Greetings and welcome to the Michigan Department of Environmental Quality, Pharmaceutical Waste Tutorial recorded in September of 2012.

My name is Christine Grossman.

I am the waste specialist in the Office of Environmental Assistance.

I help people on a day to day basis get answers to questions on Michigan's environmental waste regulations.

I work in the Environmental Assistance Center.

This is where people can call Monday through Friday 8 to 4:30 to get answers on environmental questions.

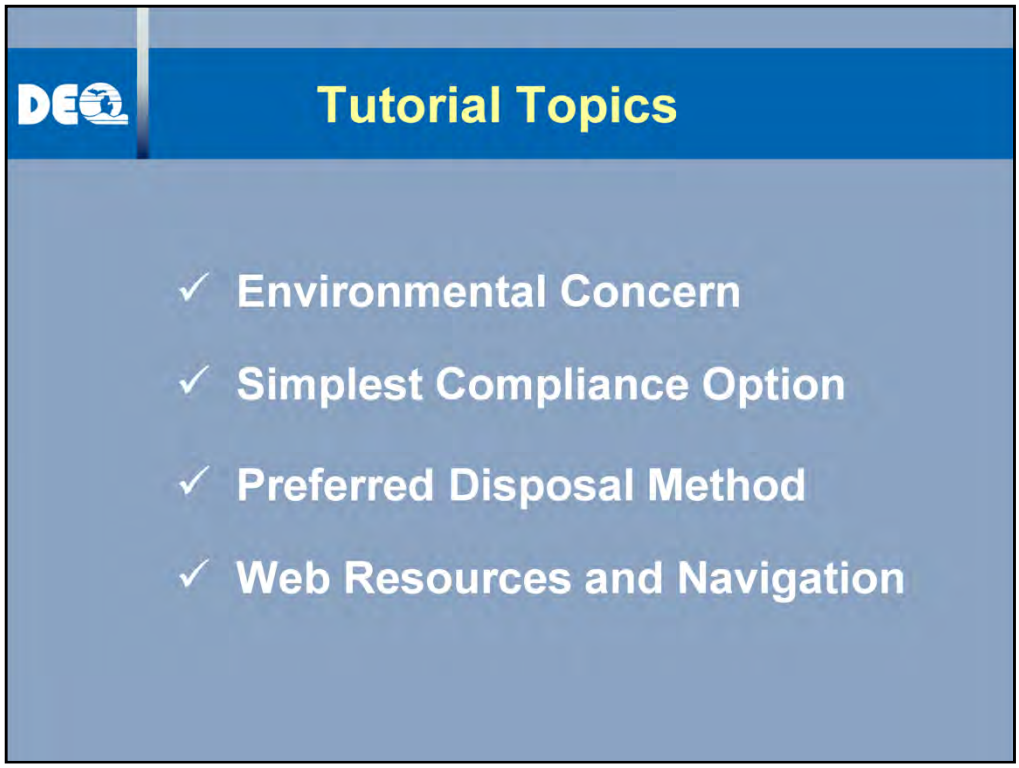
I work with a team of specialists who can answer most questions related to DEQ matters or direct you to staff that can.

Our center is housed in the Office of Environmental Assistance or the non-regulatory arm of the Department.

Since we are non-regulatory, you don't have to be concerned about increased oversight from contacting the DEQ.

So, if you have any questions related to the information provided in this tutorial, I encourage you to contact us for help.

That is what we are here for.



Today we are going to cover:

1. **Why there is an increased concern about pharmaceuticals in our environment;**

2. **A simple way to manage drug waste to meet the environmental disposal ;regulations;**

3. **The preferred disposal method for pharmaceuticals, because it has the least impact on our water resources; and**

4. **Lastly, how to find compliance assistance and pollution prevention resources designed specifically for health care.**

I'm guessing your are probably asking why we've come to be more concerned about pharmaceuticals in the environment?

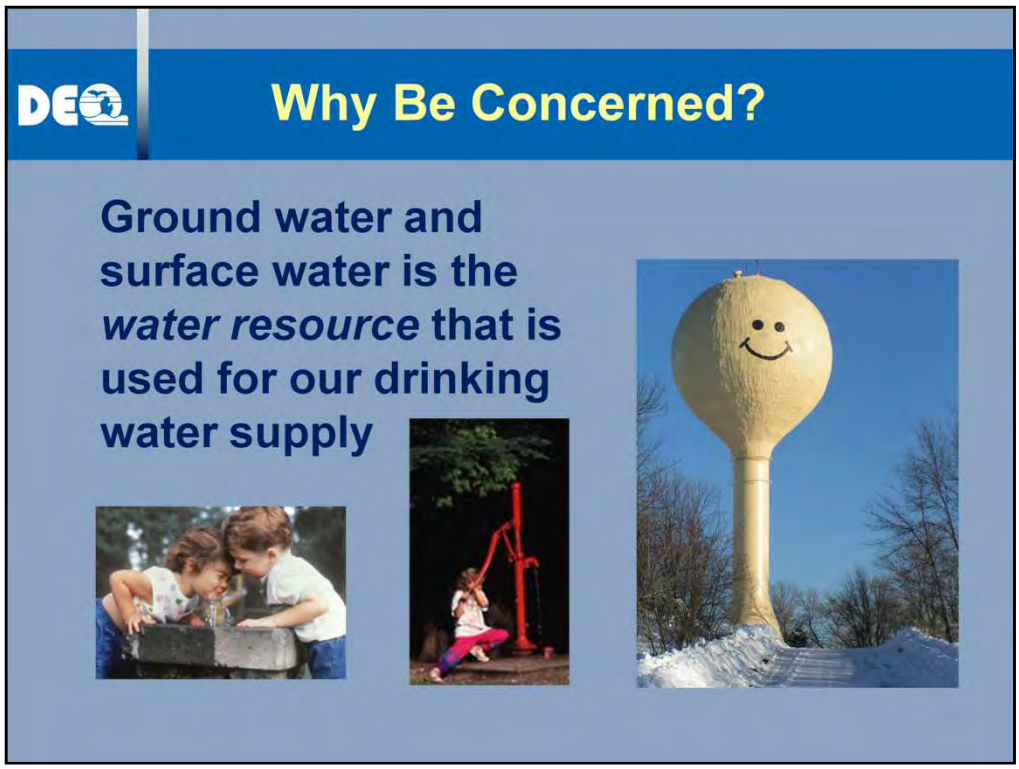
Basically, our concern has heightened over recent years because we now know that many pharmaceuticals are persistent in our environment.

We first detected them in our surface water and ground water sometime in the 1970s.

And, through continued testing over the past thirty years by the US Geological Survey, we've come to learn that that pharmaceuticals generally don't readily break down after entering the environment.

Instead they generally remain intact and cycle through our environment.

In fact, most lakes , streams and groundwater tested across the US, have shown low levels of pharmaceuticals remaining in the water.

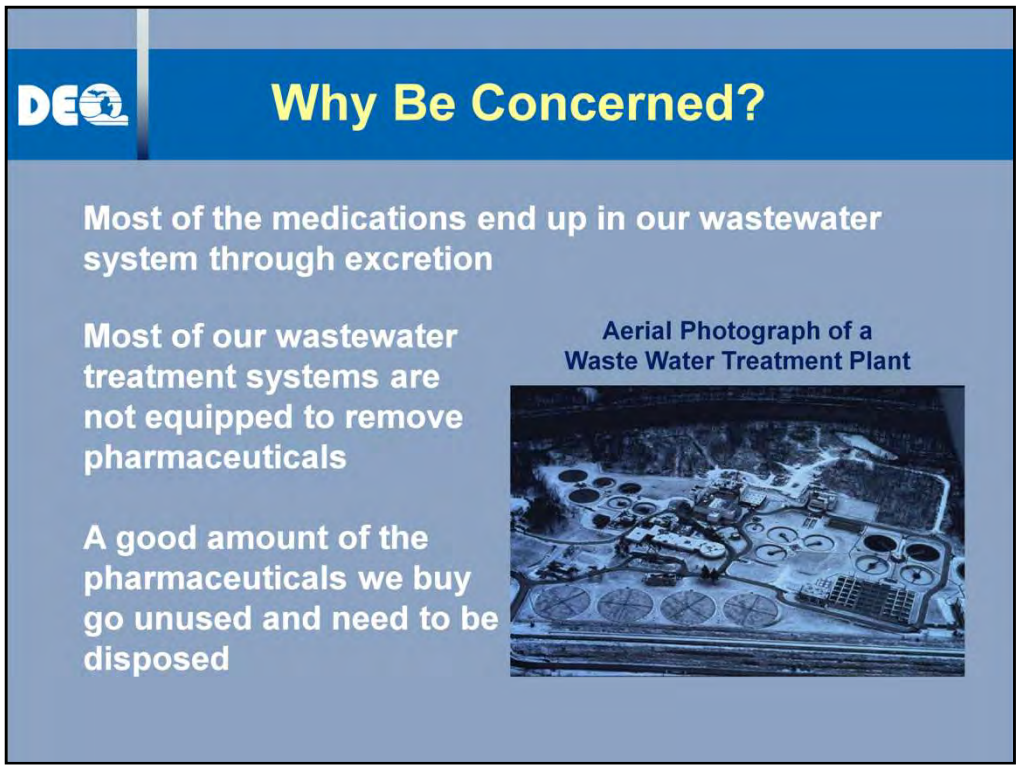


This is particularly concerning given this is the very same water resource we use for our drinking water.

We've seen materials like sleep aids, blood pressure meds, birth control, antidepressants, and various other medications detected.

Presently, the U.S. Environmental Protection Agency continues to study the matter looking for a grander scale course of action.

So, what we're doing today is discussing ways to collectively make a difference to help minimize our "pharmaceutical footprint" in health care.



As you likely know as a medical professional, most medications we take are not absorbed by our bodies.

Most are excreted and end up in our wastewater system, but our wastewater systems are not equipped to remove pharmaceuticals.

So, we have a sizable contribution of pharmaceuticals in water from use, and we have another chunk from prescriptions that go unused for various reasons.

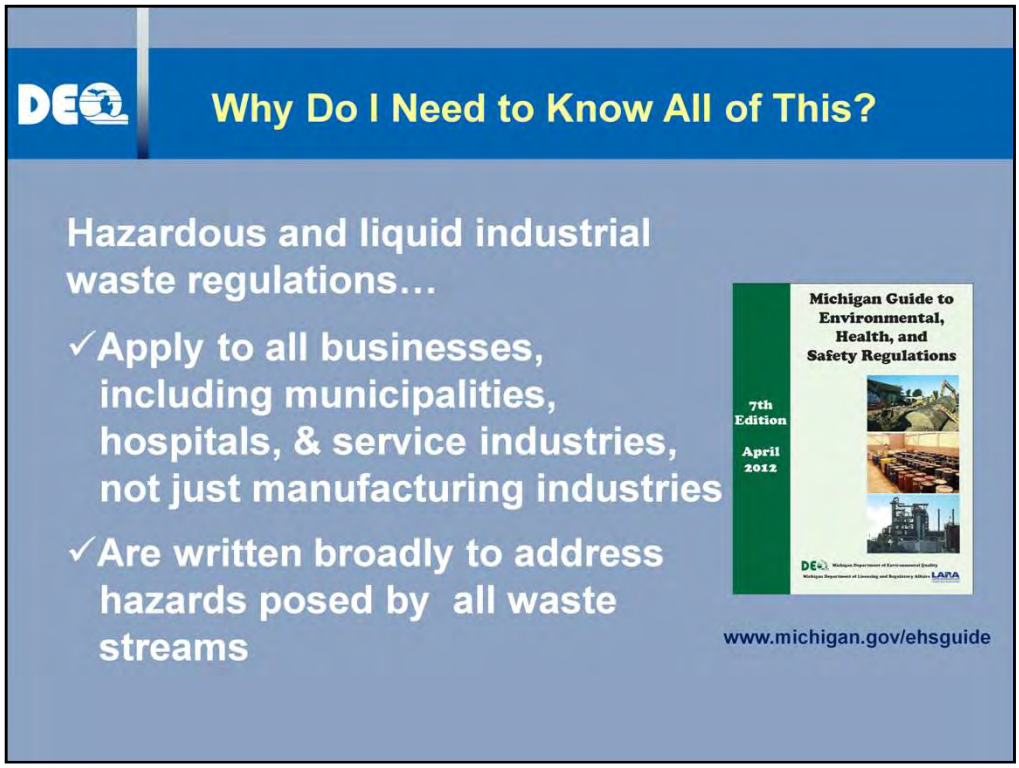
Fortunately, there are no known health impacts to people at the low levels detected.

However, absent improvements in our disposal or wastewater treatment, we expect that the level of drugs in our water to rise from an increasing population using more medications.

Some studies have shown impacts to fish and wildlife.

Fish have been found to be feminized, no longer exhibiting all the male anatomy they should and this is expected to be caused by exposure to low levels of estrogens in the water.

Due to this growing body of evidence, pharmaceutical pollution is coming under greater scrutiny.



Because of all of this, we are reaching out to educate health care professionals on the existing waste regulations, and trying to also ready everyone for regulatory changes down the road.

At this point, you are probably asking if health care providers really need to know all this.

Ultimately, they do.

They need to know all of this because the waste regulations were written broadly.

They apply to all businesses including hospitals, and medical care and veterinary clinics.

They don't just apply to manufacturing.

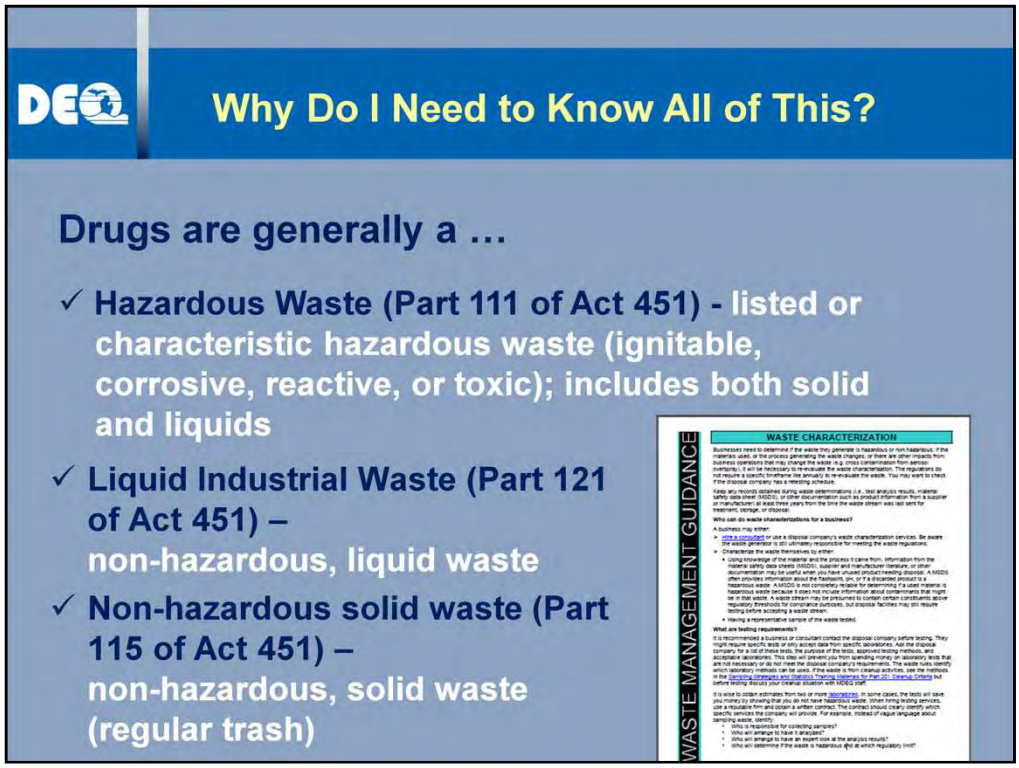
To comply with the waste regulations, health care providers need to evaluate each drug at each dosage, and determine what type of waste they have.

Is it a hazardous waste, liquid industrial waste, or non-hazardous solid waste.

Then they have to determine the total weight of all hazardous waste generated monthly

From that information they can determine their legal disposal options.

The more hazardous waste a site generates, the more regulations it is subject to.

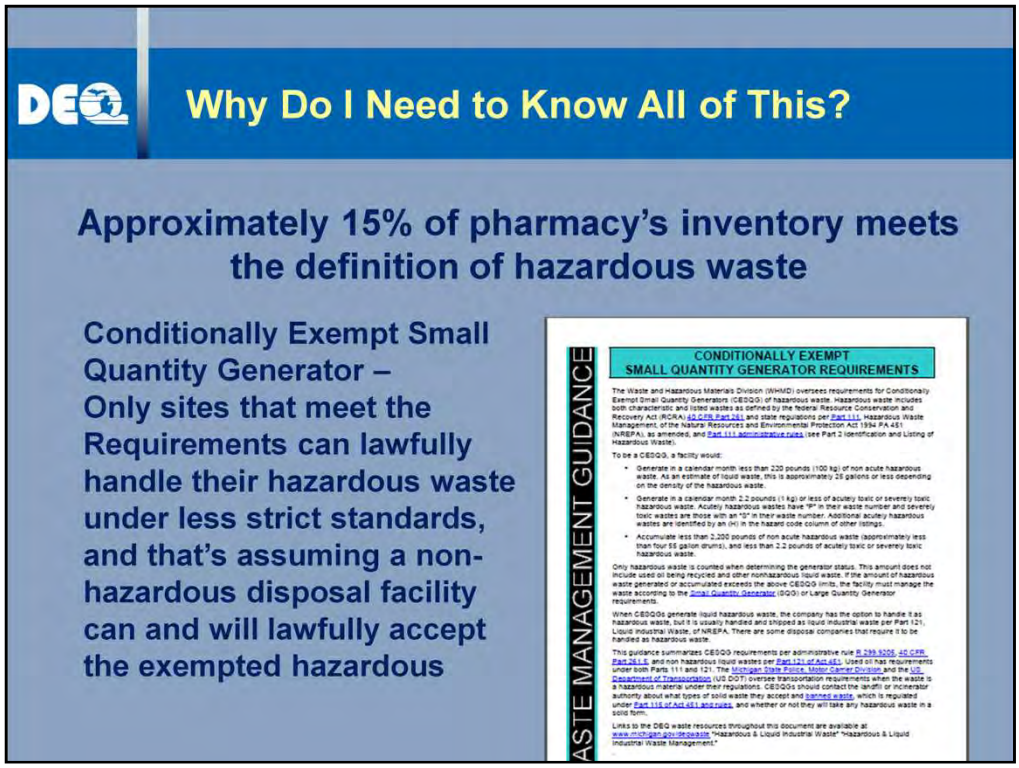


Some drugs, when destined for disposal, are subject to hazardous waste regulation.

Others are subject to liquid industrial waste regulation.

While still others are subject to non-hazardous solid waste regulation.

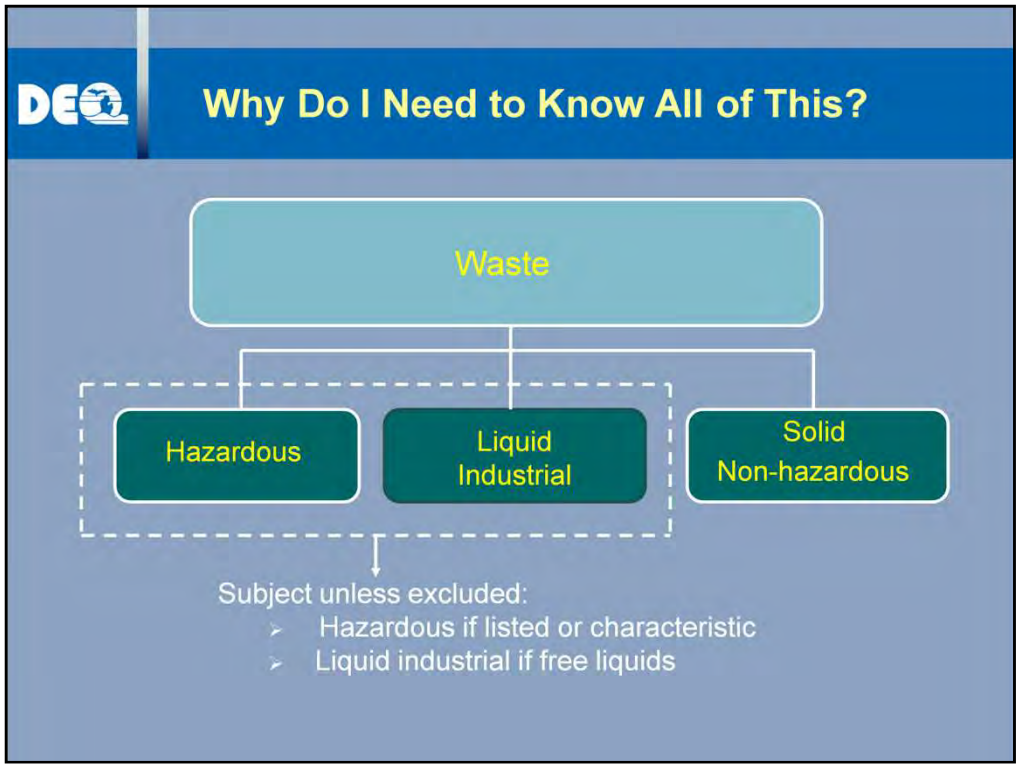
Each waste type has its own unique set of handling and disposal requirements.



To put things into perspective, approximately 15% of pharmacy's inventory meets the definition of hazardous waste.

Beyond that, there are many medication that come in liquid form.

Only sites with records that prove they are exempt from hazardous waste regulation or are a conditionally exempt small quantity generators can manage waste that meets the definition of hazardous waste under less strict standards, and that's assuming they can find a non-hazardous disposal facility that will take them.



This slide provides an overview of waste characterization.

When you have a waste, you first look at whether it's a hazardous waste. If it meets the definition of a hazardous waste by being on the lists in the rules or exhibiting a characteristic of being ignitable, corrosive, reactive or toxic; and it's not excluded, when then it's subject to hazardous waste regulation.

If the waste doesn't meet the definition of hazardous waste or is excluded from hazardous waste regulation, then you look to see if it has free liquids.

If it does, and is not excluded from liquid industrial waste regulation, then it's subject.

If it is excluded from both hazardous waste and liquid industrial waste regulation and it's a waste, well it falls into being subject to non-hazardous solid waste regulation and can go in a regular landfill.

To be sure it's clear, I want to highlight that we're ONLY talking about pharmaceuticals, or ONLY drugs, or medications that are used to treat, diagnose, cure, and prevent human or animal ailments.

We are not talking about infectious medical waste like needles, blood, body fluids, and organs.

Medical waste is subject to a completely different handling and disposal requirements.

And medical waste should not be mixed with drugs,

If you mix them, you are selecting the costliest method to collect and dispose of your waste.

This is because there are additional handling requirements for medical waste mixed with drugs.

There is also a more limited set of facilities capable of handling the mixed waste.

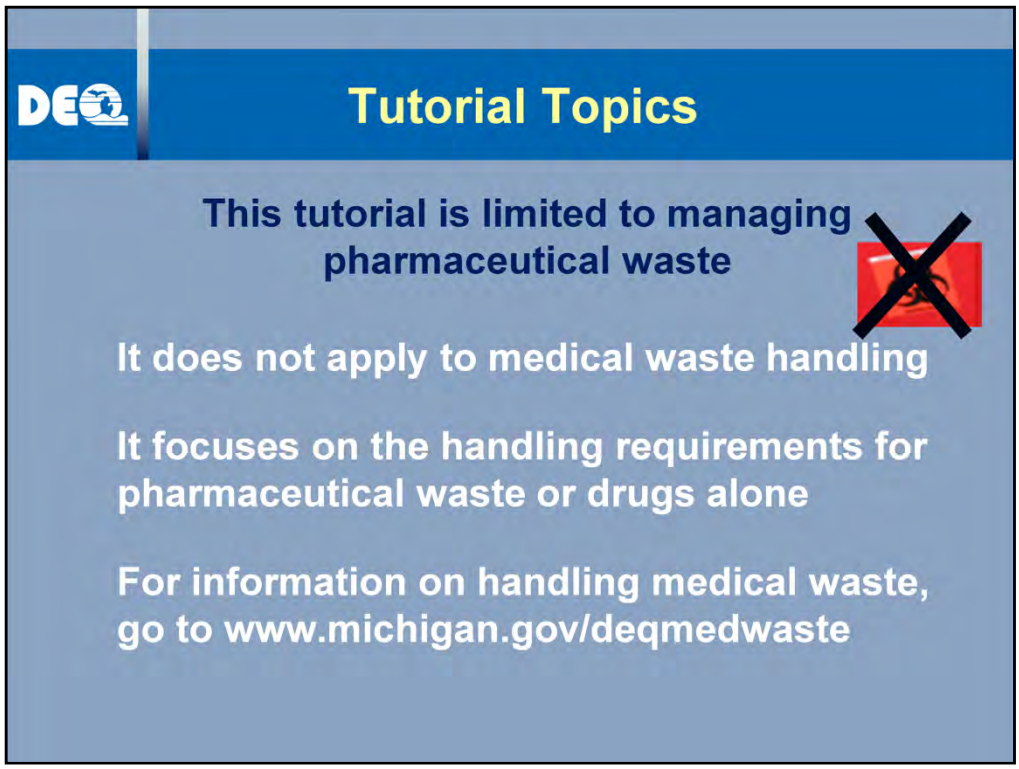
So, if drugs are inadvertently mixed with medical waste and sent for disposal as a medical waste, that would be considered improper disposal.

In Michigan, if drug waste is sent for disposal as a medical waste, it's likely to go to an autoclave where it will be treated under heat and pressure to kill the infectious components of the waste prior to landfilling.

If that is the case and pharmaceuticals are mixed, it is likely to result in the medications being fumigated, potentially exposing the autoclave operator to the medications in aerosol form.

So the point is, medical waste should generally be collected separate from drugs.

It it's not, you should be prepared to pay the higher disposal expense that comes with mixed medical waste.



So, this tutorial only applies to drug waste, not medical waste.

Note too that in some cases it is not possible to collect drug waste separate from medical waste.

For example vaccinations with live or attenuated viruses preserved with thimerosal generally become a mixed medical or dual waste when being disposed.

They're subject to medical waste regulation due to the virus

And, hazardous waste regulation from the mercury in the thimerosal.

For more information on what is and is not a medical waste, including how to handle it, please go to our Medical Waste Web page or call our Environmental Assistance Center for help.

Today's tutorial targeted to help all business that dispenses medications.

However, we're focusing more on health care providers that generate relatively small amounts of pharmaceutical waste.

Specifically, we are looking to reach doctors offices, veterinary clinics, outpatient clinics, retail pharmacies, and home health care providers that dispense medications to residents.

Larger facilities, like hospitals with several hundred beds, can benefit from the tutorial.

But they should look more closely at all of the different pharmaceutical waste management compliance options to see what suits their site's specific needs best based on cost, real estate , etc.

I'll discuss where you can get more resources to review and gain a better understanding of all of the compliance options a little later in this tutorial, when we get to the on-line resources section, at the end.

Simple Management Option

Tutorial advocates:

- ✓ ***COMMINGLING*** all pharmaceutical waste (hazardous, non-hazardous, liquid, and solid) during collection
- ✓ Managing all pharmaceuticals as a ***UNIVERSAL WASTE***

Today we are advocating that smaller generators of pharmaceuticals commingle all waste pharmaceuticals - regardless of whether they're hazardous, non-hazardous, liquid, or solid, and to manage them under streamlined standards for hazardous waste, called the universal waste standards.

We are recommending this because it is the simplest way to manage waste pharmaceuticals in Michigan.

The benefits from managing pharmaceuticals as a universal waste include:

There being no need to test or produce data to prove a given pharmaceutical is non-hazardous.

When you manage them as a universal waste you are presuming they are hazardous and managing them as a hazardous waste.

Therefore, there is no need to produce and maintain records proving it's not hazardous.

You can generally store the waste longer or up to a year

The container labeling is easier…

Because you don't have to list all of the hazardous waste codes that apply.

The biggest benefit from managing them as a universal waste is that the weight of the drug waste doesn't have to be included in the site's monthly hazardous waste inventory.

This eliminates paperwork and can reduce your overall regulatory burden since the more hazardous waste you generate, the more regulations you have to meet.

It only takes 2.2 pounds of acute hazardous waste pharmaceuticals in a month for a health care site to be subject to full hazardous waste regulation.

The general handling and disposal requirements for universal waste are simple.

They require the universal waste generator:

To place waste drugs in a container that will contain the waste and be compatible with the waste;

To separate incompatibles;

To maintain the container closed except when adding or removing waste;

To label the container with the words "Universal Waste Pharmaceuticals;" and

To ship the waste to a universal waste handler or destination facility within a year.

Be sure to document the year requirement is met.

You can do this by simply dating the container.

You also have to make prior arrangements for your waste shipments to ensure they'll accept it.

The record of shipment is important so be sure to keep receipts verifying what you sent to whom, when and in what volumes.

It's important to note too that spill clean-up from hazardous waste drugs can't be managed as a universal waste, nor can personal protective equipment contaminated with hazardous waste pharmaceuticals.

This is because the universal waste standards only apply to pharmaceutical, not to materials inadvertently impacted by them.

As such, you have to handle them separately, generally as hazardous waste unless you have records to prove you're exempt, can manage it as non-hazardous and have a non-hazardous disposal facility can legally, and will as a matter of choice, take exempted hazardous waste.

It may be easier to just manage these materials as a hazardous waste even if it's not required by law.

These are topics that can be sorted out through discussion with your disposal vendors.

We are also recommending that all pharmaceuticals be sent for incineration.

This is because incineration destroys most of the hazardous chemicals…

And it will prevent the pharmaceuticals from cycling, intact, into our water resources.

Managing them as a universal waste and sending them for incineration may provide for managing them at a higher level than is required, but it can also reduce your regulatory burden while providing for the least impact on our water resources.

Cost Implications

- Commingling is generally more cost effective for sites with smaller volumes of pharmaceutical waste
- Sites with larger volumes can offset increased training, container management, and drug labeling costs with greater reductions in disposal costs

Commingling is generally expected to be more cost effective for sites with smaller volumes of pharmaceutical waste because of the decreased regulatory burden.

The decreased regulatory burden from managing them as a universal waste is generally expected to off-set the increased disposal expense.

Sites with larger volumes of pharmaceutical waste are better able to offset the increases in costs for training, container management, drug labeling and recordkeeping with a bigger reductions in the final disposal costs.

So, commingling pharmaceutical waste and managing it as a universal waste is the simplest compliance option and likely the most cost effective as well.

If sent for incineration, this option also results in the least long term impact to our water resources.

The other option is to prove your exempt…

By having good waste characterization and monthly inventory records for all of your drug

waste…

And maintaining monthly hazardous waste inventory records proving you're exempt…

After you locate a non-hazardous disposal facility authorized and willing to take your exempted hazardous waste.

Hazardous Waste Examples

Coumadin (Warfarin ≤.3%) – listed (U248)
Coumadin (Warfarin > .3%) – listed (P001)
Arsenic Trioxide – listed (P012)
Silver Nitrate cream – toxic, ignitable (D011, D001)
Selsun Blue – listed (U205)
Afrin – toxic (D009)
Rubbing Alcohol – ignitable (D001)
Preparation H – toxic (D009)
Nyquil – ignitable (D001)
Nytroglycerin – toxic (P081)
Nicotine & salts – toxic (P075)
Barium Hydroxide Crystals – toxic (D005)

Some examples of drugs that are a hazardous waste include:

Coumadin or Warfarin, Arsenic Trioxide, Silver Nitrate, Nicotine, Rubbing Alcohol.

Hazardous Waste Examples

Epinephrine – listed (P042)
Phentermine – listed (P046)
Chloral Hydrate – listed (U034)
Chloroform – listed (U034)
Strychnine – listed (P108)
Ammonia inhalants – ignitable (D001)
Alcohol (denatured ethyl, ethyl, isopropyl alcohol) – ignitable (D001)
Carbolic acid– corrosive (D002)
Clinatest – reactive (D003)
Dry Picric Acid – reactive (D003)
Benzoic Acid – listed (P188)

Epinephrine, Phentermine, Chloral Hydrate, among many other drugs.

Recall that about 15% of a pharmacy's inventory meets the definition of hazardous waste.

Note too as you look at these lists, that I've included details as to whether it's a listed or characteristic hazardous and the hazardous waste codes that apply.

Here are examples of non-hazardous liquid pharmaceuticals.

They would have to be managed as a liquid industrial waste but could be managed as a universal waste with hazardous waste drugs.

In either case, they would have to be manifested for disposal unless you self transported them using a trip log or had written authorization from the sanitary sewer authority to discharge them to the waste water treatment plant.

Benadryl, Augmentin, Amoxicillin, and Acetaminophen.

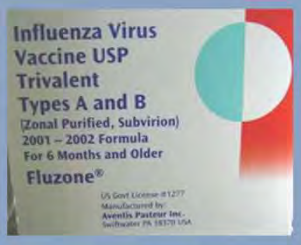
Any drugs that do not meet the definition of hazardous waste that are solid can lawfully go in the regular trash; however, we're recommending that they be incinerated where possible.

Drugs in pill form that are not a listed or characteristic hazardous waste fall into being a non-hazardous solid waste.

This includes drugs like Zocor, Augmentin, Amoxicillin, and Acetaminophen in pill form.

Mixed Medical or Dual Waste Examples

Influenza Vaccine, thimerosal preservative – toxic (D009)
Pneumococcal Vaccine, Phenol Preservative – toxic (U188)
Fluogen with thimerosal – toxic (D009)



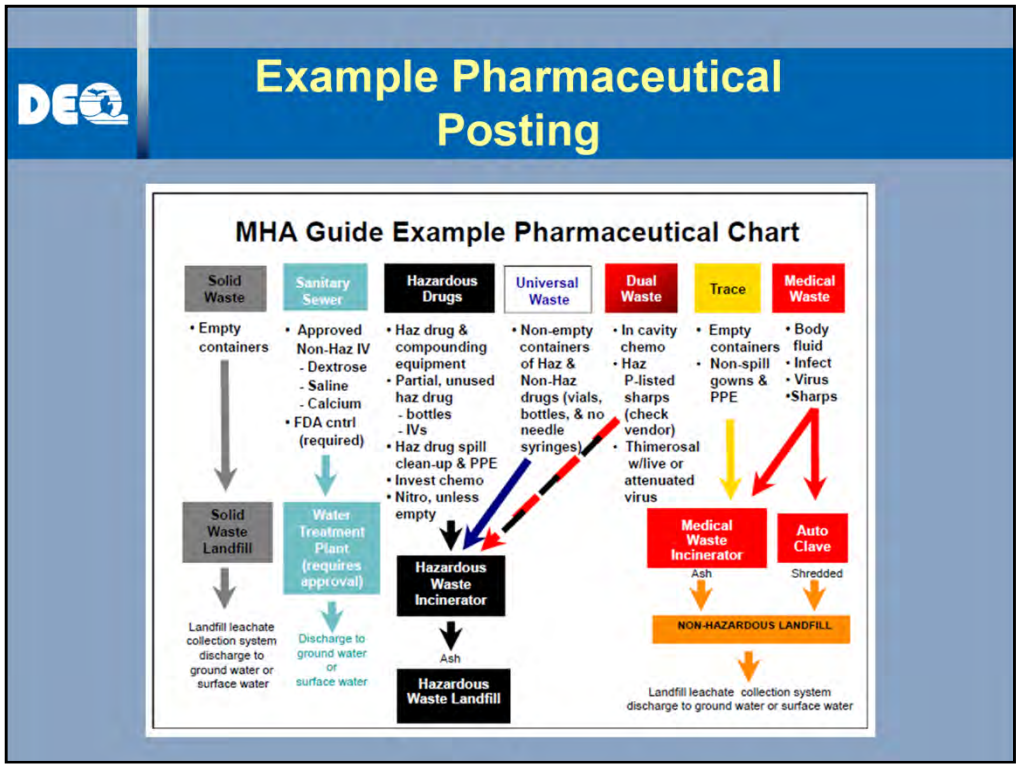
Mixed medical or dual waste can include drug waste preserved with mercury, creosols, or phenols that contain live or attenuated viruses.

It also can include needles that came in contact with listed hazardous waste drugs.

For examples, needles used in chemotherapy compounding.

When evaluating whether you have a dual waste that requires special handling, I'd recommend discussing your waste with your waste vendor.

They can help clarify whether the waste is subject to regulation as a dual waste or not.



This chart is something to look at more closely later to get a better understanding of common health care wastes, the disposal methods envisioned for the waste in the MHA guide, and how the disposal method may impact our water resources.

Note too that due to the high temperature and residence time associated with hazardous waste incineration and all of the add on air pollution control equipment, the stack exhaust for these facilities is 99.9999% free of hazardous constituents.

And, the hazardous waste incinerator ash is required to be disposed in a hazardous waste landfill which will have treatment on their leachate to remove the hazardous substances

With that, I'd like to move onto how you can find more on-line resources.

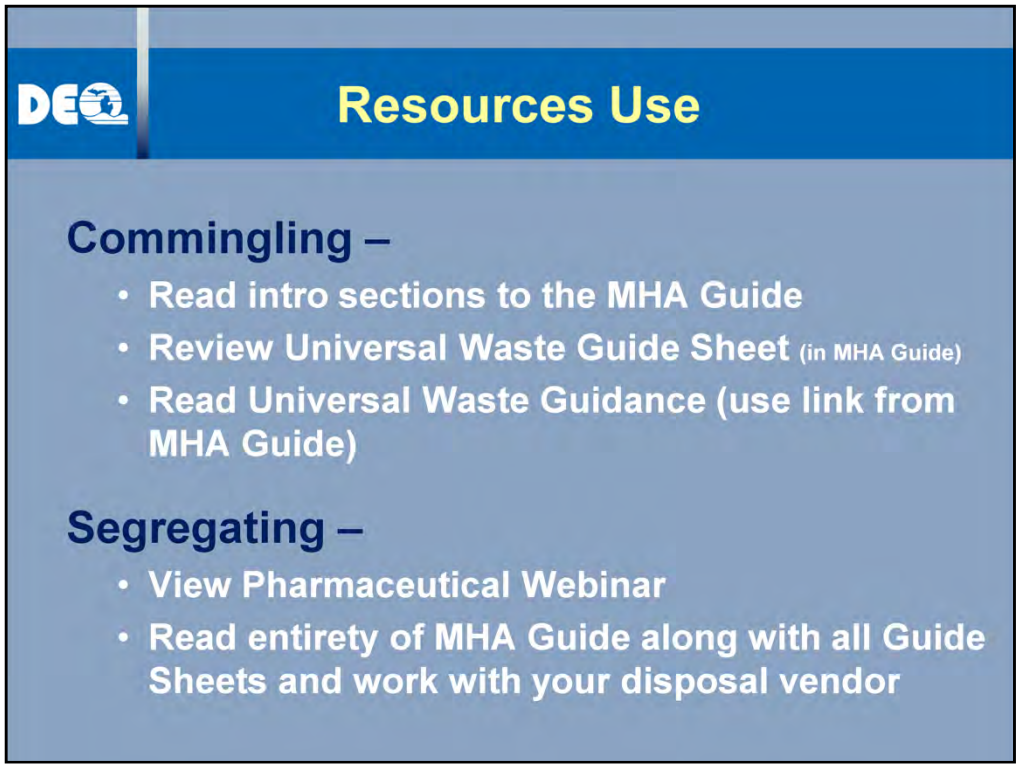
To find resources specific to health care, you should always start by entering in www.michigan.gov/deqhealthcare in your web browser address field.

This will take you to our DEQ Health Care Web page.

Our "Announcement" section at the top of the page currently displays this Tutorial and the MHA Guide Webinar.

We have Pollution Prevention Resources on the left and Compliance Assistance Resources are on the right.

Ultimately both will be housed with our other waste compliance assistance page under the "Waste Health Care Resources" web page found with the Compliance Assistance Resources.



So, in summary, there are generally 2 options for managing drugs waste.

You can commingle all drug waste to streamline your compliance requirements, or you can segregate hazardous waste drugs from non-hazardous drugs.

Segregation appears more cost effective for larger facilities.

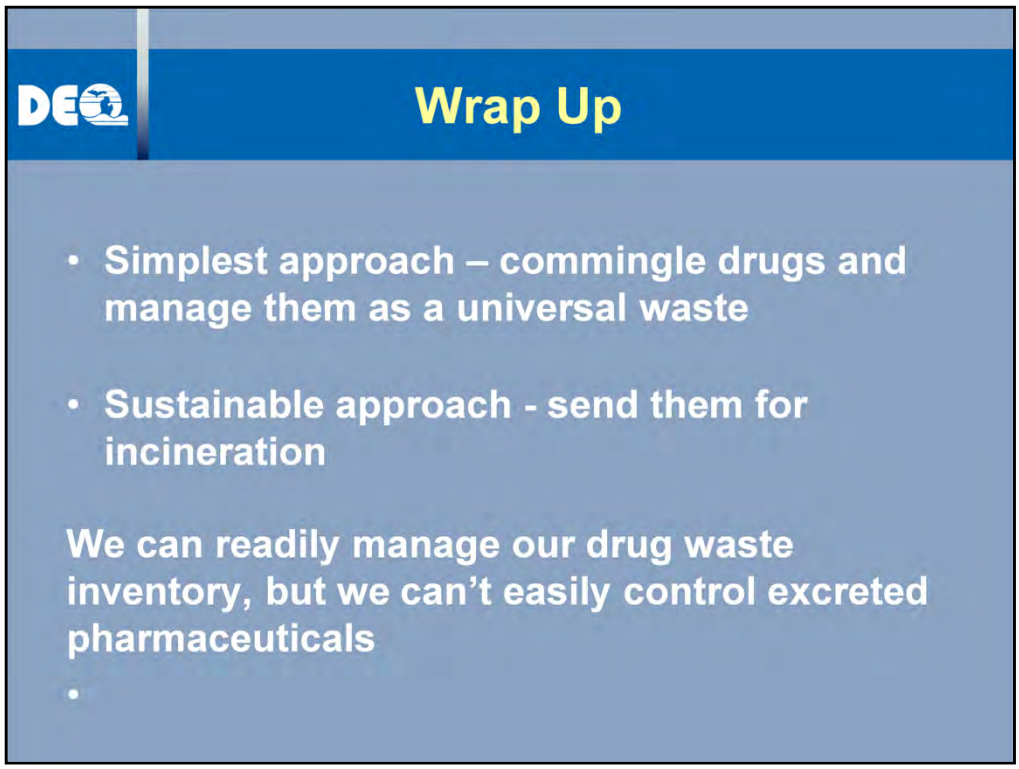
This slide outlines the resources that I believe would best help you review use of the different options.

If you want to commingle, I'd recommend going to the MHA guide, reviewing the introduction and glossary, reviewing the Universal Waste Guide Sheet and reviewing the Universal Waste Guidance you can hyperlink to from the definition of Universal Waste Pharmaceutical in the glossary.

If you'd like to segregate I'd recommend reviewing the entirety of the MHA Guide, viewing the MHA Guide Webinar, and potentially viewing all three of the free one hour webinars in the Introduction to Hazardous Waste Series Webinar

In the event you'd like to just confirm you can legally just put unused solid, pill form prescriptions in the trash, you should at least review the waste characterization and Conditionally Exempt Small Quantity Generator Guidance from the glossary links.

Regardless of whether it is subject to hazardous waste or non-hazardous waste regulations, I encourage you to incinerate pharmaceuticals to preserve the quality of our water resources.



To wrap things up, the simplest approach for businesses in Michigan is to commingle all drugs and manage them as a universal waste, ultimately sending them for incineration as a hazardous waste.

This compliance approach is expected to collectively provide the least impact on our water resources.

We encourage you to do this this because we can readily manage our drug waste inventory, but we can't readily and easily control excreted pharmaceuticals.

Sustainable water resources are important for both current and future generation to be able to use and enjoy.

Compliance Resources

More Questions?

Go to www.michigan.gov/deqhealthcare

Contact the Environmental Assistance Center at 1-800-662-9278 or deq-assist@michigan.gov

Contact Christine Grossman at 517-373-0590 or grossmanc@michigan.gov

With that, I hope you have come away with a better general understanding of the environmental implications associated with pharmaceuticals and the resources you can use to determine your preferred management option.

Thank you for your time and commitment to making Michigan a great place to live, work, and play.

If you have more questions, please do call me or the Environmental Assistance Center for help.

You can also review more on the pharmaceutical pollutions issue, standards, and expected changes in the waste regulations by diving deeper into the links provided here.

Once again we thank you for viewing the tutorial and for your efforts to help protect Michigan's environment.