March 20, 1986

MEMORANDUM

SUBJECT: Determination of the Presence of Wastewater Treatment Sludges and/or the Presence of Wastewaters

- F006 Wastewater Treatment Sludges from Electroplating
- K001 Bottom Sediment Sludges from the Treatment of wastewaters from Wood Preserving

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Discussed below is some information that may be useful in any determination of what point a wastewater no longer is a wastewater, but is instead a treated effluent. This question is being raised at the present time by both electroplaters and wood treaters who feel that after a given number of treatment steps, their wastewaters are adequately pure with respect to meeting any effluent limitations imposed by the Clean Water Act. They feel that any subsequent treatment units (and any concomitant sludges generated thereby) should be exempt from regulation under RCRA, since they have meet the treatment criteria imposed by the CWA.

GUIDANCE FROM THE LISTING BACKGROUND DOCUMENTS FOR F006 AND K001

The listing background documents for K001 wood preserving wastewater treatment sludges and F006 electroplating wastewater treatment sludges gives no guidance as to when an effluent is a wastewater and at what point this wastewater becomes a treated effluent. The F006 and K001 background documents are silent as to when a wastewater is considered “treated” or not. They do speak about points of discharge, which in no way implies treatment.

The K001 background document speaks of several treatment steps for wastewaters in series, without any indication in of the Agency's belief that at some point, the wastewater is "treated" where it no longer is capable of generating the wastewater treatment sludges described by the listing:

> "After biological treatment, treatment by irrigation may be used. This process typically consists of (1) settling, (2) storage, (3) aerated treatment, (4) spray irrigation, and (5) runoff storage. . ."

All these steps are termed to be treatment.

DEFINITION OF A WASTEWATER VS. A TREATED EFFLUENT UNDER THE CLEAN WATER ACT

The EGD Development Documents for the wood preserving and electroplating industries also speak of wastewaters being subjected to any of a number of wastewater treatment steps. No language is given for a point within a facilities grounds or even after the point of discharge where the wastewater no longer is a wastewater, but is instead a "treated effluent." This is because the standards under the CWA were developed from a standpoint of practicality and economically achievable treatment levels.

Additional treatment has always been considered possible over and beyond that stipulated by the effluent limitations. Under the CWA, degrees of treatment are the basis for the standards. This can be seen by the fact that there are different standards for new plants over those for an existing plant. If the levels are different, both cannot be completely treated.

GUIDANCE FROM RCRA AS TO WHEN A WASTEWATER TREATMENT SLUDGE IS EXEMPT FROM REGULATION

The language of Part 261 clearly differentiates the point at which wastewaters or effluent (not wastewater treatment sludges) are under the authority of the CWA or RCRA:

> 261.4 (a) (2) "Materials which are not solid wastes. . . Industrial wastewater discharges that are point source discharges subject to regulation under Section 402 of the Clean Water Act. . . This exclusion applies only to the actual point source discharge. It does not exclude industrial wastewaters while they are being collected, stored or treated before discharge, nor does it exclude sludges that are generated by industrial wastewater treatment. . ."

Since the Clean Water Act applies to discharges to the navigable surface waters, point source discharges cannot apply to some internal midway point in the wastewater treatment train on the grounds of a facility or another facility (unless it is a

POTW) which treats, stores, or collects these wastewaters. Even if the wastewaters themselves were exempt from regulation under RCRA while they were being treated, collected, or stored prior to discharge, the sludges are not exempt as the result of any exemption of the wastewater. It may even be that RCRA regulated sludges can be generated after the point of discharge (except for the current exemption of POTW sludges).

SLUDGE GENERATED AS A RESULT OF WASTEWATER COLLECTION, STORAGE, OR DISPOSAL, INSTEAD OF WASTEWATER TREATMENT

Under the CWA, achieving zero discharge as the result of wastewater disposal or storage on-site is considered to be a "Pretreatment Standard". Therefore, the retention of wastewater is considered a treatment practice under the CWA.

As far as RCRA is concerned, any process which does in fact render a waste less hazardous or more amendable to storage or disposal is considered to be treatment. Most wastewater storage or disposal practices will generate a sludge and will subsequent "purify" the wastewater as it evaporates to the atmosphere or percolates down to ground water. Often times this treatment is not consciously intended by the facility. But without its occurrence, the storage or disposal technique for the wastewater would not be possible.

For example, if dissolved substances, suspended oils, or solids were not filtered out by the surface soils in a land treatment unit (spray irrigation field), then the wastewater along with these substances would travel directly to ground water. Another example would be a wastewater percolation pond; if it did not retain dissolved substances and suspended oils and solids in the bottom sediments while cleaner water percolated downward, then this total load would reach ground water without any attenuation. Or, if an evaporation pond released all of the contaminant load directly to the air, instead of selectively evaporating primarily water, then a fairly large air emissions problem could result.

GUIDANCE FROM RCRA LISTING BACKGROUND DOCUMENTS AS TO THE CONCENTRATIONS OF TOXICANTS IN THE WASTEWATER TREATMENT SLUDGES

The RCRA listing background documents cannot be examined by a facility or by Headquarters staff to make a determination as to whether a wastewater treatment sludge with a given contaminant concentration "meets the listing description." (A delisting would consider whether the waste and the hazardous properties for which it was listed, an entirely different determination.)

This is because the Agency did not give a toxicant criteria level as a basis for listing the generic class of wastes as hazardous. One cannot be imposed at this time without going

through due process and subjecting the revised listing to public comment.

For the F006 and K001 listings, the Agency listed a class of wastes by a listing description. Its authority to do so (without giving toxicant concentration criteria as a basis) is contained in Part 261.11 (b):

"The Administrator may list classes or types of solid waste as hazardous waste if he has reason to believe that individual wastes, within the class or type of waste, typically or frequently are hazardous under the definition of hazardous waste found in Section 1004 (5) of the Act." (Emphasis added.)

USE OF DELISTING PROCEDURES UNDER PART 260.20

If a facility believes that it particular waste does not have the hazardous properties for which the class or type of waste described by the listing description was listed, then it may submit a delisting petition. This is common practice, particularly for F006 wastewater treatment sludges. Even if the delisting process were not statutorily required, its historical use gives much weight to its continued usage. The Agency cannot simply issue a memorandum giving facilities delisting criteria and subsequently an across the board delisting.

If a change for electroplaters or wood preservers is thought prudent, then a specific exclusion should be promulgated through rulemaking, as we did with pickle liquor sludges. Alternatively, we could withdraw the F006 listing and rely instead on the EP Toxicity characteristics, thus allowing facilities to delist themselves.

USE OF THE VHS DELISTING MODEL VS. EFFLUENT LIMITATIONS UNDER THE CWA FOR DETERMINING RISKS FROM WASTEWATERS AND ANY SUBSEQUENT SLUDGES THEY MAY GENERATE

The effluent limitations for electroplaters under the CWA is a lower health-based standard than the considerations used under RCRA. That health was only part of the basis for the CWA effluent limitations can be seen by the fact that different concentrations limits or loadings are imposed for new or existing facilities. Also, any health considerations which were considered under the CWA were based strictly on the effects of using surface waters. No consideration was ever given for the contamination of ground water from effluents which are released to navigable waterways or during the various on-site treatment scenarios.

Under the VHS delisting model, ground water contamination is specifically considered (but not surface contamination). Our VHS specifically deals with considerations of toxicant loadings to either surface impoundments or land treatment

units from a wastewater effluent, and any subsequent ground water contamination resulting from this loading by way of concentrating a wastewater effluent. This is a working, in-place mechanism for determining the hazards of wastewaters while on-site.

EXAMPLES OF RISKS TO HUMAN HEALTH AND THE ENVIRONMENT AS THE RESULT OF USING CWA STANDARDS

Three examples will quickly show what types of risks to human health and the environment would result from using the CWA effluent limitation standards for the effluent at some internal point withing s plant wastewater management system.

Facility A is an electroplater, a new plant complying with the 1.71 ppm total chromium effluent limitation. Often this plant has their wastewater below this concentration level even before it treats/disposes of its wastewater on two spray irrigation fields totaling 14.8 acres. If we apply the CWA criteria, however, we must always assume that his concentrations are at this limit before he treats/disposes of the wastewater by spray irrigation.

The facility generates 30,000 gallons of wastewater a day. We could make the assumption that the chromium from this wastewater precipitates out onto the top 1 inch of soil. Then the facility would be increasing the surface soil concentrations by approximately 3 ppm chromium per year. If the facility employed spray headers with a higher evaporation rate and used only 1/3 of the spray field area, then the chromium concentrations would be increasing by 9 ppm per year. Until an EP test was run, we cannot assume that this level will be effectively bound to the soil. After time, the soils could become EP toxic, even with no ground water contamination potential. If this facility is exempted because of the CWA standards, then real harm to the environment could result.

Facility B is a pentachlorophenol (PCP) wood preserver who disposes of his wastewater in an on-site evaporation/percolating pond. If the CWA standard was imposed as a criteria for determining whether or not a K001 wastewater treatment sludge could be generated as a result of the treatment/storage/disposal of the wastewaters in that pond, then the folling criteria would apply. Under the effluent limitations for existing wood preserving plants, a total concentration of 100 ppm oil and grease (as an indicator of pentachlorophenol or creosote). Since a 7% PCP concentration in fuel oil is commonly used, one can assume that 7 ppm of this allowable oil and grease is PCP.

The actual PCP concentration in this facility's final treatment/disposal/storage pond is only 1.9 ppm, which would be well within the CWA criteria for discharge to surface waters. (Many plants easily achieve this 7 ppm PCP level well before the end of their wastewater treatment train.)

Yet the sludges at the bottom of the facility's final pond are 18,000 ppm PCP. This could result in a substantial ground water contaminating potential, since similar facilities with this amount of PCP in the sludges of surface impoundments have ground water contamination.

Use of CWA criteria for on-site wastewater management units is very dangerous, even if these criteria were entirely health based. This is because wastewater treatment/storage/disposal units on-site typically concentrate substances out of the ground water.

The third example is a facility utilizing either an optional or required mass-loading effluent limitation under the CWA. A facility, perhaps even Facility A, decides that it has done an excellent job of treating and disposing of its wastewater on-site with no discharge. Since for the electroplating industry, a certain loading of toxic metals may be released each day as an alternative to the concentration limits, the facility might simply dump toxic metal sludges from tanks into surface waters or the land, since the CWA is less stringent than the EP Toxic Waste requirements.

USE OF THE VHS MODEL ALONE TO DELIST WASTEWATER TREATMENT UNITS

There may be some danger in using the VHS model alone without any consideration for the toxicant concentrations in surface soils of land treatment units or sludges in surface impoundments. Although the VHS model does not consider sorption on the soil materials as an attenuating factor in any potential ground water contamination, this very real sorption of toxicants by surface soils or sediments could lead to the eventual build-up of high concentrations of toxicants. The smaller the unit (with a given waste loading) the greater the potential for this occurrence.

CRITERIA FOR DETERMINING THE PRESENCE OF WASTEWATER TREATMENT SLUDGES

A wastewater treatment sludge will inevitably be generated as the result of any wastewater management practice, as discussed above. The generation of a sludge does not mean that the sludge has the hazardous properties for which it was listed. In other words, a sludge is a solid waste, even if it is nothing but calcium carbonate from water.

The mechanism for the formation of sludges from waters may be either precipitation of suspended solids or other constituents in the wastewater, the absorption or adsorption of substances from the wastewater onto the bottom matrix of the unit, or the filtration of contaminants onto a soil matrix or other media. These filtration processes may consist of the physical removal of suspended solids or the adsorption or dissolved or suspended liquid substances onto the filtration media.

In addition, biological or other degradation processes (photolysis, hydrolysis, chemical conversion) may concert substances in either the upper water layers or the sludge layer itself to other products which may subsequently become constituents of the sludge by precipitation, adsorption, absorption, or filtration.

Laboratory tests may be used to determine whether or not a sludge is generated from wastewater management. Basically, these tests certify whether or not anything is present in a wastewater management unit over background. Think of the difference between a newly excavated pond which has just had distilled water added to it. Then think of the changes over time as sediment sludges start accumulating. If these sludges would have "happened" even without the addition of wastewaters, it makes no difference to the determination of whether or not the sludges meet the listing description (the mixture rule).

Tests to Quantify the Generation of a Sludge from Wastewater

A demonstration of whether or not a land based surface impoundment had generated a sludge would involve a determination that the substances on the bottom or the subsurface were not the same as would be found in freshly exposed soil layers at the same depth. Similarly, a spray irrigation field or any other filtration device designed to remove either suspended solids, dissolved substances, or suspended liquid substances, also would generate a sludge if the character of the original filtration material or native soils had changed.

In order to make a quantified determination of sludge formation as a result of wastewater being treated, stored or disposed of in any unit, a positive determination of a differencel between virgin material and the material in the unit is all that is necessary. Suggested physical/chemical tests to make these determinations for several types of units are given below.

1. Land-Based Surface Impoundments, Spray Irrigation Fields or Other Land Treatment Units, Land-Based Filtration Units, or Injection Wells - Suitable tests to differentiate between the material in the bottom, surface, or subsurface of the unit to values for soil that would occur naturally (surface soils or newly excavating subsurface soil material at a similar depth) are listed below. If no positive difference is established by one of these tests, then additional ones need to be made to make an adequate determination.

a. The presence of live or dead microbial or other organism populations.
b. Ash content
c. Total metals
d. Oil and grease
e. Total organic carbon
f. Nitrogen, phosphorous, and chloride content
g. pH
h. Soil morphology, including horizons, color, texture, structure, consistence, concretions, coarse fragments, root distribution, pedological features, saturated hydraulic conductivity, bulk density, and moisture regime.
i. Key substances of concern
j. Degradation products of substances of concern
k. Any tests necessary to differentiate the filtration media from virgin filtration media, as above

2. Impermeable Lined Surface Impoundments or Tanks -
Suitable tests to differentiate between the material in the bottom, surface, or subsurface of the unit to values that would occur in a new unit not having an opportunity to generate sludge are listed below. If no positive difference is established by one of these tests, then additional ones need to be made to make an adequate determination.

a. Determination of a sludge layer on top of the lining material of the unit by any of the following:

(1). Visual Observation
(2). Measurement with a sonic or other sludge layer detection device
(3). Detection by physically inserting some manual sensing device

b. If wastewater or sludges have leaked or spilled from the unit, then the following tests on the subsurface or perimeter soils should be performed:

(1). The presence of live or dead microbial or other organism populations
(2). Ash content
(3). Total metals
(4). Oil and grease
(5). Total organic carbon
(6). Nitrogen, phosphorous, and chloride content
(7). Soil morphology (as above)
(8). pH
(9). Analytical tests for key substances of concern
(10). Degradation products of substances of concern associated with unit

I hope this information will be useful to you. If you have any questions or need any other supporting data, please do not hesitate to ask.

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