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School Chemicals and Disposal

Each year schools, colleges and universities find themselves needing to take care of surplus, unnecessary, unknown, or outdated chemicals. These chemicals often originate in chemistry labs, but can also originate from swimming pool operations, vocational education classes, and maintenance activities. The following are guidelines for the disposal of such chemicals and helpful hints to avoid the need for disposal in the future.

Inventory

The school should prepare an inventory of all chemicals to be disposed before disposal options can be determined. The inventory need not be detailed but must include chemical names and the approximate weight of each chemical. Make sure your weights are all noted in kilograms or pounds, use the correct equation to calculate conversions from one to the other, and do not mix units as you total up your amounts. To avoid confusion we have listed both the English and Metric units associated with each regulation throughout this Guidance Document; use which ever system you are comfortable with and stick with it. The quantity and type of waste will determine which requirements in Title 128 – Nebraska Hazardous Waste Regulations are applicable to the school.

- For safety, someone familiar with handling chemicals should perform the inventory. Because Title 128 and disposal companies use Chemical Abstract Service (CAS) numbers, you may want to add CAS numbers to your inventory. Use appropriate personal protective equipment such as goggles, gloves, face shield, an impermeable smock, etc. when doing the inventory. Do not allow high school students to do the physical inventory.
- Unknown chemicals need to be identified. Contact former employees if necessary to identify the unknown items. These items may need to be tested if you cannot make a determination any other way. Since many chemicals used in the classroom are chosen to be impressive in experiments and demonstrations, all unknown chemicals should be assumed to be dangerous until proven otherwise.
- If explosive or highly reactive chemicals are encountered, do not handle or move these chemicals. Under no circumstances attempt to remove the cap on containers of these chemicals. The Nebraska State Patrol can be contacted at (402) 471-4545 for assistance. Explosive chemicals that are often encountered at schools include picric acid (crystallized) and peroxides from ethers.
- The NDEE, your local landfill, your local wastewater treatment facility, or a hazardous waste disposal company can use the inventory you develop when assisting with disposal options.

Acute Hazardous Waste

Consult the list of acute (P-List) hazardous wastes in Title 128, Chapter 3, §015. If your inventory contains *more than 1 kg (2.2 lbs)* of chemicals on this list, full large quantity generator hazardous waste regulation applies to this waste. Contact the Waste Management Section at (402) 471-4210 or Hazardous Waste Compliance Assistance at (402) 471-8308. The remainder of this fact sheet applies to wastes that are not on the list of acute hazardous waste chemicals. Note: In order for a material to be an acute (P-List) hazardous waste, it must be the sole active ingredient and be unused. The material remaining in an opened container would normally be considered to be “unused.” For example: a ¼ full bottle of carbon disulfide is a P022 acute hazardous waste.

All Other Hazardous Waste

- The school must determine which wastes are hazardous wastes according to the hazardous waste regulation. On the inventory, mark all items that meet any of the following criteria. These items are hazardous wastes:
 - Listed as toxic chemicals in Title 128, Chapter 3, §016 (U-listed hazardous waste).
 - Listed as hazardous waste from a nonspecific source in Title 128, Chapter 3, §013. An example is spent toluene from cleaning equipment (F005).
 - Contains a toxicity characteristic as described in Title 128, Chapter 3, §010 (D004 through D043).
 - Exhibits a characteristic of ignitability, corrosivity or reactivity as described in Title 128, Chapter 3, §007 through §009. Material safety data sheets (MSDS) and other reference materials can be used to help determine the physical characteristics of the waste. Many of these sources may be available on the internet (search for the desired chemical name). Many school chemical wastes are hazardous waste due to ignitability (D001); that is, they have a flash point below 140°F (60°C).
 - The MSDS can often be used to determine the constituents of your chemical products. This may allow you to avoid expensive analytical testing.
- If 100 kg (220 lbs) or more of hazardous waste is present in the inventory for that month, or if the school generates other hazardous waste (for example, vocational classes such as auto repair) and the total hazardous waste generated in that month is greater than 100 kg (220 lbs), more stringent hazardous waste regulations apply. Contact the NDEE Waste Management Section or the Environmental Assistance Coordinator for assistance.
- If the total amount of hazardous waste generated *is less than* 100 kg (220 lbs) in the calendar month, the school is subject to reduced regulation for the hazardous waste present on your inventory. These “reduced” regulations for *conditionally exempt small quantity generators* (CESQGs) can be found in Title 128, Chapter 8.
 - Hazardous waste from CESQGs may be placed in the landfill at a maximum rate of 19.5 kg (43 lbs) per day. No approval is required by NDEE prior to disposal to a landfill. However, local governments or landfills may restrict such waste. Contact your county and municipal waste agency for confirmation and always obtain the landfill’s prior approval. Bulk *liquid* wastes are not allowed in Nebraska landfills.
 - Many chemicals might not be a regulated hazardous waste but could still be a dangerous hazardous material such as poisons, caustics, etc. Use a commercial publication such as the Merck Index to determine your chemical’s properties.
 - Some CESQG or non-regulated waste should not be sent to a landfill even though the waste regulations might allow it. Some chemicals are so dangerous that they should not be placed into the environment except under controlled conditions. Examples of chemicals that fall into this category are strong oxidizers or flammable solids (yellow phosphorous, camphor, nickel nitrate,

stannic chloride) and very toxic or reactive substances (aluminum chloride, antimony trichloride, arsenic trioxide, lead carbonate, nickel sulfate, pyrogallol).

- Even though a CESQG might be allowed to send its hazardous waste to a landfill or chooses to send its non-hazardous, but dangerous, wastes to a landfill, care must be exercised to keep hazardous waste and other hazardous materials from children. Waste in a dumpster is easily accessible to any number of persons. Consider hauling the waste materials to the landfill yourself or arrange to dispose of the waste in the trash receptacle at the same time the trash hauler arrives for pick up.
- Some liquid wastes and some dissolved solid wastes can be safely disposed down a sanitary sewer. *Do not allow incompatible chemicals to be co-mingled! Do not allow any ignitable wastes to be disposed down the drain. Do not allow any chemicals that form shock sensitive compounds with metals to be disposed down the drain.* Obtain the local wastewater treatment facility's permission before disposing chemicals to the sanitary sewer. If you have a septic system or some other sewer system that does not flow to a public wastewater treatment facility, do not dispose of any chemicals down the drain.
- Some chemicals, such as acids and bases, can be neutralized by qualified personnel and then disposed down a sanitary sewer. *Do not allow incompatible chemicals to be co-mingled!* This procedure should be accomplished under a chemical fume hood. Use proper personal protective equipment.
- Elemental mercury, including the mercury in thermometers and in electrical switches, is a hazardous waste. The department recommends that elemental mercury never be disposed to a landfill. If the school is a CESQG, it is allowed to bring its hazardous waste, such as elemental mercury, to a local household hazardous waste (HHW) collection facility or one-day event. *Note that HHW facilities or events have the option to refuse any or all CESQG waste at their discretion.* Coordinate with the HHW organizers or management prior to using that avenue of disposal. If elemental mercury can't be disposed to a HHW facility or event, then the school will need to dispose of the material commercially.
- You may need to dispose of your wastes at a permitted hazardous waste treatment, storage, or disposal facility (TSDF). Contact the NDEE Waste Management Section for assistance. See our web site for a copy of the Waste Service Providers Directory. Actual hazardous waste transportation and disposal services will involve costs that you should plan for. Assistance might also be available through extant grant programs. Contact Keep Nebraska Beautiful or your Educational Service Unit (ESU) for information regarding the School Chemical Cleanout Campaign (SC3).
 - Note that *liquid* hazardous and non-hazardous wastes are not allowed to be disposed at landfills. As a result, those wastes that cannot be disposed to the sanitary sewer will normally be required to be disposed of at a commercial facility. An example of a waste that could not be disposed to a sanitary sewer is acetone, as it is ignitable.
 - No hazardous waste generator, not even a CESQG, is allowed to let his or her *hazardous waste* evaporate as a means of disposal. Non-hazardous, aqueous, inorganic mixtures may be evaporated. The department discourages the deliberate evaporation of non-hazardous organic mixtures. Note the distinction made between regulated hazardous waste and non-hazardous waste.

Waste Reduction and Management

- Purchase the minimum quantity of lab and other chemicals needed. Avoid high volume purchases of toxic chemicals; the money you may save by bulk buying will probably be lost in disposal costs. (Not to mention the disposal hassle!)
- Incorporate micro scale experiments into your courses to reduce waste generation.
- Incorporate experiments into your curriculum that produce non-hazardous end products and waste.
- Use less toxic chemicals for cleaning and maintenance activities. Let your school's daily operations be an example of positive environmental stewardship to your students. "Do as I do as well as what I say."
- Attempt to use your excess, *usable* chemicals as intended in lieu of disposal. If that option is not realistic, attempt to find another user for your excess, *usable* chemicals. For example, there may be another school district that needs the chemical you no longer need. Both districts can save money. Your ESU might be able to identify needs across school districts. The Keep Nebraska Beautiful, Materials Exchange Program can be a useful resource. Attempt to pool disposal efforts among several schools or across school districts to help reduce disposal costs, just remember that each location is its own generator.
- Review your chemical inventories at least yearly.
 - Include maintenance areas and custodial closets.
 - Be on the lookout for deteriorating containers, labels, and cabinets.
 - Ensure labels are secure and legible.
 - Store chemicals strictly in accordance with label directions.
 - Stock your chemicals to ensure chemical compatibility. The Flinn Guide is very useful in this regard. Don't store flammables with acids.
 - Never store pesticides with other chemicals.
 - Arrange for the disposal of chemicals that are no longer being used. Chemicals past their expiration dates should be disposed of promptly. Some chemicals deteriorate into dangerous compounds.
 - Arrange for the prompt disposal of chemicals whose containers are starting to deteriorate.
 - Establish some type of monitoring system that school officials can use to confirm that the above guidelines are being accomplished.
 - Avoid chemicals that are excessively dangerous and/or that have limited usefulness. See Attachment 1 for some examples.
 - Have a plan to respond to safety issues related to handling and storing chemicals.

Radioactive Materials

It is not uncommon to come across radioactive source material when cleaning out an old chemistry or physics laboratory. Radioactive sources were common teaching tools following the nuclear boom of the 1950's and are sometimes left forgotten in the depths of the storeroom after curriculum and staff changes. NDEE treats such source material as mixed waste (both hazardous and radioactive) but may allow small quantities to be disposed of in a MSW Landfill with department assistance and landfill permission. The Nebraska Department of Health and Human Services operates a Radioactive

Materials Program to help license and educate facilities on the proper handling, storage and disposal of radioactive material in Nebraska.

Geiger counters or scintillation counters among your equipment are strong indicators that radioactive source material may have been used in the classroom in the past. If you find radiation equipment in your class supply storage area an effort should be made to search for unknown radioactive sources. Not all radioactive materials are labeled to indicate they are radioactive, especially if they were obtained in the distant past. Look for materials containing Uranium, Thorium, and Radium to name a few; minerals like Uraninite, Sphalerite and Monazite are some minerals with naturally occurring radiation. Unsealed sources can pose a serious health hazards because they are often powdered and easily ingested or inhaled. If you come across radioactive materials that need to be disposed of contact the Nebraska Department of Health and Human Services RAD program at (402) 471-2079, or contact the NDEE at (402) 471-4210.

HELPFUL WEB SITES:

- Nebraska Department of Environment and Energy Website – <http://dee.ne.gov/>
- MSDS information – <http://www.ilpi.com/msds/>¹
- Nebraska Department of Health and Human Services radiation page – <http://dhhs.ne.gov/rad>

DOCUMENTS:

- [Title 128 – Nebraska Hazardous Waste Regulations](#)²
- NDEE Report – Waster Service Providers Directory³

CONTACTS:

- NDEE Main Line (402) 471-2186
- NDEE Hazardous Waste Compliance Assistance (402) 471-8308
- NDEE Toll Free Number (877) 253-2603
- DHHS Rad Program (402) 471-2079

- Keep Nebraska Beautiful, Materials Exchange Program (800) 486-4562
or in Lincoln: (402) 486-4622

ATTACHMENT:

- Hazardous Chemicals
1. NDEE does not endorse any public or private website.
 2. Titles can be found on the NDEE website under *Laws & Regulations*, or a copy can be obtained by contacting the NDEE Waste Management Section.
 3. Documents can be found on the NDEE website under *Publications & Forms*, or a copy can be obtained by contacting the NDEE Waste Management Section.

Attachment

HAZARDOUS CHEMICALS

**Chemicals that usually have a greater hazard than usefulness.
(Not all-inclusive)**

Acrylonitrile	Dichlorobenzene	Nicotine	Sodium nitrate
Aluminum Chloride	Dichloroethane	Osmium tetroxide	Sodium sulfide
Ammonium chromate			
Aniline	Dimethylaniline	Oxygen, tank	Sodium thiocyanate
Aniline hydrochloride	p-Dioxane	Paris green	Stannic chloride
Anthracene	Ethers	Phenol	Stearic acid
Antimony trichloride	Ethylene dichloride	Phosphorus, red, white, yellow	Strontium
Arsenic	Ethylene oxide	Phosphorus pentoxide	Strontium nitrate
Arsenic chloride	Gunpowder	Phthalic anhydride	Sudan IV
Arsenic pentoxide	Hexachlorophene	Picric acid	Sulfuric acid, fuming
Arsenic trioxide	Hydrobromic acid	Potassium, metal	Talc*
Asbestos	Hydrofluoric acid	Potassium oxalate	Tannic acid
Ascarite	Hydrogen	Potassium sulfide	Tetrabromoethane
Benzene	Hydriodic acid	Pyridene	Thermite & compounds
Benzoyl peroxide	Indigo carmine	Pyrogallic acid	Thioacetamide
Calcium cyanide	Lead arsenate	Saccharin	Thiourea
Calcium fluoride	Lead carbonate	Selenium	Titanium trichloride
Carbon tetrachloride	Lead (IV) chromate	Silver cyanide	o-Toluidine
Chlorine	Lithium (metal)	Silver oxide	Uranium
Camphor	Lithium nitrate	Silver nitrate	Uranyl acetate
Chloral hydrate	Magnesium powder	Sodium arsenate	Uranyl nitrate
Chloretone	Mercury	Sodium arsenite	Urethane
Chloroform	Mercuric chloride	Sodium azide	Vinylite
Chloropromazine	Mesitylene	Sodium chromate	Wood's metal
Chromium	Methyl iodine	Sodium cyanide	
Chromium oxide	Methyl methacrylate	Sodium dichloroindophenol	
Chromium potassium sulfate	Methyl orange*	Sodium dichromate	
Chromium trioxide	Methyl red*	Sodium, metal	
Colchicine	Nickel, metal, nitrate, & oxide	Sodium ferrocyanide	

*Suggested alternatives:

Methyl orange & Methyl red → Bromophenol blue & Bromothymol blue,

Talc → Starch talc

Reference: Dr. John Moody, Indiana University Southeast, derived from <http://www.ius.edu/>