. If you do not puncture the cans, they must be accumulated in a container that is structurally sound, compatible with the contents of the aerosol cans, lacks evidence of leakage, spillage, or damage that could cause leakage, and is protected from sources of heat. If the aerosol cans show evidence of leakage, they must be packaged in a separate closed container or over-packed with absorbents.

Businesses observing this option must do three things:

1. Sort aerosol cans by type
2. Mix intact same type cans in one container
3. Remove actuators to reduce the risk of accidental release.

### Option 1

EPA has determined that businesses may purchase equipment for puncturing and draining aerosol cans or may design their own equipment, provided the device safely punctures aerosol cans is designed or retrofitted according to accepted engineering practices based on established codes, standards, and published technical reports.

Puncturing and draining systems for aerosol cans are available from multiple commercial vendors. These devices generally consist of an enclosed puncturing device that punctures an aerosol can, allowing the contents to be drained into an attached container. These devices include instructions for their use which must be kept at the business and handy for use by the handler. These devices must be used in a well-ventilated area that is free from sparks and ignition sources in order to prevent fires. Users must use personal protective equipment such as safety goggles, and segregate incompatible products from being drained into the same container. Operators of these devices must ensure that the container remains closed, that it does not become overfilled, and that the container storing the contents of the drained aerosol cans is kept in a well-ventilated area free from sparks or ignition sources. Handlers must be trained to use these devices and there must be a written procedure for handling spills or leaks.

Once the can is punctured, it should be recycled with scrap metal.



A container in which the aerosol cans are contained, must be labeled or marked clearly with any of the following phrases: "Universal Waste—Aerosol Can(s)", "Waste Aerosol Can(s)", or "Used Aerosol Can(s)".

For more information on Aerosol Can Management, see 40 CFR 260 to 268 and Chapter 62.730 FAC.

## Battery recycling

No flyer (yet) for battery recycling at the schools.

The school board has been recycling all types and sizes of batteries for many years. I help by explaining the process the school board has set up and what they request each school do for the process.

Tote and roll of tape needed.

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## Landfill fires are a problem


Discussion about pesticide containers, batteries, aerosol cans, and other chemicals helps to reduce the amount of chemicals being added to our landfill.

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# A new issue for schools.... Vapes

**E-cigarettes go by many names and have many designs**

E-cigarettes are sometimes called e-cigs, vapes, vape pens, e-hookahs, and electronic nicotine delivery systems or ENDS. Some e-cigarettes look like regular cigarettes, cigars, or pipes. Some look like USB flash drives, pens, and other everyday items.



**E-cigarettes** come in many shapes, sizes, and types.

CDC.gov/Teens CDC

seizures. Nicotine can also harm fish and other aquatic organisms. Nicotine e-liquid is an acute hazardous waste with the RCRA hazardous waste code P075 (nicotine, & salts).

**Lithium batteries can catch fire, especially when damaged.** When placed in trash and recycling bins, lithium batteries often get damaged by trash compactors and can cause fires during transportation and at waste and recycling facilities. Most lithium batteries, when discarded, would likely be considered ignitable and reactive hazardous waste (RCRA hazardous waste codes D001 and D003, respectively).






**Schools and Businesses can safely dispose of e-cigarettes and components**

**Do not:**

- Put nicotine e-liquids down the drain.
- Rinse or wash e-liquids out of e-cigarettes.
- Put e-cigarettes or e-cigarette components in the trash or recycling bins.
- Bring the e-cigarettes to Drug Enforcement Administration Take-Back Days, which are for individual consumers, not schools or businesses.


**Safely store collected e-cigarettes before disposal.**

Intact e-cigarettes	E-cigarette components	
	Lithium batteries	Nicotine e-liquids (vials or loose cartridges/pods)
Place each individual e-cigarette in a separate clear, sealed plastic bag to prevent the batteries from short-circuiting and catching fire.	Place each individual lithium battery in a separate clear, sealed plastic bag to prevent the batteries from short-circuiting and catching fire.	Place nicotine e-liquid vials, cartridges, and pods in a clear, sealed plastic bag. You can combine multiple items in the same bag.

Intact e-cigarettes	E-cigarette components	
		
	Alternative: Tape the battery terminals to prevent the batteries from short-circuiting and catching fire.	Caution: If possible, wear chemical resistant gloves (e.g., latex or nitrile) to protect your skin from nicotine poisoning.
		

https://www.epa.gov/how-safely-dispose-e-cigarettes-information-schools-and-small-businesses

**E-cigarettes contain lithium batteries and nicotine**



A vape pen showing the portions that contain the two hazards.

One thing that these e-cigarettes have in common is that they contain nicotine and lithium batteries, making them hazardous waste under the Resource Conservation and Recovery Act.

**Nicotine is acutely toxic.** Liquid nicotine in e-cigarettes can be easily absorbed by the skin, potentially causing nicotine poisoning with symptoms that include difficulty breathing, fainting, or

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One thing I will work on before next round

Spanish translations for my flyers.

Many of the custodial staff at the schools speak primarily Spanish. I have had several requests for Spanish flyers. While AI can translate word for word, the phrasing may not be correct.

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Thank you for your  
time!

Enjoy the rest of this  
year's SE NAHMMA  
Conference.

### Contact information:

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