GRANULAR RE-ACTIVATED CARBON

Part II

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Disposal costs for hazardous waste have increased by over 2500% since 1984 and are projected to double again by 1995.
-Environmental Progress (Vol. 8 No.3) Aug. 1989

In Part I of this two-part wrap up on Granular Activated Carbon (GAC) in WC & P's February issue, we explained that not all spent GAC is considered hazardous. Most residential and commercial uses are probably exempt. We did, however, encourage moderate users of GAC to consider re-activation as a more environmentally sound method of disposal. Part II will deal with the mechanics of hazardous GAC disposal.

At the onset of this article, we pointed out the rapidly escalating cost of hazardous waste disposal. There are many factors that have caused this:

1. Landfill regulations are tightening.
2. Landfills are phasing out.
3. Liability insurance has sky rocketed.
4. Legal fees, permits and manifesting costs are up.
5. Solidification and stabilization costs are up.
6. Packaging and transportation costs are up.
7. Profiling and analytical costs are up.

Waste Generators - Defined

Hazardous waste generators are classified under the U.S. Code of Federal Regulations, Book 40, Part 262 (EPA) as: 1) Conditionally Exempt, 2) Small or 3) Large (or Regular). For a copy of these regs, contact the Government Printing Office in Washington, D.C.. Ask for CFR-40, Parts 190-299.

A *Conditionally Exempt Small Quantity Generator* is defined as a waste generator producing less than 220 lbs of hazardous waste/month. As such, he does not require an EPA ID number and is therefore not regulated. He may accumulate and store up to 2200 lbs. of hazardous waste, on-site, without permits. Beyond that quantity, the CESQG is considered a "Small" generator.

The *Small Generator* is one which produces more than 220 lbs but less than 2200 lbs of hazardous waste/month. He must obtain an EPA ID# as a waste generator. (To obtain this, contact your state agency listed in Part I.) He must also comply with the manifesting system (more later.) Records of analysis and records on storage and accumulation must be kept.

The Small Generator can accumulate hazardous waste on-site for up to 180 days without a permit as long as the total does not exceed 13,200 lbs. In addition, if the Treatment, Storage, Disposal (TSD) facility is more than 200 miles away, he may store waste for up to 270 days providing the total quantity does not exceed the 13,200 lb (6000 Kg). If it exceeds the quantity, he automatically becomes a regular "Large" waste generator.

The *"Large Generator"* must abide by all the regulations applicable to the small generator. In addition, he is limited to 90 days storage on-site with no exceptions for distance to the TDS facility. The Large Generator (LG) must have at least one employee on-site at all times. He is designated the "emergency coordinator." The LG's waste must be stored in a contained, designated area and he must conduct weekly inspections and generate reports on storage status (leaks, general condition and quantity). In addition, he must have emergency procedures in effect defining the characteristics of the waste and providing emergency handling equipment for spills, etc. The EPA does not take hazardous waste lightly!

Any waste generator, regardless of status, can always ask for an extension of storage time of up to 90 days. Check with the state agency.

But I'm Exempt!!

In Part I, we defined "waste" and "hazardous" waste per EPA definition. Now we have defined the classification of the waste generator. Most readers will put themselves into the category of "exempt"

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because they generate less than the 220 lbs./month of hazardous waste. Since wet GAC weighs about 55 lbs./cubic foot, that's only four cubic feet. In addition, the 220 lb. limit refers to total hazardous waste generated. Everyone should examine their manufacturing and disposal practices carefully to determine their status.

Just what does "exempt" exempt you from? As a CESQG, you do not need an EPA ID#. Therefore, you are not in their system and not regulated. In addition, you may transport your waste to a TSD facility by common carrier (generally at much lower freight rates than hazardous waste haulers). Being small allows for some abuse of the system, but even being "exempt" does not mean you do not have to obey the laws. A waste generator is a waste generator, and hazardous waste is hazardous waste. It must be disposed of properly.

The "Conditionally Exempt" status for the small hazardous waste generator excuses one from the burden of record keeping and procedures - but not the responsibility of proper waste disposal.

Also keep in mind that if you are manufacturing a product that is to be used for hazardous waste collection (such as carbon canisters for chlorinated hydrocarbon collection at dry cleaners, degreasers or plating shops) and that product produces a large number of non-regulated, small (exempt) hazardous waste generators, the burden of collection and proper disposal may be placed on you rather than your customer.

If you have determined that you are a generator of hazardous wastes or simply wish to do your part for protecting the environment, there are some facts and procedures you should familiarize yourself with regarding the storage, handling, packaging and transporting of hazardous waste.

Storage of Hazardous Waste

Your best advice is to store spent GAC in a vessel you can use for shipment. If you sift through the regulations, you will find that spent GAC is classified such that the Department Of Transportation (DOT) code vessels usually required for hazardous waste transportation do not apply. Simply put, use a leakproof container in good condition that is compatible with the GAC and has a closable top.

Some may find it convenient to unload a GAC vessel into woven bags or super sacks to dewater it. This is OK since the adsorbed organics are held tightly enough to prevent leaching. For storage, however, the GAC should be transferred to drums (lined fibreboard OK) or a tank. A lined super sack may be suitable for storage but not transporting. Open top bins or open drums are not acceptable.

Handling

Handle spent GAC with extreme care. Wet GAC depletes oxygen from the air. Use auxiliary breathing equipment or at least good ventila-

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tion if working inside a GAC tank (even if not spent or hazardous).

Handling of hazardous substances is covered by OSHA regs. OSHA requires personal protective equipment - fully clothed, goggles, gloves, respirator (a must for vapor phase carbons). Assume the spent GAC is an open container of whatever it has been used to adsorb. Use caution.

Packaging

EPA says that packaging and transporting of hazardous waste falls under DOT. This is covered by the Code of Federal Regulations, Book 49, Parts 100-177. There is a table of chemical substances listed in Part 172.101. Spent GAC is not listed. Hazardous (by EPA definition) spent GAC falls under "Hazardous Waste Solid." It is classed as ORM-E (Other Regulated Materials - Class E). It's ID# is NA 9189. The shipping name is Hazardous Waste Solid nos (not otherwise specified). You will need this information for filling out the manifest. No labeling is required. Although the normal hazardous waste shipping container must be a DOT spec 17H or 17C drum, Class ORME is an exception. The container must simply be a "good condition leak proof container compatible with the waste and with a closed top." A good condition fibre drum with a liner will do.

Transporting

To transport hazardous waste to a TSD facility, one must use a *permitted hazardous waste transporter.* (This does not apply to CESQG). The transporter will have an EPA ID#. They are not too plentiful. Call any common carrier for referral or call your TSD facility.

Manifesting

The *Uniform Hazardous Waste Manifest* (or simply "manifest") is the EPA and DOT mandated system for tracking hazardous waste from the cradle to the grave. Each state has the option of producing a manifest for their state or using the Federal Form. Check with your state.

The manifest is a "bill of lading" for hazardous waste. It lists the EPA ID# of the generator and his address. Also, the transporter (with ID#), the TSD facility (with ID#), the DOT name, class and ID#, the number of containers, type of containers, quantity (lbs.) of waste and waste code.

Who are the TSD facilities?

Anyone who is currently a generator of hazardous waste will get to know his TSD facility very well. Every state has them. There are hundreds of them. They are the Treatment, Storage and Disposal Facilities. At some time or another you may use different types of TSD's. A TSD can either be a GAC reactivator, an incinerator or a landfill. PCB's and Dioxin must go to an incinerator.

Not all hazardous GAC can be reactivated. Nuclear wastes, PCB's, Dioxin and certain heavy metals cannot be handled.

There are four TSD facilities

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currently permitted to reactivate hazardous waste GAC in the U.S. They are:

1. Cameron Yakima - Yakima, WA.
2. Calgon Carbon - Pittsburgh, PA.
3. Adsorption Systems, Inc. - Milburn, NJ.
4. Envirotrol - Sewickley, PA.

We suggest that you contact several TSD facilities to discuss their requirement to accept spent GAC.

What are the costs of reactivation?

Contrary to some beliefs, the cost of GAC reactivation is not free. TSD's do not beat a path to your door looking for hazardous wastes. Reactivation is, however, generally less expensive than other forms of disposal. It is also more environmentally sound and it recycles a valuable product. Most importantly, GAC reactivation terminates the waste generators responsibility.

GAC reactivation is environmentally sound, economical and terminates the generator's responsibility.

Before hazardous GAC waste can be reactivated, it must be characterized. The profile form (supplied by the TSD) usually requires an analysis of the spent GAC. Some TSD's may accept the analysis of the waste stream treated as a substitute for the GAC analysis. If no analyses are available, some facilities will accept the profile form and a sample of the spent GAC to complete the profiling process. The costs for profiling range for $100 to $2000 (depending upon the quantity of GAC). Analytical fees range from $200-$300/sample.

If approved, a spent carbon approval number is issued (for that waste stream) and filed. This may be a one-time event or may require periodic updating. Any subsequent waste from this stream requires only paperwork. This is called a "Continuing Form" and may vary with the TSD. You are not charged again with the profiling and analytical costs.

Upon receipt by the TSD

Recycled (reactivated GAC can either be *returned or retained* by the TSD.

If returned:

1. The generator's liability for the waste is terminated. This is certificated.

2. Physical losses are 10-15% of GAC dry weight.

3. Activity is restored.

4. Costs will run $.50 to $1.00/lb. based on yield. This does not include freight, profiling and analytical costs.

If retained:

1. Liability of the generator is terminated.

2. Costs are the same.

All reactivators will take into account the value of the GAC as a "credit". Liquid phase GAC's have less value than vapor phase. Some

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reactivators will segregate your GAC and guarantee you will get your own GAC back. This is very important if you are recycling GAC on a water stream intended for potable end uses.

Are there limitations on the use of recycled GAC?

Most potable water uses require virgin carbon. The use of recycled GAC is limited. The reason is that not all hazardous materials are completely removed during reactivation.

Organics, including chlorinated hydrocarbons, will be completely volatilized during reactivation. Heavy metals will not. Silver activated carbons can be recycled (for more information, check with your source). Since GAC adsorption is an equilibrium type reaction, the residual heavy metals picked up on one water source may sluff or leach on a different water source (say one with a lower pH feed stream). Returning a recycled GAC to the same end-use location is generally acceptable.

Recycled liquid phase carbons are very suitable for wastewater clean up and groundwater reclamation. Arrangements can usually be made to have the physical volume losses made up with virgin GAC for critical applications.

What are characteristics of reactivated GAC?

Spent GAC can be reactivated to essentially "new" carbon specifications. Carbon tet (CCl_4) numbers are near new. Iodine numbers are near new and molasses numbers may actually improve.

The particle size will be reduced slightly so expect some increased pressure drop. Adsorption kinetics will be very good vs. new GAC.

Is it really worth it?

Reactivation offers a very sound "disposal" alternative for hazardous and non-hazardous carbons alike. Incineration and landfilling also require profiling, as well as, the analytical expenses.

Environmental concerns, as well as, changing regulations are leaning toward recycling rather than disposal. Remember, the cost of getting rid of hazardous waste is borne by the generator.

Reactivation offers a very sound alternative for hazardous and non-hazardous carbons alike.

You can help your customers and the environment by suggesting recycling as a means of disposal. Contact a TSD facility or your GAC supplier.

The author wishes to thank Bob Hanson, Mark Webb and Dan Robinson of Cameron-Yakima for taking the time to explain the "system" and help bring this information to you.

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