Using a Recycling Facility for Metal-Bearing Plating Waste

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Recycling eliminates long-term landfill liability and allows for reuse of valuable resources. There are various options for the recycling of plating wastes. When looking for a recycler for your plating wastes, consider what waste codes, if any, apply to the wastes and check to see what types of wastes the facility is permitted to handle, such as D002, D007, F006, etc.

A waste profile, which will include; waste type, volumes, packaging and other pertinent information, will be required. A representative pre-screen sample will also be required in most cases. The pre-screen analysis, along with the profile, will determine the processability and the cost for recycling each material.

In advance of sending samples, “qualifying” can be done to see if recycling is even feasible for a particular waste stream. Existing analytical data of the waste, waste specifications of the recycle site, annual volumes, transportation costs and various other items can be considered in discussing recycle options.

There are many factors in determining what wastes can be recycled. This presentation will give an overview of many of these considerations. It will also briefly describe the approval process.

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Waste Characterization

One of the first steps in determining whether your waste can be recycled is to ascertain if any EPA waste code(s) apply to the waste. This is called "characterizing" the waste. There are Federal EPA established hazardous waste codes, defined in the Code of Federal Regulations Title 40 (40 CFR) §261.2. Some states have adopted their own hazardous and non-hazardous waste codes or classifications as well.

A waste determined to be hazardous, due to any one of four hazardous characteristics, is called a "characteristic" hazardous waste. A waste may be also be deemed hazardous because of the process or treatment used to generate the waste. These wastes are referred to as "listed" hazardous wastes.

The four US EPA hazardous characteristics are:

Ignitability,
Corrosivity,
Reactivity, and
Toxicity.

Most wastes which exhibit one or more of these characteristics will carry a "D" prefix in the waste code. For example, some fine metal powders can self ignite. These wastes are assigned a D001 waste code. Other fine powders react violently with water. These wastes carry a D003 waste code.

The D002 waste code designates corrosivity and is a very common characteristic of many plating wastes. These wastes have a pH of less than or equal to 2 or greater than or equal to 12.5.

For a more complete definition of D001, D002 and D003 wastes, please refer to 40 CFR, §261.21, §261.22 and §261.23.

The Toxicity characteristic is more complicated. Special leaching tests can be performed to determine if any one of 40 specific contaminants are present. This Toxicity Characteristic Leaching Procedure (TCLP) testing can be performed for one or more of the suspected contaminants. The TCLP can be performed on a series of elements as well.
A common TCLP series test would be the "RCRA Metals" test which will test the leachability of the metals which are considered toxic according to the Resource Conservation and Recovery Act.

These RCRA hazardous metals are:

Arsenic	(D004)
Barium	(D005)
Cadmium	(D006)
Chromium	(D007)
Lead	(D008)
Mercury	(D009)
Selenium	(D010)
Silver	(D011)

For a complete list of contaminants and the maximum concentration allowable before being considered hazardous for Toxicity, please refer to 40 CFR §261.24. This section will also further define TCLP and test methods used for evaluation of wastes.

In many cases, it is allowable for a generator of waste to “sign off” on certain contaminants. In these cases, recycle facilities and/or the governing agencies will allow a generator to simply state that certain contaminants are not present in a particular waste stream. Any of these items could be questioned as lab analysis or other information dictates, and further TCLP testing could be required.

For example, if a plater knows that Arsenic, Barium, Cadmium or other RCRA metals are definitely not present in his process and therefore his waste, he may simply sign documentation to that effect and avoid costly testing. These “sign-offs” are very common for well-known waste streams within certain industries. If any hazardous constituents are even suspected, it is strongly recommended that the generator perform all appropriate testing to ensure that the waste is properly classified. This is the sole responsibility of the generator and will not become the responsibility of any transporter or recycle facility. The “Burden of Proof” is the responsibility of the generator of the waste.

Please also note that as a generator, it is prudent to not rely on only one set of test results. Three or more sets are recommended, especially where borderline contaminant levels might be present.

Some wastes are deemed hazardous because of the process or treatment that generates the waste. These wastes are called “listed” hazardous wastes. A very common listed waste in the plating industry is F006. This waste is defined as:

> “Wastewater treatment sludges from electroplating operations except from the following processes: (1) Sulfuric acid anodizing of aluminum; (2) tin plating on carbon steel; (3) zinc plating (segregated basis) on carbon steel; (4) aluminum or zinc-aluminum plating on carbon steel; (5) cleaning/stripping associated with tin, zinc and aluminum plating on carbon steel; and (6) chemical etching and milling of aluminum.”

This means that most wastewater treatment sludges or cakes from electroplating are considered hazardous because they come from this process. There are exceptions and other hazardous waste codes might also apply to these wastes as well.

There are many other “F” listed wastes from various processes. Please refer to 40 CFR §261.31 to see all the listed hazardous wastes.

There are also hazardous wastes from specific sources (“K” wastes) and hazardous wastes that are discarded products (“P” wastes and “U” wastes). There are hundreds of wastes that fall into these categories but they are not at all common in the plating industry and therefore will not be discussed here.

It is very important that the generator be careful and diligent in characterizing all waste streams. This characterizing can have a great deal of impact on transportation and disposal or recycle options and costs. Improper characterization can also lead to serious issues with regulators, transporters and disposal/recycle facilities. Fines can be imposed if a generator knowingly misrepresents waste.

Once a waste has been converted to a usable form (i.e. a product), it is no longer waste. In some states, materials destined for this type of recycling are not even considered waste.

All of the above information is merely provided as an overview to waste characterizing and not meant to be a complete guide to performing this characterization. It is strongly advised that all waste generators consult with their industry, their regulatory agencies, published documents concerning this topic or a qualified environmental consultant to ensure that wastes are characterized properly.

Waste Profiling

Once waste has been properly characterized as hazardous or non-hazardous with appropriate waste codes, a profiling of the waste can be done. The profile, which is provided by the recycle facility, will typically be only one or two pages but could be longer. This profile will vary from facility to facility but there are many items in common on most waste profiles. A waste profile will usually ask for other specifics about the waste in addition to what waste codes apply. These specifics will include appropriate names, addresses, and phone numbers as well as the anticipated yearly volume of waste, the process that it comes from, the type of packaging that will be used and other pertinent information.

Profiles should be completed carefully (once signed, they can become legal documents in a court of law). The information provided on them is very important to the recycle facility. For example, small quantities may be processable where large quantities might pose a problem, or drums of a material might be acceptable but bulk shipments might not. Generators should ensure that information on this document is accurate.

There are some companies in the waste industry that will "take title to your waste". This indicates that after you profile the waste to one of their Treatment Storage Disposal (TSD) facilities, they will then re-profile your waste as they prepare it for its final destination. In doing this, they may mix your waste with other wastes, repackage it, or simply transport it elsewhere as they picked it up. In these cases, you are the generator to them and they become the generator to the final destination. The original generator of the waste maintains some degree of liability wherever the waste ends up. This liability is considered long-term if the waste is landfilled. Most recycling facilities will all but eliminate landfill liability. Some recycle facilities are forced to landfill a small fraction of the waste from their process if there is no other option available.

Samples

Once a waste has been properly profiled, it is typical that a representative sample of the waste be sent to the recycle facility, or its designated laboratory, for analysis. A profile of the waste should accompany the sample so lab personnel are aware of what they are dealing with. Samples should be representative of the actual waste that is intended to be shipped. There are sampling protocols that should be followed but common sense in gathering a representative sample should suffice. Most facilities will only require about 16 ounces of a liquid or a pound or less of solid for analysis. When packaging and sending samples, be cautious and aware of potential hazards. Up to one kilogram (about 2.2 pounds) of a hazardous waste sample is considered exempt from hazardous waste regulations. Be considerate and aware of potential hazards in the event that your container should break. Provide adequate labeling for anyone who might handle dangerous samples. There are numerous containers available for shipping these samples, including containers within containers with absorbents for shipping acids and other corrosives.

Most recycle facilities are only going to test for the elements and items that are of concern and interest to them. The sample analysis, along with the profile, allows the recycle facility to evaluate the processability of the waste and also the approximate cost involved in processing. The processing facility can also determine the approximate residual value of the metals which will be recovered. From this information, they will provide a quotation to process the waste. In some cases, residual values of metals reclaimed will allow for the waste to be processed at no charge or even return monies back to the generator.

Qualifying

It is possible that an analysis will indicate the presence of elements that adversely effect the particular recycling process. If the anticipated adversity is severe enough, the recycle facility will most likely not be able to process that particular waste. Sending, receiving and analyzing such samples can be frustrating for both the generator and the recycle facility. It is therefore suggested that a "qualification" of wastes chosen for recycling be done prior to sending any samples. This qualification can usually take place by phone and/or fax.

Documentation about the recycle facility (i.e. wastes preferred and specification limits) can be examined to see if the facility is likely to process this type of waste.

Example: Approximate Solid Waste Specifications

Nickel	> 1.3%
Chromium	> 5.0%
Iron	No limit
Phosphorous	< .05%
Tin	< .05%
Copper	< 2.0%

Specifications, such as the ones above, would indicate that the facility wants nickel and chromium and has no problem with iron. It also indicates a low tolerance for copper and an even lower tolerance for phosphorous and tin. Specification limits are usually guidelines and are not hard and fast numbers that cannot be exceeded.

Waste volumes can be important in qualifying. Perhaps several drums of a certain waste could easily be handled, but ten tons per week are a major problem. Unwanted or "tramp" elements in small volumes can be absorbed in process much easier than large quantities of these elements.

Previous waste analysis, which may be available, can be helpful in qualifying materials for potential recycling. The type of analysis available may limit its helpfulness in qualifying. For example, if only TCLP data is available, this would not indicate the actual amounts of processable metals present. It would only show the leachability of certain elements and probably indicate what waste codes apply. Also, be aware that one facilities' analysis will not completely suffice for another facility. Testing parameters will vary. Each recycle facility will require its own analysis before making a final determination on the processability of a particular waste.

Recycle Options

The purpose of waste recycling is to convert all or most of a material received, into a usable form. A recycle facility may recover certain metals from waste or they may remove contaminants from waste making the remaining material suitable for reuse. For example, a liquid treatment facility may take contaminants out of liquid waste and discharge clean water to approved channels (i.e. stream, lake, sewer, etc.). Another facility might reclaim precious metals from waste through segregation, smelting, precipitation and/or other available technologies.

Most, if not all, waste generators would like to avoid landfilling their wastes, but they must consider what is practical. Unfortunately, not all industrial waste can be recycled at this time.

There are a number of recycling options available for various plating wastes. Many recycle facilities have been established to serve particular industries, and the plating industry has a

handful of established recycle facilities that have serviced this industry for many years. The options for recycling of a particular waste will depend on a number of factors, some of which have been discussed above.

The constituents in the waste will be a determining factor in the recycling considerations. The amount of recoverable metals or other materials, the level of contaminants present, handling and processing difficulty, are all factors to be considered. Cost to recycling versus the alternatives is always a factor. Transportation to a recycle facility versus alternative facilities should be considered. A recycle facility may have a preference for liquid waste or may just process solids. Most of these issues can be addressed quickly with a phone call, fax or email to the targeted facility.

Todays industrial recycling facilities are equipped to handle almost all of the waste packaging which is commonly used. If a facility is permitted to handle liquid waste, for instance, they most likely will be able to process these liquids from drums, totes, bulk tankers, etc. Solids handling facilities should be able to process materials coming in dump trucks, rolloff boxes, supersacs, gaylord boxes or other common packaging.

The waste generator is ultimately responsible for his waste. The generator needs to ask what will happen to the waste after arriving at a recycle facility. Environmental information is readily available and should be requested. An Environmental Audit of the recycle facility should be performed. All reputable facilities will welcome visitors and willingly provide appropriate environmental information.

Recycle facilities can be found by attending industry functions, such as this AESF Conference. They can also be researched through industry publications and of course, the Internet. Specific websites have been established just for this purpose.

Please feel free to ask the publisher of this paper for further information about recycling in the Surface Finishing Industry.