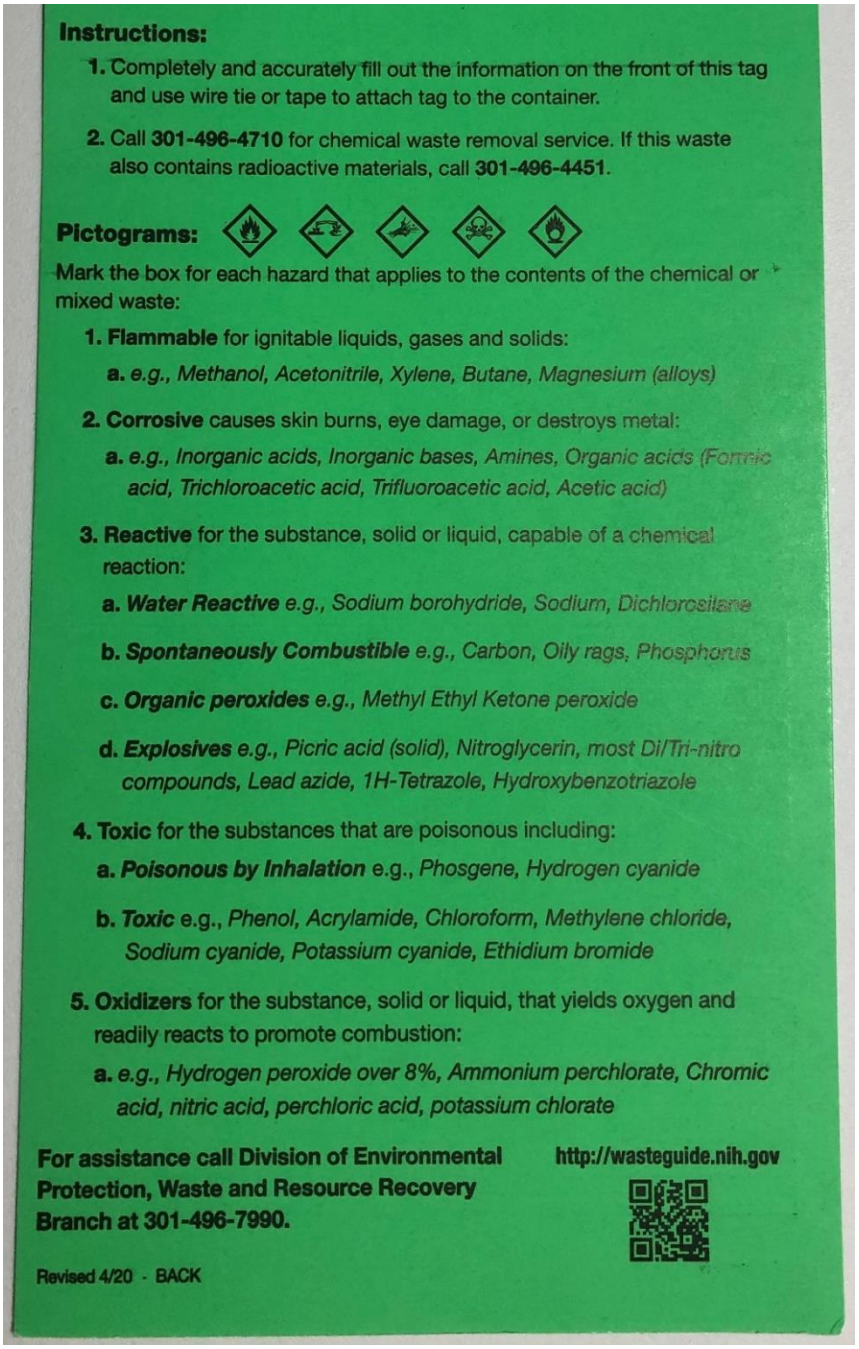
NIH Chemical Waste Tag Guidance Tool

Questions, Please Contact ORF/DEP at 301-496-7990

The Office of Research Facilities, Division of Environmental Protection has created a new chemical waste tag for the NIH Maryland Facilities to comply with the new EPA hazardous waste generator regulations. Instructions for filling out the new chemical waste tag can be found on the back of the tag:

Step 1: Review Instructions on Back of Waste Tag (see image below):



Instructions:

1. Completely and accurately fill out the information on the front of this tag and use wire tie or tape to attach tag to the container.
2. Call **301-496-4710** for chemical waste removal service. If this waste also contains radioactive materials, call **301-496-4451**.

Pictograms:

Mark the box for each hazard that applies to the contents of the chemical or mixed waste:

1. **Flammable** for ignitable liquids, gases and solids:
   a. *e.g., Methanol, Acetonitrile, Xylene, Butane, Magnesium (alloys)*
2. **Corrosive** causes skin burns, eye damage, or destroys metal:
   a. *e.g., Inorganic acids, Inorganic bases, Amines, Organic acids (Formic acid, Trichloroacetic acid, Trifluoroacetic acid, Acetic acid)*
3. **Reactive** for the substance, solid or liquid, capable of a chemical reaction:
   a. ***Water Reactive*** *e.g., Sodium borohydride, Sodium, Dichlorosilane*
   b. ***Spontaneously Combustible*** *e.g., Carbon, Oily rags, Phosphorus*
   c. ***Organic peroxides*** *e.g., Methyl Ethyl Ketone peroxide*
   d. ***Explosives*** *e.g., Picric acid (solid), Nitroglycerin, most Di/Tri-nitro compounds, Lead azide, 1H-Tetrazole, Hydroxybenzotriazole*
4. **Toxic** for the substances that are poisonous including:
   a. ***Poisonous by Inhalation*** e.g., *Phosgene, Hydrogen cyanide*
   b. ***Toxic*** e.g., *Phenol, Acrylamide, Chloroform, Methylene chloride, Sodium cyanide, Potassium cyanide, Ethidium bromide*
5. **Oxidizers** for the substance, solid or liquid, that yields oxygen and readily reacts to promote combustion:
   a. *e.g., Hydrogen peroxide over 8%, Ammonium perchlorate, Chromic acid, nitric acid, perchloric acid, potassium chlorate*

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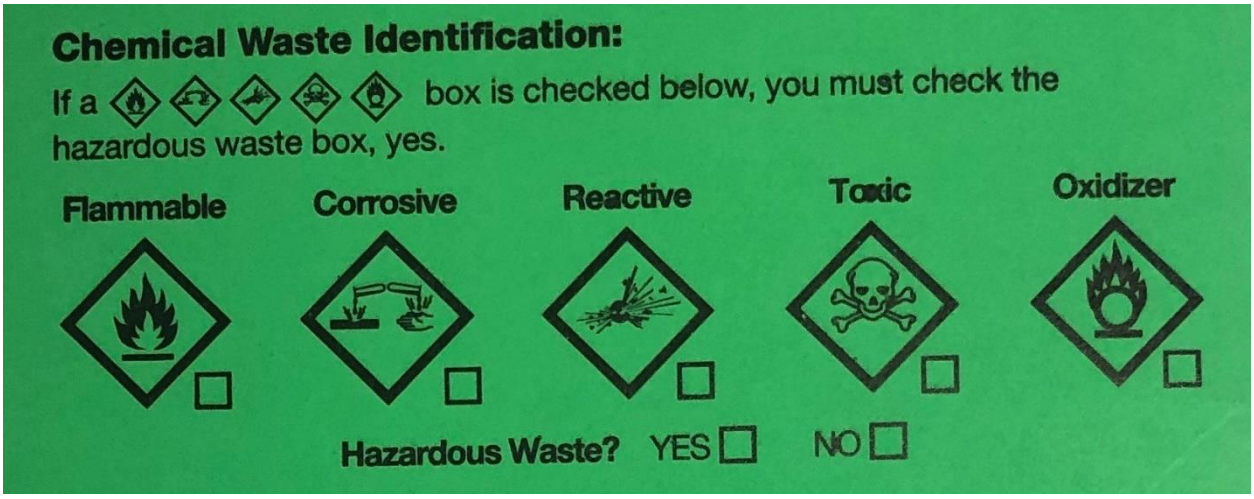
Revised 4/20 - BACK

Step 2: Fill out Chemical Waste Identification Check Boxes on Front of Tag (image below):

Choose the applicable chemical hazard labels on the tag (see the front of tag: checkboxes image below). Below is advice to help determine the hazards of the chemical wastes you generate. The new regulations require that you can show to a Maryland Department of the Environment (MDE) or Federal (EPA) inspector how you chose the hazard(s) you checked on the tag. The resources available to identify your waste's hazards are:

- The sds (safety data sheet) of each hazardous chemical that is in the waste container (***Priority Reference***)
- The hazard labels and warnings on the bottles that you used in generating the waste (***Priority Reference***)
- NLM- PubChem https://pubchem.ncbi.nlm.nih.gov/ (***Priority Reference***)
- Knowledge of the hazards from your research protocols and/or processes
- Testing (pH paper is commonly used to determine whether the waste is corrosive – remember, pH paper only works if the waste contains some water)
- Advice you receive from DEP



In addition to these resources, below are examples of various chemical hazard classes and some examples of chemicals that have these hazards. If you are uncertain of the hazards that your waste may have, just check the hazard boxes on the waste tag that you found on the bottles of chemicals that contributed to the waste. If you checked any of the hazard boxes on the chemical waste tag, we are asking you to also check the "hazardous waste" box.

In addition to designating the hazards of the chemical waste you generate in your lab (check boxes on the chem waste tag), **you must also**:

- place your chemical waste containers in spill containment pans, provided by the chemical waste contractor, while they are in your lab awaiting collection.
- provide separate spill containment pans for chemical wastes that have incompatible hazards and could react.

Below are examples of incompatible chemicals that should not be stored in the same spill containment pan (or poured into the same waste collection container when accumulating chemical wastes in a container) (See "Incompatible chemical hazards" below)

Incompatible Chemical Hazards:

When storing multiple containers of chemical waste in your lab, including wastes still in their original containers, you need to separate hazards that may react with each other into separate spill containment pans. Here are some hazard classes that should be separated:

- separate acids from bases (possible violent exothermic reaction)
- separate acids from most metals (produces flammable hydrogen gas and the heat to ignite it)
- separate acids from:
    - cyanides (forms toxic and flammable hydrogen cyanide gas),
    - sulfides (forms toxic and flammable hydrogen sulfide gas),
    - azides (may form explosive hydrazoic acid) and
    - phosphides (may form toxic and flammable phosphine gas)
- separate oxidizers from acids (depending on the acid, may form toxic and/or explosive compounds) (e.g. concentrated sulfuric acid mixed with chlorates or perchlorates form explosive compounds)
- separate oxidizers from organic materials, especially flammable liquids or solids (possible ignition)
- separate oxidizers from metals (may form explosive compounds)
- separate water-reactive chemicals from aqueous solutions (in many cases just the moisture in the air will cause reaction: e.g. metal hydrides, alkali metals and certain metal dusts in moist air will form hydrogen gas and ignite) (halosilanes and acid halides will react with water to form toxic acid gases)

Examples of Chemical Hazard Classes:

Flammable liquids

methanol, ethanol, isopropanol, acetone, xylene, toluene, ethyl acetate, tetrahydrofuran, ethyl ether, benzene

- **Basic (alkaline) flammable liquids:** flammable amines (ex: triethylamine, diethylamine, TEMED, ethylenediamine, solutions of trimethylamine (pure compound is a gas), pyrrolidine, morpholine, cyclohexylamine, sodium methylate (in alcohol solution), tissue solubilizer (often a hydroxide**/**flammable liquid mixture), etc.

- **Acidic Flammable Liquids:** Glacial acetic acid (100%), acetic acid (>80%), acetic anhydride, formic acid (>85%), propanoic acid (100%) (also called propionic acid); mixtures of acids and flammable liquids [ex: methanol (>10%) + acetic acid(>10%)]

Corrosives

- **Organic acids:** the flammable acids immediately above (at concentrations lower than listed above, they are not flammable); also: butyric acid, pentanoic acid, hexanoic acid, Trichloroacetic acid (TCA), Trifluoracetic acid (TFA), etc.

- **Inorganic acids:** hydrochloric acid, sulfuric acid, phosphoric acid, (the oxidizing inorganic acids, like perchloric, nitric, chromic and iodic acid – are oxidizers and should be kept separate from organic materials, including organic acids – see oxidizers, below)

- **Bases (alkaline):** metal hydroxides (ex: sodium, potassium, calcium, or nickel hydroxide, etc.), ammonium hydroxide, non-flammable amines (ex: ethanolamine, tributylamine, etc.)

Oxidizers

Inorganic nitrates, nitrites, permanganates, chlorates, perchlorates, iodates, periodates, persulfates, chromates, hypochlorites, peroxides, perborates (ex: potassium perchlorate, calcium hypochlorite, sodium nitrate, sodium iodate, ammonium persulfate, sodium peroxide)

- **Oxidizing acids:** (in low concentrations may only present a corrosive hazard): Nitric acid, perchloric acid, hydrogen peroxide, periodic acid, chromic acid

Poisons (Toxic chemicals)

[many are in aqueous solution, but they are also available as mixtures or pure compounds]: acrylamide, glutaraldehyde, chloroform, phenol, methylene chloride, stains and dyes, venoms, toxic metals (even at very, very low concentrations, chemicals containing these metals are always hazardous waste: arsenic, silver, cadmium, chromium, mercury, barium, lead, and selenium)

Reactives

(Most of these will be disposed in their original bottles. If they were used in a protocol, they are usually reacted out and not still present a reactive hazard)

Pyrophorics (air-reactive)

- Metal alkyls and aryls, such as RLi, R3Al, R2Zn (e.g.: methyllithium, trimethylaluminum, diethylzinc, phenyllithium)
- Nonmetal alkyls, such as R3B, R3P, R3As (e.g.: triethylborane, trimethylphosphine)
- Phosphorus (white) [careful: when packaged under water, don't store in an area where water reactives are present]
- Metal alkyl hydrides and halides (ex: diisobutylaluminum hydride, dimethylaluminum chloride)

- Other pyrophorics: Titanium trichloride, tert-butyl hypochlorite, lithium diethylamide, lithium diisopropylamide, sodium methoxide (sodium methylate), sodium sulfide [anhydrous or with<30% water], Raney Nickel catalyst

Water-reactives (can react with the moisture in the air to produce toxic and/or flammable gas)

- Alkali metals (ex: sodium, lithium, potassium)
- Metal powders, such as Al, Co, Fe, Mg, Mn, Pd, Pt, Ti, Sn, Zn, Zr
- Borane complexes (ex: Borane-dimethylamine complex, borane-methyl sulfide complex)
- Carbides (ex: calcium carbide)
- Grignard reagents, RMgX (alkyl or aryl magnesium halides like: phenylmagnesium bromide, ethylmagnesium chloride)
- Metal hydrides and borohydrides (ex: sodium hydride, potassium borohydride, lithium aluminum hydride)

Water reactive acids

- Chlorosilanes: dimethyldichlorosilane, ethyltrichlorosilane, etc.
- Acid halides: Acetyl chloride, benzenesulfonyl bromide, propanoyl chloride, etc.
- Phosphorous pentoxide (also called phosphoric anhydride, when mixed with water, may boil from the heat generated)

Cyanides and Sulfides ("reactive" cyanides produce toxic hydrogen cyanide gas on exposure to acids; "reactive" sulfides form toxic hydrogen sulfide)

- "reactive" cyanides, such as: sodium cyanide, potassium cyanide, calcium cyanide; [most organic cyanides (also called nitriles) are not reactive cyanides; ex: acetonitrile, acrylonitrile]
- "reactive" sulfides, such as: lead sulfide, iron sulfide; [some metal sulfides, when they have low water content, such as sodium and potassium sulfides, are pyrophoric]

Non-hazardous or Non-regulated Chemicals:

- buffers, surfactants, ion exchange resins, alumina, silica, culture media, agarose, albumin, pump oil, non-hazardous salts (ex: sodium chloride, magnesium sulfate, potassium phosphate, calcium acetate), etc.
- [always look for the presence of hazardous toxic preservative compounds in "non-hazardous" products, e.g. mercury or azide salts in buffer solutions]

FAQ's

Question 1: Is it a requirement to check either yes or no to the Hazardous Waste question?

Answer 1: Yes, all waste containers are identified as hazardous or non-hazardous at the point of generation (Lab).

Question 2: Do the Chemical Waste Identification pictograms apply to waste of all states of matter?

Answer 2: Yes, a cylinder containing Acetylene would require checkmarks for the Flammable pictogram and Hazardous Waste.

Question 3: Could a researcher or staff fail inspection for not completing the Chemical Waste Identification section of the tag?

Answer 3: Yes

Question 4: When should I start filling out the tag?

Answer 4: When you first add waste to the chemical waste collection container. Write the names of each chemical added (including volume and concentration) and ***check*** the hazard pictograms that apply to the chemicals you added, when you add them. If a hazard pictogram is ***checked***, you must also check the yes box for "hazardous waste".

Question 5: Should I fill out and attach a chemical waste tag to a chemical that is still in its original container, but I want to dispose of it?

Answer 5: Yes. Even though the hazard pictogram is almost always on the bottle's label, you still need to write down your contact information and check the "Hazardous Waste" box on the chemical waste tag if the bottle has one or more of the hazard pictograms on it.

Question 6: Why are you requesting common chemical formulas, structures or abbreviations not be used?

- Example – chloroform = CHCL3.
- Similarly: a common combination for extractions: IAA/CHCL3 = isoamyl alcohol/chloroform; also, TRIZOL = phenol, guanidine isothiocyanate

Answer 6: To avoid interpreting various shorthand methods. Identification is critical in shipping hazardous waste. Improper labelling/identification of wastes can lead to injury, property damage and fine(s) for violation of Federal and State laws. Trade names and laboratory procedures/process identifications are not acceptable.

Question 7: How is the new tag different than the previous version?

Answer 7: Changes to the new tag include: waste pictograms, hazardous waste question checkbox (yes or no), and additional instructions and resources. Outside of these changes, the new NIH Chemical Waste Tags (Beige – government/ Green – contractor) will continue to capture the same information and retain their current shape and size.

Question 8: How long can we use the old tags?

Answer 8: You can use the older designed tags up until February 1, 2021. Beginning February 1, 2021 and on, only the new tag design will be authorized for use.

NIH Waste Tag Full Picture Reference:

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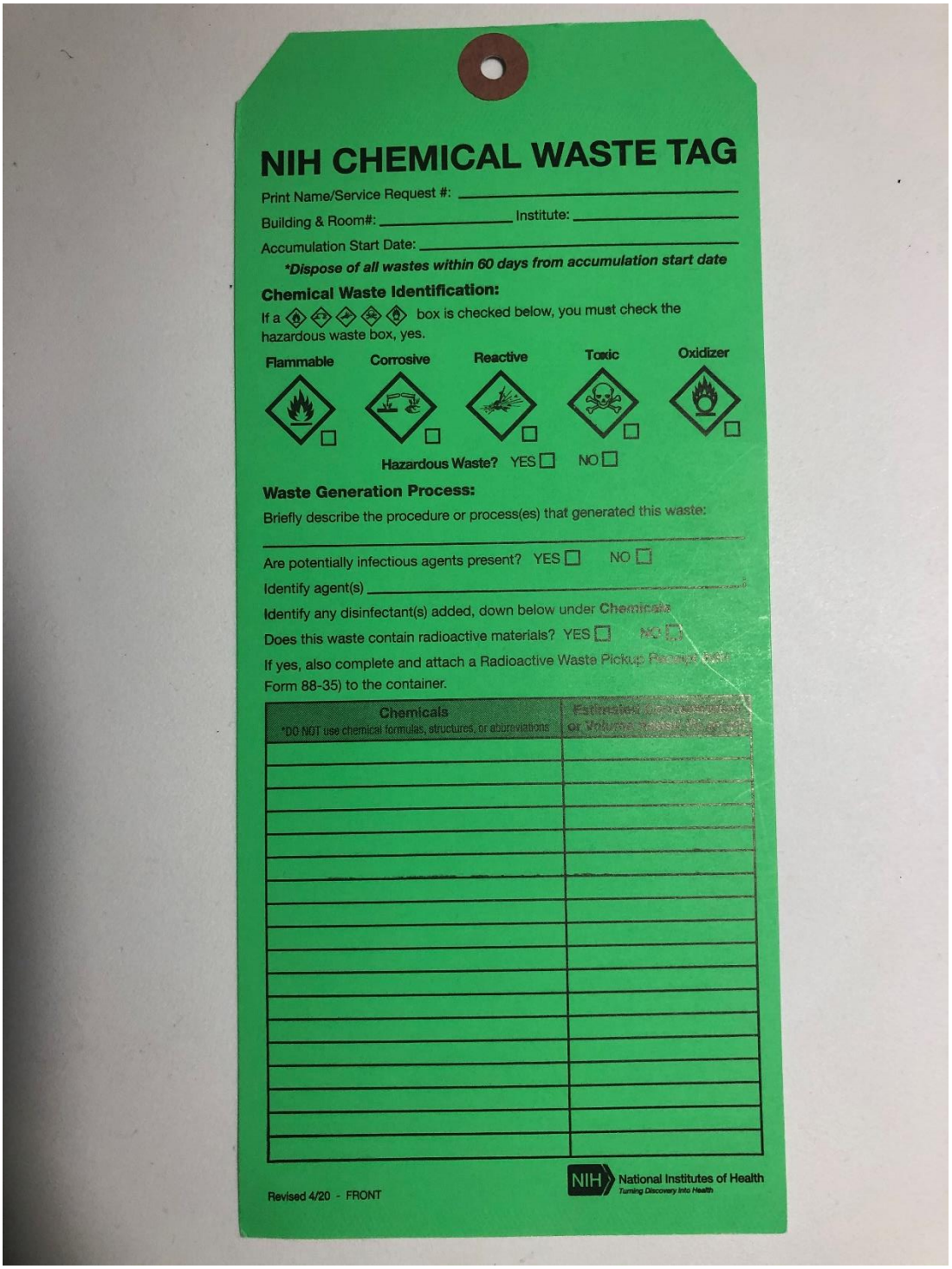
Front Side of Tag



NIH CHEMICAL WASTE TAG

Print Name/Service Request #: _____

Building & Room#: _____ Institute: _____

Accumulation Start Date: _____

Dispose of all wastes within 60 days from accumulation start date

Chemical Waste Identification:

If a ☐ box is checked below, you must check the hazardous waste box, yes.

Flammable ☐ Corrosive ☐ Reactive ☐ Toxic ☐ Oxidizer ☐

Hazardous Waste? YES ☐ NO ☐

Waste Generation Process:

Briefly describe the procedure or process(es) that generated this waste:

_____

Are potentially infectious agents present? YES ☐ NO ☐

Identify agent(s) _____

Identify any disinfectant(s) added, down below under Chemicals

Does this waste contain radioactive materials? YES ☐ NO ☐

If yes, also complete and attach a Radioactive Waste Pickup Request (NIH Form 88-35) to the container.

Chemicals *DO NOT use chemical formulas, structures, or abbreviations	Estimated [illegible] or Volume

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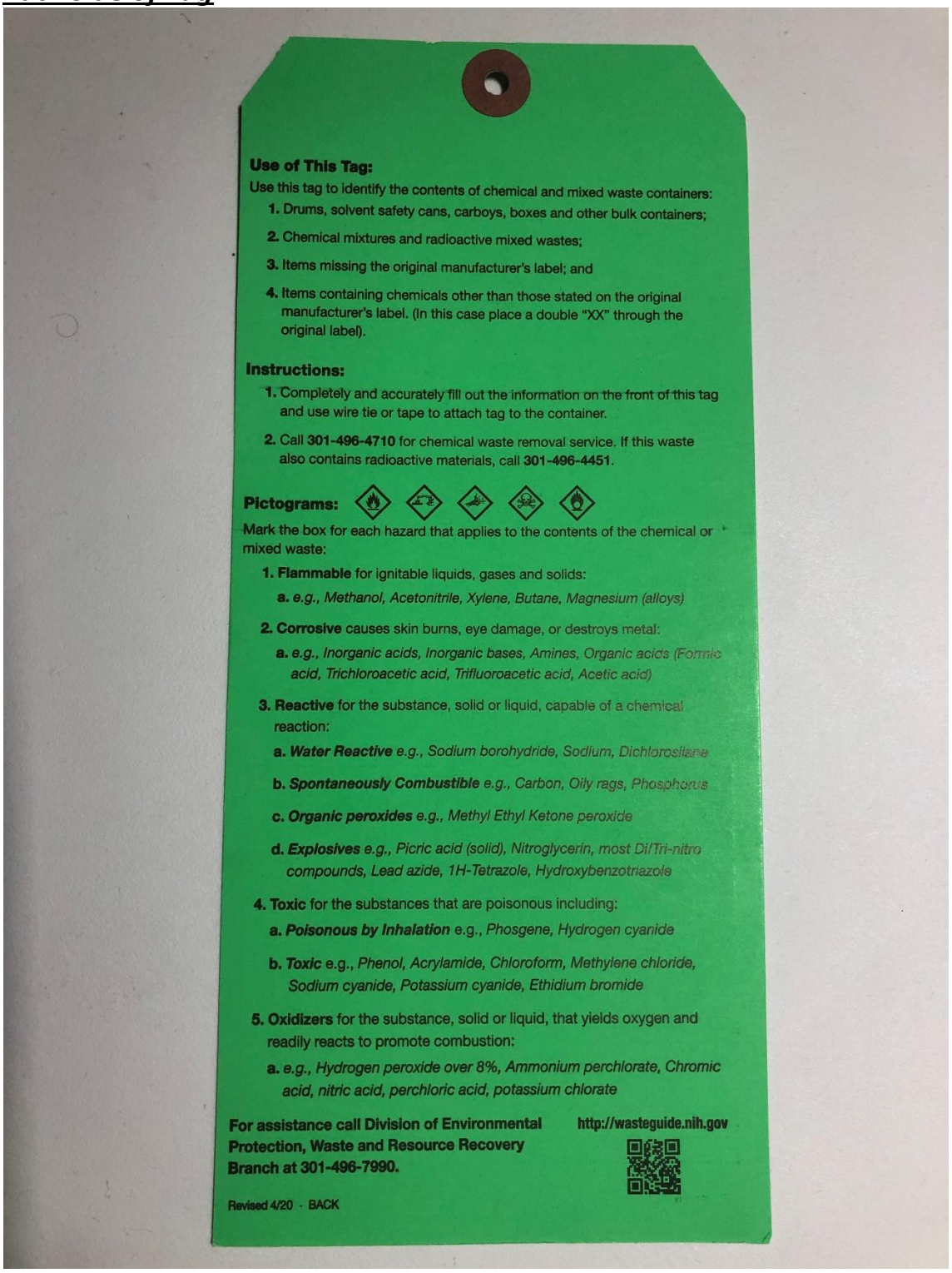
Back Side of Tag



Use of This Tag:

Use this tag to identify the contents of chemical and mixed waste containers:

1. Drums, solvent safety cans, carboys, boxes and other bulk containers;
2. Chemical mixtures and radioactive mixed wastes;
3. Items missing the original manufacturer's label; and
4. Items containing chemicals other than those stated on the original manufacturer's label. (In this case place a double "XX" through the original label).

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Revised 4/20 · BACK