



**DIRECTIVE NUMBER:** 9433.05(84)

**TITLE:** Test Methods and Standards to Evaluate Cyanide  
Levels in Inorganic Wastes

**APPROVAL DATE:** 12-11-84

**EFFECTIVE DATE:** 12-11-84

**ORIGINATING OFFICE:** OSW

☒ **FINAL**

☐ **DRAFT**

**LEVEL OF DRAFT**

☐ **A — Signed by AA or DAA**

☐ **B — Signed by Office Director**

☐ **C — Review & Comment**

**REFERENCE (other documents):**

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Key Words: Test Methods, Cyanide

Regulations: 40 CFR 260.22

Subject: Test Methods and Standards to Evaluate Cyanide Levels in Inorganic Wastes

Addressee: Dave Rudder, Vice President, Environmental/Process Control, Seigel-Robert, Inc., 8645 South Broadway, St. Louis, MO 63111

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Source Doc: #9433.05(84)

Date: 12-11-84

Summary:

Four forms of cyanide [total, free (amenable to chlorination), leachable, and photodegradable] must be evaluated for petitioning to delist an electroplating sludge. Total and free cyanide in the waste are determined using Method No. 9010, "Total and Amenable Cyanide," in Test Methods for Evaluating Solid Waste. Leachable cyanide is determined in the EP Toxicity Test with no acid adjustment. Method 9011, "Method for the Determination of Photodegradable Cyanide," is used in the determination of photodegradable cyanide.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
WASHINGTON, D.C. 20460

DEC 11 1984

OFFICE OF  
SOLID WASTE AND EMERGENCY RESPONSE

Mr. Dave Rudder  
Vice President - Environmental/Process Control  
Seigel-Robert, Inc.  
8645 South Broadway  
St. Louis, Missouri 63111

Dear Mr. Rudder:

The purpose of this letter is to describe the test methods and standards used in evaluating cyanide levels in inorganic wastes petitioned for exclusion under §260.22 of the RCRA regulations. As explained in our telephone conversation on December 5, 1984, the Agency requires four forms of cyanide to be evaluated for the purposes of petitioning to delist an electroplating sludge. These include total, free (amenable to chlorination), leachable, and photodegradable cyanide.

Total and free cyanide in the waste is determined using Method No. 9010 "Total and Amenable Cyanide" in Test Methods for Evaluating Solid Waste. The delisting program imposes no limitations on the amount of total cyanide present in the waste other than the requirement of running the photodegradable cyanide test if total cyanide in the waste exceeds 10 ppm. Free cyanide in the waste however, is considered hazardous at levels at or above 10 ppm. The 10 ppm limitation is derived from the workroom air threshold standard of 10 ppm set by the American Conference of Governmental Industrial Hygienists (ACGIH).

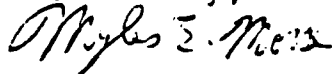
Leachable cyanide is the only cyanide parameter evaluated in the extract rather than in the waste. The test method used for this determination is the EP Toxicity Test with no acetic acid adjustment. Therefore this is a distilled water extraction. The delisting program looks at all cyanide showing up in the extract as being leachable cyanide, therefore cyanide in the extract is measured as total cyanide. This total cyanide concentration in the extract is evaluated using a generalized ground water dispersion model which predicts a receptor well concentration 500 feet from the disposal site. The receptor well concentration is then compared to a health based standard - the U.S. Public Health Services' suggested drinking water standard of 0.2 ppm. If the receptor well concentration exceeds 0.2 ppm then the waste is considered hazardous. The model uses the maximum extract level reported as well as the volume of waste generated on an annual basis. The model automatically yields a ten fold dilution of the maximum extract value, therefore a waste exhibiting a maximum extract concentration at or below 2.0 ppm would be delistable while a decision on higher extract levels would depend on the volume of waste generated.

As indicated above, a determination of photodegradable cyanide is required when total cyanide concentrations in the waste exceeds 10 ppm. The test used for this determination is Method 9011 "Method for the Determination of Photodegradable Cyanides" in Proposed Sampling and Analytical Methodologies for Addition to Test Methods for Evaluating Solid Waste. This test measures any hydrogen cyanide gas that might be generated after irradiating the waste with a UV lamp. The concentration of hydrogen cyanide generated in this test is again compared directly to the ACGIH threshold of 10 ppm as cited above. A concentration of less than 10 ppm would be considered non-hazardous.

In wastes exhibiting high concentrations of total cyanide it is possible that artificially high free cyanide levels can be recorded. This is due to positive interferences attributable to the complexed iron cyanides in the waste. In these instances the Agency has a number of alternate test methodologies that are less prone to interferences. The most frequently used is "Test Method for the Determination of Cyanide and Sulfide Containing Wastes" (copy attached). This test measures the generation of hydrogen cyanide gas which is then evaluated in terms of the 10 ppm ACGIH threshold previously discussed. Again, a concentration of less than 10 ppm would be considered non-hazardous.

I have enclosed a background article on the ground water model now being used by the Agency in petition evaluation. A detailed appendix explaining the assumptions used in the model will appear in the Federal Register as a part of the next group of proposed delistings (hopefully in February of 1985).. If you have any questions regarding any of the tests or standards described in this letter do not hesitate to call me at (202)-382-4782.

Sincerely,



Myles E. Morse  
Environmental Protection Specialist  
Delisting Program