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United States Environmental Protection Agency
Washington, D.C. 20460
Office of Solid Waste and Emergency Response

September 21, 1994

Peter F. Downing, C.H.M.M.
Manager
Environmental, Health and Safety
Fidelity Chemical Products Corporation
470 Frelinghuysen Avenue
Newark, New Jersey 07114

Reference: Applicability of F006
Hazardous
Waste Code to
Nickel
Reclamation
Process for
Electroless
Nickel Plating
Spent Solutions

Dear Mr. Downing:

This responds to your letter dated November 5, 1993, requesting an interpretation of the potential applicability of the hazardous waste listings to your proposed process for reclaiming the nickel in spent electroless nickel plating solutions. Because your proposed process concerns a specific site, we have consulted with Mr. Jeffrey A. Sterling of the New Jersey Metro Bureau of Water and Hazardous Waste Enforcement and Mr. John Wilk of the Hazardous Waste Management Division of Region II in preparing this response.

The application of the hazardous waste regulations discussed in this letter is based on the information provided in your letter, which we summarize here for convenience.

You propose to recycle the nickel in solution by reducing the nickel ions with sodium hypophosphite through a controlled chemical plate-out process, allowing gradual deposition of nickel on steel wool. The nickel-plated steel wool will then be sent to a smelter

for further reclamation in a smelting operation. The batch process will consist of 1) adjusting the Ph and concentration of the sodium hypophosphite reducing agent, 2) heating the solution to the optimum reaction temperature, and 3) allowing the nickel to plate out to a concentration of less than 10 ppm. The wastewater will then be polished through activated carbon and sub-micron filters followed by ion exchange and Ph adjustment prior to discharge to the local POTW. Spent solutions not amenable to the plate-out process will be precipitated to the metal hydroxide, followed by processing through the identical polishing process described above.

Your letter requested verification of the following aspects of your process with respect to the RCRA current regulations:

- "1. Electroless nickel solution is not a hazardous waste if it does not contain any listed waste (K,P,U,F) or wastes exhibiting the characteristics of hazardous waste (D wastes).
2. Any treatment to reclaim or recycle the nickel from spent electroless nickel solutions is not hazardous waste treatment subject to the requirements of a hazardous waste treatment permit.
3. Regeneration of either the ion exchange resin or the activated carbon does not require a hazardous waste treatment permit.
4. The sludge generated from the precipitation of the nickel as a metal hydroxide is not a hazardous waste if it does not exceed the TCLP parameters or exhibit any of the characteristics delineated at 40 CFR Part 261, Subpart C, Characteristics of Hazardous Wastes.
5. The metal deposited on the steel wool is not a hazardous waste, is a solid waste and is defined as scrap metal at 40 CFR 261.2(c)(6)."

Our interpretation of the above based on current RCRA regulations is as follows:

- The spent electroless nickel solutions received from your customers for the purpose of nickel metal reclamation are

not hazardous unless they have been mixed with or derived from any listed waste(s) or exhibit any of the hazardous waste characteristics under 40 CFR 261.20 through 261.24. This determination is based on the fact that electroless plating is specifically exempted from the scope of the F006 listing as defined by the Agency in the Interpretative Rule which was published in the Federal Register on December 2, 1986 (51 FR 43350).

- Unless the spent electroless nickel solutions are determined to be characteristically hazardous, the proposed reclamation process would not involve the treatment of hazardous waste. This also applies to regeneration of either the ion exchange resin or the activated carbon, because the wastewater is not generated in an electroplating process and also does not meet any other listing description. Also, for the same reason, the sludge generated from the precipitation of the nickel as a metal hydroxide is not a hazardous waste if it does not exhibit any of the characteristics identified in 40 CFR Part 261, Subpart C. (Although your letter does not indicate how this sludge is to be managed, you should be aware that a characteristic sludge that is destined for reclamation is excluded from the definition of a solid waste. See 40 CFR 261.2(c)(3). Note: The State of New Jersey does not have a similar exemption at this time.)

- Assuming the steel wool (on which the nickel has been plated) does not exhibit the characteristic of a hazardous waste or is not otherwise a hazardous waste because of the mixture-derived from rule, the steel wool would not be a hazardous waste. If the nickel-plated steel wool exhibits a characteristic of hazardous waste, you raised the issue of whether it met the definition of scrap metal (40 CFR 261.1(c)(6) and would be exempt when reclaimed (40 CFR 261.6(a)(3)(iii)); because the definition of scrap metal is based on a physical description of the material, the Agency is unable to make a definitive determination. Such determinations are case-specific and are typically made by the relevant State unless the State is not authorized for RCRA in which case the determination would be made by the relevant EPA Regional office. Please contact the appropriate State officials if you need additional assistance on this issue.

Please be aware that under Section 3006 of RCRA (42 U.S.C. Section 6926) individual States can be authorized to administer and enforce their own hazardous waste programs in lieu of the Federal program. When States are not authorized to administer their own program, the appropriate EPA Regional office administers the program and is the appropriate contact for any case-specific determinations. Please also note that under Section 3009 of RCRA (42 U.S.C. Section 6929) States retain authority to promulgate regulatory requirements that are more stringent than Federal regulatory requirements.

The Agency reserves the right to change this interpretation if it finds new information which refutes either the facts or assumptions on which this interpretation is based.

Thank you for your patience in this matter. If you have any further questions, please contact Max Diaz of my staff at (202) 260-4786.

Sincerely yours,

William F. Brandes, Chief
Waste Identification Branch

cc: Waste Management Division
Directors, Regions I-X
John Wilk, Region II
Jeffrey A. Sterling, NJ DEQ

Attachment

FIDELITY CHEMICAL PRODUCTS CORPORATION
A DIVISION OF AURIC CORPORATION
470 FRELINGHUYSEN AVENUE
NEWARK, New Jersey 07114

November 5, 1993

U.S. Environmental Protection Agency
401 M Street, SW (OS-330)
Washington, D.C. 20460

Attn: Rick Brandes, Chief
Waste Identification Branch

Dear Mr. Brandes:

On Tuesday, October 26, 1993, I met with Dave Carver of your staff regarding my letter dated August 4, 1993. This letter is a follow-up to our meeting. As stated in my previous letter, we are establishing a recycling program for our customers using electroless nickel (EN) plating technology.

We propose to recycle the nickel in solution by reducing the nickel ions with sodium hypophosphite through a controlled plate-out procedure. This allows gradual deposition of nickel on steel wool through chemical means. The nickel-plated steel wool will then be sent to a smelter for use as a raw material in a smelting operation.

We anticipate the need to conduct an extensive auditing and quality control program to ensure compliance with all applicable RCRA standards. We will require a facility audit of our participating customers to identify any potential problem areas which could lead to the shipment to us of non-conforming electroless nickel solution. This audit will include a tour of the plating areas, waste management program, management procedures to prevent cross-contamination, and sample collection. Samples will be submitted to us by the customers for every drum to be returned. The samples will be analyzed at our facility for heavy metals and plating characteristics, and a composite will be sent to a NJ DEPE certified laboratory for complete TCLP analyses with RCRA

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characteristics. The customer has to complete a recyclable material profile which delineates the characteristics of their spent EN solutions as well as certifying that the samples submitted are representative of the material to be shipped annually.

Once the material has been tested and determined to be acceptable, the customer will ship the material to our facility, where we will analyze the material and accept it only if it matches the pre-shipment samples and meets all applicable TCLP parameters. It is then pumped into our batch process, where the pH and concentration of reducing agent are adjusted prior to recycling. The solution is heated to the optimum working temperature and allowed to plate until the concentration of nickel in solution is less than 10 ppm. It is then transferred to a process tank prior to polishing through a carbon filter and sub-micron filtration, and finally ion exchange for the removal of the remaining nickel from solution. After final quality control and pH adjustment, the water is suitable for discharge to our local POTW.

In the event that the spent EN solution meets RCRA characteristics and TCLP parameters does not perform adequately in the plate-out process, we will precipitate the nickel as a metal hydroxide. Once precipitation is completed, it will be polished as above to remove any residual nickel from solution.

Although many aspects of the process have been discussed with Dave, I feel that it is necessary to verify some of the more critical points:

1. Electroless nickel solution is not a hazardous waste if it does not contain any listed waste (K,P,U,F) or wastes exhibiting the characteristics of hazardous waste (D wastes).
2. Any treatment to reclaim or recycle the nickel from spent electroless nickel solutions is not hazardous waste treatment subject to the requirements of a hazardous waste treatment permit.
3. Regeneration of either the ion exchange resin or the carbon does not require a hazardous waste treatment permit.
4. The sludge generated from the precipitation of the nickel as a metal hydroxide is not a hazardous waste if it does not exceed the TCLP parameters or exhibit any of the characteristics

delineated at 40 CFR Part 261, Subpart C, Characteristics of Hazardous Wastes.

5. The metal deposited on the steel wool is not a hazardous waste, is a solid waste and is defined as scrape metal at 40CFR261.2(c)(6).

Please review my understanding of the key components of my meeting with Dave Carver, as indicated in this letter, in writing at your earliest convenience. Enclosed is a process schematic which may assist you in reviewing the information contained in this letter.

If you have any questions or comments, please do not hesitate to call me at 201-242-4110.

Very truly yours,

FIDELITY CHEMICAL PRODUCTS CORP.

PETER F. DOWNING C.H.M.M.
Manager
Environmental, Health and Safety

PFD/pd
cc:MB,PD

Enclosure

FIDELITY CHEMICAL PRODUCTS CORPORATION
A DIVISION OF AURIC CORPORATION
470 FRELINGHUYSEN AVENUE
NEWARK, New Jersey 07114

August 4, 1993

U.S. Environmental Protection Agency
401 M Street, SW (OS-330)
Washington, D.C. 20460

Attn: Rick Brandes, Chief
Waste Identification Branch

Dear Mr. Brandes:

On Thursday, July 29, 1993 I spoke to Mr. Dave Carver of your office. This letter is to confirm my conversation with Dave regarding classification of spent electroless nickel plating solutions.

We are a manufacturer of solutions for the metal finishing industry. One of our primary product lines is electroless nickel (EN), a technology which allows deposition of nickel on variety of substrates without the need for an electrical current. As a service to our customers, Fidelity Chemical Products has begun establishing a recycling program for the nickel. Initial determinations have been made and confirmed by Dave Carver that both the spent EN solutions and the recycled nickel would not be considered a hazardous waste by the US EPA.

The electroless nickel solution does not contain any listed hazardous wastes. It passes for TCLP and RCRA characteristics. The solution contains roughly 6 grams nickel per liter of solution, present as nickel sulfate. The reducing agent in solution is sodium hypophosphite, at a concentration of <5 percent.

Our process takes the EN solution, and continues plating the nickel on steel wool, as our customers would. Rather than replenish the nickel to the solution, however, we continue plating until the concentration of nickel left in solution is below 10 ppm. We then

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pass the solution through ion exchange to reduce the nickel concentration to below our pre-treatment standards for discharge to our local POTW. Prior to discharge, we filter any solids and carbon treat the material, as we do with all of our effluent.

If we find that the nickel is not removable from solution by reduction, we precipitate it as a metal hydroxide. This metal hydroxide also meets TCLP requirements, and we would consider it to be a non-hazardous waste material per RCRA standards.

In either event, the recycled material would be sent off site to be smelted and recycled into various steel products. In this manner, we feel that we can offer our customers a viable alternative to conventional treatment and landfilling, while helping to protect the environment.

Please respond to me in writing to confirm that the spent electroless nickel solution, the plated nickel metal, and the nickel hydroxide are not hazardous wastes, and the process which I have described herein would not be considered a "hazardous waste treatment" method. I am very eager to get this recycling program rolling, and would appreciate your response as soon as possible.

If you have any questions, please call me at 201-242-4110.

Very truly yours,

PETER F. DOWNING, C.H.M.M.
Manager
Environmental, Health and Safety

Enclosure

FIDELITY CHEMICAL PRODUCTS CORPORATION
A DIVISION OF AURIC CORPORATION
470 FRELINGHUYSEN AVENUE
NEWARK, New Jersey 07114

FAX MESSAGE

TO: Max Diaz - U.S. EPA

FROM: Peter F. Downing, C.H.M.M.

DATE: September 1, 1994

Total pages including cover sheet: 7

MESSAGE: Max

Per our discussion on 8/31/94, attached are the letters to NJ DEP and their response regarding the spent EN recycling. Please call me if you have any questions.

Thanks,
Pete

Please contact the sender at 201-242-4110 if any pages are missing or unclear.

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Enclosure

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF HAZARDOUS WASTE MANAGEMENT
Trenton, New Jersey 08625-0028

July 19, 1990

Mr. Maurice Bick, President
Fidelity Chemical Products Corporation
470 Frelinghuysen Avenue
Newark, New Jersey 07114

Re: Recycling of Electroless Nickel

Dear Mr. Bick:

This letter is in response to your July 5, 1990 letter to Kurt Whitford discussing hazardous waste issues concerning the receipt of spent electroless nickel plating solutions by your company. As you stated in your letter, spent electroless nickel plating solutions are not listed hazardous wastes in New Jersey (or Federally). As such, these solutions could be hazardous in one or more of three scenarios: 1) if mixed with wastes listed in N.J.A.C. 7:26-8.13, 8.14, or 8.20; 2) if displaying one or more of the RCRA characteristics found in N.J.A.C. 7:26-8.9-8.12; or 3) designated as a hazardous waste by the Department due to the presence of hazardous constituents listed in N.J.A.C. 7:26-8.16.

Prior to accepting spent electroless nickel solutions from a company, Fidelity Corporation should determine that no listed hazardous wastes have been mixed with the solution. In addition to the auditing and testing proposed, a total petroleum hydrocarbon (TPH) analysis may be enlightening. Anytime TPH varies significantly from previous batches, further investigation should be considered.

Although spent electroless nickel plating solution should not fail any of the hazardous waste characteristics, routine evaluation of batches should be performed, as outlined in your July 5, 1990 letter. Anytime a batch solution fails the criteria found in N.J.A.C. 7:26-8.9-8.12 the waste is hazardous and cannot be

accepted by your company without first obtaining a hazardous waste facility permit.

Your letter states that spent solutions to be received by your company will contain 4000-5000 ppm of nickel. At those concentrations, the Department, when considering the factors listed in N.J.A.C. 7:26-8.6, would not consider the waste to be hazardous due to the presence of nickel as a hazardous constituent.

If the spent nickel solutions are not hazardous waste, a RCRA Part B permit and manifesting would not be required.

If you have any further questions, please contact Kurt Whitford at (609) 292-8341.

Very truly yours,

Shirlee Schiffman, Chief
Bureau of Hazardous Waste
Regulation and Classification

Enclosure

FIDELITY CHEMICAL PRODUCTS CORPORATION
A DIVISION OF AURIC CORPORATION
470 FRELINGHUYSEN AVENUE
NEWARK, New Jersey 07114

July 5, 1990

N.J. Dept. of Environmental Protection
B H W R & C
CN 028
401 E. State Street, 5th Floor
Trenton, New Jersey 08625

Attn: Kurt W. Whitford
Bureau of Hazardous Waste
Planning and Classification

Re: Recycling of Electroless Nickel

Dear Mr. Whitford:

This letter is in follow-up to my and Al Ruffini's conversations with you concerning the Federal and New Jersey state regulations governing the recycling of electroless nickel wastes. As we indicated, our firm is evaluating whether to offer such a recycling service to customers who purchase electroless nickel from us. We would be recycling the liquid nickel at our Newark, NJ facility. Some precipitated nickel from our process would be manifested to WRC Processing Resources or Inmetco. Some would be used internally.

The electroless nickel products to be reclaimed include 4855A, 4855BM, 4855CD, 4865A, 4865B, 4865C and similar formulations. Customers will return spent materials to Fidelity where we will then reclaim nickel from the solutions. The reclamation process involves precipitating the nickel in tanks and filtration in a filter press. The nickel sludge is then used internally or sold to a reclamation facility which will recover the nickel. The received nickel solutions are reduced from 4000-5000 ppm to about 5 ppm by us through precipitation. The remaining liquid is then put through an ion exchange unit which will further reduce the nickel content of the liquid to less than 0.1 ppm. The liquid is discharged to the

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sewer in conformance with our Passaic Valley permit.

As we stated, our primary concern is whether such an activity would require us to obtain a hazardous waste facility permit (commonly known as a RCRA Part B Permit). We are also concerned as to whether our customers must manifest the electroless nickel solutions to be recycled that they are sending us.

You indicated there is a classification of material termed "spent materials" which are considered to be solid wastes if they are reclaimed. "A spent material is any material that has been used and as a result of contamination can no longer serve the purpose for which it was produced without processing." You felt that waste electroless nickel falls into this category.

Having concluded that the waste is a solid waste, the next question is whether or not the solid waste is a hazardous waste. Hazardous wastes fall into two categories - listed and characteristic. Spent material from electroless nickel plating is not listed as either a non-specific waste source or a waste stream from a specific source. The only specific nickel compounds which are listed hazardous wastes as commercial or off specification products, are nickel carbonyl and nickel cyanide. Based upon our description of our material, you felt that electroless nickel is not a listed hazardous waste.

You also explained that if spent electroless nickel is not a listed waste, it may still be a hazardous waste if it is a characteristically hazardous waste. A waste is characteristically hazardous if it is ignitable, corrosive, reactive, or it exhibits the characteristic of toxicity. These criteria are listed as follows:

Ignitable

A waste is ignitable if it meets one of the following criteria:

- 1) Flash point less than 140 degrees F.
- 2) Flammable solid.
- 3) Ignitable compressed gas.
- 4) Is an oxidizer as defined in 49 C.F.R. 173.151.
That section defines an oxidizer as a substance that readily yields O₂, to stimulate combustion of organic matter, such as chlorates, permanganates

and inorganic peroxides.

Corrosive

A waste is corrosive if it is

- 1) aqueous with a pH less than or equal to 2 or greater than or equal to 12.5.
- 2) a liquid and corrodes steel at a rate greater than 0.25 inches per year.

Reactive

A waste is reactive if it is:

- 1) is normally unstable.
- 2) reacts violently with water.
- 3) forms explosive mixtures with water.
- 4) generates toxic gases when mixed with water.
- 5) is a sulfide or cyanide bearing waste which can generate toxic gases when exposed to pH conditions between 2 and 12.5.
- 6) is explosive or can be detonated.

Toxicity

A waste exhibits the characteristic of toxicity ("TC") if an extract from a representative sample of the waste contains one or more of listed contaminant at higher than listed levels. Currently, the test procedure for toxicity is the Extraction Procedure ("EP") which looks at 14 contaminants. In September of 1990 the EP toxicity test will be replaced by the Toxicity Characteristic Leaching Procedure ("TCLP") and the list of contaminants of concern will be expanded to 40.

Based upon our tests and knowledge of the electroless nickel, we do not feel it exhibits the characteristics of ignitability, corrosivity, reactivity or toxicity.

Al Ruffini and I also described our actual procedure for selecting and monitoring customers to be included in this program. They were as follows:

- 1) Customers would be selected one at a time and the

customer base for whom we would recycle electroless nickel would be built up slowly.

- 2) A customer would be audited at their plant by us in order to qualify for sending their nickel to us. We would look for strong management, good environmental procedures and a well run, orderly plant.
- 3) We would require a sample of their electroless nickel to be sent to us before we accepted their first electroless nickel. This sample would be sent to a State approved lot for EP Toxicity Test. This would be for the first shipment only. We would, on receipt of the first shipment, also send it to a NJ certified lab for EP Toxicity Test.
- 4) On all future shipments from that customer, we would require a certification that their shipment is in conformity with sample previously submitted. We would test these future shipments for EP Toxicity in our plant. If there is any questions regarding a particular shipment, we would submit to a State certified laboratory for their analysis.
- 5) Whenever and wherever TCLP toxicity testing becomes a requirement, we will test under TCLP Toxicity rather than under EP Toxicity.

Based upon the above analysis and information which we gave to you, you felt that electroless nickel was not a hazardous waste by either Federal or State of NJ standards and that we would not require a RCRA Part B Permit. You also felt that our customers would not have to manifest the electroless nickel they were sending to us unless their home state required it.

We feel that the above electroless nickel recycling project which we have proposed would be good for Fidelity and good for the environment.

We would appreciate a letter from you indicating receipt of this letter and that it basically describes our conversations with you of June 27, 1990.

Very truly yours,

FIDELITY CHEMICAL PRODUCTS CORP.

MAURICE BICK
President