

US EPA ARCHIVE DOCUMENT



## **Response to Comments Document**

# **Hazardous Waste Listing Determination for Inorganic Chemicals Industry Wastes (Final Rule)**

**Volume IV:  
Responses to Comments ICMP-00023  
through ICMP-L0005**

**Public Comments on the  
Inorganic Chemical Manufacturing Listing Determination  
(Proposed September 14, 2000)**

Comment ICMP-00023, Eastman Chemical .....	IV-2
Comment ICMP-00024, Envirocare .....	IV-15
Comment ICMP-00025, Steel Trade Associations .....	IV-16
Comment ICMP-00026, CPC .....	IV-28
Comment ICMP-00027, CPC, 11/9/2000 .....	IV-30
Comment ICMP-00028, Cookson Group plc .....	IV-33
Comment ICMP-00029, Waste Management .....	IV-41
Comment ICMP-00030, U.S. Borax .....	IV-43
Comment ICMP-00031, Eaglebrook .....	IV-51
Comment ICMP-L0001, Color Pigments Manufacturers Association .....	IV-57
Comment ICMP-L0002, Kerr McGee .....	IV-60
Comment ICMP-L0003, DuPont .....	IV-62
Comment ICMP-L0004, DuPont .....	IV-64
Comment ICMP-L0005, Cookson .....	IV-75

## Comment ICMP-00023, Eastman Chemical

Introduction: Eastman Chemical Company (Eastman) is pleased to comment on the agency's proposed rule to list certain waste streams as hazardous in the inorganic chemicals industry (65 FR55684-55782, September 14, 2000). Eastman is a major global manufacturer of chemicals, plastics, fibers, specialty resins and colorants, and specialty products for the inks and coatings markets. We are also a member of the American Chemistry Council and as such, subscribe to the tenets of the Responsible Care® program. While not directly impacted by the proposed listings for the inorganic chemicals industry, Eastman and many other companies across the nation may well be impacted by the Agency's decision to name manganese as a constituent of concern, with proposed LDR standards. Our comments will address Eastman's belief that manganese is not a toxic chemical of concern and will provide an abundance of information to demonstrate why we believe it should not be a "hazardous constituent" or the basis for any listing.

EPA is proposing to list a titanium dioxide nonwastewater stream in the inorganic chemicals industry, with manganese as one of the hazardous constituents for which it would be listed. The following concentration levels for manganese are proposed for 40 CFR Table 268.40, "Treatment Standards for Hazardous Wastes," and for the "Universal Treatment Standards" at 40 CFR 268.48:

- Wastewaters 17.1 mg/L
- Nonwastewaters 3.6 mg/L TCLP

EPA also proposes to add manganese to 40 CFR 261, Appendices VII and VIII. Eastman firmly asserts that the addition of manganese to the list of hazardous constituents is inappropriate and unjustified. According to the literature, manganese is one of the least toxic of the metals and is found throughout our environment. Only in very unique and limited circumstances has the ingestion of manganese been associated with undesirable consequences. Eastman strongly opposes the inclusion of manganese as a constituent of concern for the listing of titanium dioxide nonwastewater streams (or any waste streams), and believes the regulation of manganese is an inappropriate and abusive use of Agency and industry resources.

### Comment 23-1: Manganese Appears in Many Common Items at Relatively High Background Levels

Manganese is a basic element, ubiquitous throughout nature. The following bullet points demonstrate the magnitude of its presence in several media. Reference numbers in brackets are used throughout these comments, with full references included at the end of this document.

- Noncontaminated soils in the western U.S. contain 30-5,000 ppm manganese, with a mean of 380 ppm. The range in the eastern U.S. is <2 - 7,000 ppm, with a mean of 260 ppm. In Europe, the mean of manganese in ordinary soils ranges from 233 ppm (Denmark) to 1,405 ppm (England).<sup>1</sup>
- Nuts, whole-grain cereals, dried legumes and tea contain >20 ppm manganese. Vegetables and fruits contain 1-5 ppm manganese.<sup>2</sup>
- Sewage sludge in Iowa cities contained 194-557 ppm manganese.<sup>3</sup>
- Anaerobic sewage sludge contains a mean of 400 mg/kg manganese; aerobic sludge contains a mean of 420 mg/kg; lagooned, primary, tertiary and other unspecified sewage sludges contain 250 mg/kg. The overall mean is 380 mg/kg manganese.<sup>4</sup>
- Natural phosphate deposits in Florida, USA contain 771 ppm manganese; in Kola, USSR, 266 ppm; and in Morocco, 10 ppm.<sup>5</sup>
- "The average adult contains about 12 mg of manganese. The skeletal system contains about 43%, with the rest in soft tissues including liver, pancreas, kidneys, brain, and central nervous system."<sup>6</sup>
- Twenty commercial detergents were analyzed, and the ppm of manganese ranged

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<sup>1</sup>U.S. soil data: ATSDR Health Assessment Guidance, July 1990, with its referenced source the U.S. Geological Survey. Source for Europe data: "A Perspective on Metals in Soils," Journal of Soil Contamination, 5(4): 329-359, 1996.

<sup>2</sup> Introductory Nutrition, 2<sup>nd</sup> Edition, 1975, Helen Andrews Guthrie, The C.V. Mosby Company, St. Louis.

<sup>3</sup> Process Design Manual for Land Application of Municipal Sludge, US EPA, Office of Research and Development, Municipal Environmental Research Laboratory, October 1983. Published by US EPA, Center for Environmental Research Information, Cincinnati, OH.

<sup>4</sup> Ibid.

<sup>5</sup> "Sorption of Trace Elements on Carbonates and Phosphates," p. 229, Table 64 entitled "Trace elements in phosphate materials (ppm)," title of book unknown. Reference for information in Table 64 is "Langmyhr et al., 1977.

<sup>6</sup> Hazardous Materials Toxicology, Clinical Principles of Environmental Health, Chapter 85, "Manganese and Magnesium," edited by John B. Sullivan, Jr. and Gary R. Krieger, 1992, Williams & Wilkins, Baltimore, MD.

from 40-175 ppm, with an average of 87 ppm.<sup>7</sup>

Thus, manganese is naturally found in soils, food, and the human body and is also found in many nonhazardous wastes and products, often at fairly high concentrations.

Response 23-1: EPA is deferring our decision on manganese. Please see section IV.B. of the preamble for further clarification.

Comment 23-2: Manganese Has Low Toxicity and Is Not a Threat to Human Health

Human health has rarely been impacted by the "ingestion" of manganese. In fact, it is an essential mineral for good health, given its role in many critical biochemical reactions within the body. Nearly all the recorded instances of health problems are associated with the inhalation of manganese, in the manganese mining and processing industries. OSHA regulations have addressed those historical health/inhalation occupational problems, and manganese is also regulated as a Hazardous Air Pollutant (HAP) under the Clean Air Act. The few isolated incidents of ingestion-related problems, discussed below, would not have been prevented by the listings proposed in this rule. Eastman finds it ludicrous that EPA is planning to regulate a benign substance such as manganese, with so few recorded health effects throughout the world. We believe the following information provides substantial documentation for why manganese is not a problem through ingestion and why it would be a waste of agency and industry resources to regulate it as a hazardous constituent.

Manganese is an essential element for normal physiologic functioning in all animal species, as well as for plants. As stated by EPA, "Although inhaled manganese dusts have been reported to be toxic to humans, manganese normally is ingested as a trace nutrient in food. The average human intake is approximately 10 mg/day (Sollman, 1947). Very large doses of ingested manganese can cause some disease and liver damage but *these are not known to occur in the United States. Only a few manganese toxicity problems have been found throughout the world* and these have occurred under unique circumstances, i.e., a well in Japan near a deposit of buried batteries (McKee and Wolf, 1963)."<sup>8</sup> (emphasis added) The disposal of batteries in the U.S. is currently thoroughly regulated to prevent harm to human health or the environment. For example, hazardous waste regulations may apply to batteries under certain circumstances; 40 CFR Part 266, Subpart G applies to spent lead-acid batteries that are being reclaimed; and 40 CFR Part 273 contains management standards for universal wastes, including batteries.

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<sup>7</sup> "Sorption of Trace Elements on Carbonates and Phosphates," p. 229, from unpublished data, Institut für Sedimentforschung, Heidelberg.

<sup>8</sup> Quality Criteria for Water 1986, US EPA, Office of Water Regulations and Standards, EPA 440/5-86-001, May 1, 1986.

- Iron and manganese in drinking water are not considered health hazards.<sup>9</sup>
- In over 40 percent of the groundwater drinking water sources in the United States, iron (Fe) and manganese (Mn) concentrations exceed the recommended levels set by the Environmental Protection Agency (EPA). Iron and manganese are not considered health hazards, although micro-environments may be supported in wells and distribution systems which harbor microorganisms. *The main concern with these metals is the color imparted by the oxidized forms that rarely go unnoticed by the consumer. In addition, clothes and plumbing fixtures are easily stained.*<sup>10</sup> (emphasis added)
- Ingested manganese has rarely been associated with toxicity. No quantitative information is available to indicate toxic levels of manganese in the diet of humans. It is generally not considered to be very toxic when ingested with the diet.<sup>11</sup>
- No reports of actual manganese toxicity or deficiency have been reported for infants.<sup>12</sup>
- Manganese resembles iron and zinc in having a *low order of toxicity* in mammals and birds. . .Manganese toxicity in man arising from excessive intakes of this element in food has never been reported and is virtually impossible, except where industrial contamination has occurred . . . Chronic manganese poisoning occurs among miners following prolonged working with manganese ores.<sup>13</sup> (emphasis added)

Eastman points out that neither "iron" nor "zinc" is an Appendix VIII constituent, and that the problems associated with inhalation of manganese at mining operations or throughout industry have been addressed through OSHA standards. Further, the inhalation of manganese in the waste streams being proposed for listing is not an issue, as EPA clearly states in the preamble. To quote, "For surface impoundments, we concluded that releases to air were not likely to present concerns. For most sectors, the constituents of concern are

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<sup>9</sup> NebGuide, published by Cooperative Extension, Institute of Agriculture and Natural Resources, University of Nebraska-Lincoln. <http://www.ianr.unl.edu/pubs/water/g1280.htm>

<sup>10</sup> "Chemical and Biological Removal of Iron and Manganese from Drinking Water," Thesis Defense by Arthur Hall Lundquist, M.S. Environmental Engineering, November 22, 1999, The Center for Biofilm Engineering, an NSF Engineering Research Center at Montana State University-Bozeman.

<sup>11</sup> U.S. EPA IRIS Substance file – Manganese.

<sup>12</sup> Ibid.

<sup>13</sup> Toxicants Occurring Naturally in Foods, Second Edition, 1973, National Academy of Sciences.

nonvolatile metals, and this makes volatilization a highly unlikely pathway for constituents from normal wastewater treatment practices. . . We also considered the possibility of air releases from tanks. For most wastes, the constituents of concern are nonvolatile metals, making volatilization a very unlikely pathway of release from tanks. . . We concluded that we did not need to model any releases of volatile constituents from solids for the same reasons set out above.”<sup>14</sup>

In addition, EPA has never even hinted in the past that manganese is a constituent of any concern in the hazardous waste program. For example, several constituents were added to Appendix IX of 40 CFR Part 264 for routine evaluation in groundwater, even though these constituents were not added to the Appendix VII/VIII list of hazardous constituents. Those constituents include acetone, cobalt, copper, sulfide, tin, vanadium, xylene and zinc. In addition, EPA has added sulfide, vanadium and zinc to the list of Universal Treatment Standards at 40 CFR 268.48 but notes that these constituents are not underlying hazardous constituents. An earlier proposal by EPA to add acetone and xylene to Appendix VIII failed. EPA’s justification in this proposal for the addition of manganese to the list of hazardous constituents likewise fails.

- Manganese appears to be the least acutely CNS [central nervous system] toxic of the metals, requiring long-term, continuing exposure for CNS toxicity.<sup>15</sup> (emphasis added)
- Manganese toxicity is common only in people who mine and refine manganese ore. Prolonged exposure causes nerve damage, with symptoms resembling parkinsonism--tremors and difficulties in movement.<sup>16</sup> (emphasis added)
- Epidemiologic studies of chronic manganese poisoning via inhalation (primarily in workers of manganese mines) indicate that the central nervous system (CNS) is the major target. . . Since the first report of manganese poisoning in 1937, more than 550 cases have been recorded in the literature (U.S. EPA, 1984). . . While manganese intoxication via inhalation is well documented, cases of oral poisoning are rare.<sup>17</sup> (emphasis added)
- Manganese uptake and elimination are under homeostatic control, generally allowing

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<sup>14</sup> Preamble to the proposed rule, 65 FR 55693, September 14, 2000.

<sup>15</sup> Hazardous Materials Toxicology, Clinical Principles of Environmental Health, Chapter 85, “Manganese and Magnesium,” edited by John B. Sullivan, Jr. and Gary R. Krieger, 1992, Williams & Wilkins, Baltimore, MD.

<sup>16</sup> The Merck Manual—Home Edition, Sec. 12, Ch. 135, Vitamins and Minerals.

<sup>17</sup> “Risk Assessment of Manganese: The Essentiality of Manganese,” Trace Substances in Environmental Health, Supplement to Volume 12 (1990) of Environmental Geochemistry and Health. Edited by Delbert H. Hemphill and C. Richard Cothorn.



for a wide range of dietary intakes considered to be safe.<sup>18</sup>

- Gastrointestinal absorption of manganese is less than 5 percent . . . Manganese is eliminated in the bile and is reabsorbed in the intestine, but the principal route of excretion is with feces. This system apparently involves the liver, auxiliary gastrointestinal mechanisms for excreting excess manganese, and perhaps the adrenal cortex. This regulating mechanism, plus the tendency for extremely large doses of manganese salts to cause gastrointestinal irritation, accounts for the lack of systemic toxicity following oral administration or dermal application.<sup>19</sup> In addition, the available data show that manganese deposited in the lungs is readily absorbed. In contrast, manganese taken orally is absorbed to a very low degree, usually about 3%.<sup>20</sup>
- There is no clearly defined level of toxic exposure in drinking water determined in the literature at this time. . . High levels of manganese salts in water impart a bitter taste and give the water a brackish look. The public drinking water standard for manganese is 0.5 mg/l. This is based on aesthetic changes in water purity and not according to established levels of toxicity.<sup>21</sup>
- The manganese requirement of common domestic animals/fowl is 20-55 ppm. Significant adverse health effects in these animals begin around 2,000 ppm.<sup>22</sup>
- The daily intake and output of manganese in humans is basically equivalent. This is shown by the following table.<sup>23</sup>

Average daily balance of manganese in humans.
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<sup>18</sup> U.S. EPA IRIS Substance file – Manganese.

<sup>19</sup> "Toxic Effects of Metals," Chapter 23, Toxicology: The Basic Science of Poisons, Fifth Edition, Curtis D. Klaassen, editor, McGraw Hill, 1996.

<sup>20</sup> TLVs and Other Occupational Exposure Values CD-ROM, ACGIH, Cincinnati, OH, 2000.

<sup>21</sup> Hazardous Materials Toxicology, Clinical Principles of Environmental Health, Chapter 85, "Manganese and Magnesium," edited by John B. Sullivan, Jr. and Gary R. Krieger, 1992, Williams & Wilkins, Baltimore, MD.

<sup>22</sup> Mineral Tolerance of Domestic Animals, Board of Agriculture, 1980, p. 292, <http://books.nap.edu/books/0309030226/html/292.html>.

<sup>23</sup> "Risk Assessment of Manganese: The Essentiality of Manganese," Trace Substances in Environmental Health, Supplement to Volume 12 (1990) of Environmental Geochemistry and Health. Edited by Delbert H. Hemphill and C. Richard Cothorn.

Mn Intake (mg)	Mn output (mg)
Food = 3.0 (2.0-7.0)	Urine = 0.150
Water = 0.005 (0-1.0)	Feces = 2.857
Air = 0.002 (0-0.039)	Retained = 0.0

- One epidemiologic study describing toxicologic response in humans consuming large amounts of manganese in drinking water comes from Japan. The manganese came from about 400 dry-cell batteries buried near a drinking water well, with the concentration of manganese possibly as high as 28 mg Mn/l. Another case study is of a man receiving all his nutrition through IVs, with a dosage of manganese equivalent to 40 mg Mn/day.<sup>24</sup> Current U.S. regulations for batteries would preclude the former incident happening in this country as a result of current waste management activities, and the latter incident is certainly unlikely to reoccur and clearly not an issue addressed by this proposed rule.
- Manganese had a “chronic toxicity composite score” of 41 (scores range from 1-100, with 100 the most toxic) for a ranking of chemicals under Section 112(g) of the Clean Air Act Amendments.<sup>25</sup> Eastman notes that this indicates a score below the halfway point for a Clean Air Act issue, where inhalation of manganese over a long period of time above certain levels is known to present problems.
- Manganese is not a carcinogen, classified as “Group D (not classifiable).”

Response 23-2: EPA is deferring our decision on manganese. Please see section IV.B. of the preamble for further clarification.

Comment 23-3: Lack of Concentration Standards or Existing Concentration Standards in EPA’s Superfund Program, the Regions and States Confirm the Low Toxicity of Manganese

Manganese does not appear to be a major chemical of concern for Superfund cleanups. In fact, EPA states in the preamble that in regard to the inorganic waste streams being proposed for listing in this rule, it “. . . examined databases for information on potential and actual Superfund sites. . . In a few cases we found sites on the Superfund National Priority List (NPL) that included inorganic manufacturing processes. However these sites usually encompassed a variety of chemical manufacturing and mining industries, and it is difficult to attribute the damage reported to the specific inorganic manufacturing wastes under

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<sup>24</sup> U.S. EPA IRIS Substance file – Manganese.

<sup>25</sup> EPA’s Office of Air Quality Planning and Standards.

evaluation. . . We did not find any evidence of actual damage cases.”<sup>26</sup> The following information confirms the low priority given to manganese for cleanup/remediation projects.

- EPA’s “Generic Soil Screening Levels (SSLs) Under Superfund” do not include a SSL for manganese. There are SSLs for 14 other metals, including antimony, arsenic, barium, beryllium, cadmium, chromium (total, III and VI), cyanide, lead, nickel, selenium, silver, thallium, vanadium and zinc. This demonstrates the low toxicity and lack of historical concern for manganese by the Agency at Superfund sites. There has been no demonstrated manganese problem triggering the development of a SSL.
- The state of Texas has developed “Risk Reduction Standards” in its regulations at Chapter 335, Subchapter S, that include “Medium-Specific Concentrations, Standards, and Criteria for Health-Based Closure/Remediation” (335.568, Appendix II). There is no concentration standard for manganese, while there are for a number of other metals, including antimony, arsenic, barium, beryllium, cadmium, chromium (total and VI), cyanide, lead, mercury, nickel, selenium and silver. Again, this demonstrates no closure/remediation concerns for manganese.
- Pennsylvania has developed “Remediation Medium-Specific Concentrations” or MSCs for manganese at the following levels, based on ingestion [21]:<sup>27</sup>

Residential Soil	10,000 mg/kg
Non-residential soil	130,000 mg/kg

- Region IX has developed “Preliminary Remediation Goals” or PRGs, with the following levels developed for manganese [22]:

Residential soil	1,800 mg/kg
Industrial soil	32,000 mg/kg

- Region III has developed “Risk Based Concentrations” for manganese at the following levels [23]:

Residential soil	1,800 mg/kg
Industrial Soil	47,000 mg/kg

The above demonstrates that the low toxicity of manganese has either resulted in the setting of no standards for Superfund or remediation sites, or the setting of standards that clearly indicate a low concern for manganese, unlike the standards that EPA is proposing in this

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<sup>26</sup> Preamble to the proposed rule, 65 FR 55691.

<sup>27</sup>Note: Citations were not included in the commenter’s original submittal for endnotes beyond [20].

rule.

Response 23-3: EPA is deferring our decision on manganese. Please see section IV.B. of the preamble for further clarification.

Comment 23-4: Manganese Has Low Toxicity When Ingested and Does Not Meet the Criteria for Addition to Appendix VIII

EPA may list chemicals on Appendix VIII of Part 261 “. . . only if they have been shown in scientific studies to have toxic, carcinogenic, mutagenic or teratogenic effects on humans or other life forms.” (40 CFR 261.11(a)(3)) Eastman does not believe that manganese meets any of these criteria for inclusion in the RCRA program. Practically any substance ingested in high enough doses can be toxic to the human body, even ordinary table salt, but for addition to Appendix VIII, a higher hurdle must be met. OSHA regulations have previously addressed health issues associated with the inhalation of manganese, the only historical health issue associated with this element in the U.S. Eastman has presented ample documentation on the low toxicity of manganese in this comments package. It is Eastman’s position that the presence of manganese in the waste streams proposed for listing does not trigger the criteria for addition to Appendix VIII.

Response 23-4: EPA is deferring our decision on manganese. Please see section IV.B. of the preamble for further clarification.

Comment 23-5: Risk Assessment Comments

Eastman has not done a thorough review of the risk assessment conducted by EPA in support of this proposed rulemaking, but based on a cursory review, does encourage the Agency to ensure it has addressed the following issues.

Comment 23-5a: Dissolved metal versus total recoverable metal

EPA’s Office of Solid Waste should follow the policy of the Office of Water when analyzing the risk of metals in water. To quote, “It is the policy of the Office of Water that the use of dissolved metal to set and measure compliance with water quality standards is the recommended approach, because dissolved metal more closely approximates the bioavailable fraction of metal in the water column than does total recoverable metal. This conclusion regarding metals bioavailability is supported by a majority of the scientific community within and outside EPA. . . EPA recommends that State water quality standards be based on dissolved metal—a conversion factor must be used in order to express the EPA criteria articulated as total recoverable as dissolved.” (Water Quality Standards Handbook: Second Edition, August 1994, U.S. EPA, Office of Water, EPA-823-B-94-005a, hereafter referred to as “Handbook”)

It is noteworthy that in EPA's Water Quality Standards Handbook, Appendix J, which provides "Recommended Values (%) and Ranges of Measured Percent Dissolved Considered Most Relevant in Fresh Water," there is no percent dissolved factor for manganese. Rather, "dissolved" rates for 10 different metals range from 50% for lead to 95% for chromium VI and arsenic III (Criterion Maximum Concentration) and from 25% for lead to 95% for chromium VI and arsenic III (Criterion Continuous Concentration). The very lack of a dissolved percentage for manganese once again indicates its lack of toxicity and lack of historical concern.

At this time, EPA is considering additional changes to the ground water model to include ". . . updating surface impoundment information to improve the accuracy of estimated infiltration rates, and revising the methodology the model uses to more precisely project the transport of metals." (Daily Environment Reporter, "EPA Renews Effort to Complete Guidance for Management of Nonhazardous Waste," November 3, 2000, BNA, Inc.) Eastman believes the model used plus the very conservative assumptions used within the model result in risk levels much more conservative than are necessary to protect human health and the environment.

The Handbook further states: "Factors that must be considered in the management of metals in the aquatic environment include: toxicity specific to effluent chemistry; toxicity specific to ambient water chemistry; different patterns of toxicity for different metals; evolution of the state of the science of metals toxicity, fate, and transport; resource limitations or monitoring, analysis, implementation, and research functions; concerns regarding some of the analytical data currently on record due to possible sampling and analytical contamination; and lack of standardized protocols for clean and ultra-clean metals analysis."

It is unclear from EPA's "Risk Assessment . . ." whether bioavailability and these other factors were taken into consideration when modeling manganese. If they were not and EPA persists, despite evidence to the contrary, on treating manganese as a chemical of concern, EPA should revise its analysis to incorporate as many of these concerns as possible. Metals' bioavailability is a key issue in any analysis relevant to human health or the environment.

Response 23-5a: It is unclear from the commenter's remarks what precisely the commenter is commenting upon. With respect to the hazardous waste listing determinations for the inorganic chemical manufacturing wastes that are the subject of the proposed rule, EPA assessed ground water and surface water impacts based on chemical analysis of the wastes, using the TCLP and SPLP test procedures. These test procedures are designed to mimic, in a laboratory bench test, the leaching of contaminants from the waste under two different sets of conditions. In both the TCLP and SPLP tests, only chemical contaminants that are present in the dissolved phase are measured, either dissolved in the waste or in the extraction fluid.

The commenter's concerns regarding the behavior of metals in the aquatic environment appear misplaced. EPA's risk analysis for the proposed rule included a screening-level analysis of

possible impacts to water quality of surface waters. However, this analysis was conducted to screen out chemical constituents from further analysis. In no instance did EPA use a screening-level surface water analysis as the basis for the proposed listings.

With respect to the bioavailability issue raised by the commenter, EPA is deferring our decision on manganese. Please see section IV.B. of the preamble for further clarification.

Comment 23-5b: Consideration of Manganese's Low Absorption Rate

As pointed out earlier in these comments, manganese taken orally is absorbed to a very low degree by the human body, likely around 3%.<sup>28</sup> The remainder is expelled very efficiently. Did EPA take this factor into account when modeling the human health effects of oral ingestion of manganese? If not, Eastman encourages it to do so.

Response 23-5b: EPA is deferring our decision on manganese. Please see section IV.B. of the preamble for further clarification.

Comment 23-5c: Use of HWIR 3MRA Components is Unacceptable

It is totally inappropriate for EPA to use in a regulatory decision-making process any components of the HWIR 3MRA modeling exercise that have not been peer reviewed and revised. The 3MRA is still under development and still experiencing major credibility problems. Further, Congressional appropriations language is in place that would disallow use of the 3MRA. Thus, a listings decision based on use of portions of the problematic 3MRA cannot be validated.

Response 23-5c: In response to the commenter's concern, EPA wishes to clarify that no component of the 3MRA models was used in the risk assessment for the proposed rule that led to any of the proposed decisions to list a waste as hazardous under RCRA. Although it is not clear from the commenter's remarks, the commenter may be referring to an algorithm for estimating infiltration rates from surface impoundments that is based on equations that were developed for use in the 3MRA source module for tanks and surface impoundments. EPA used this algorithm to account for sediments that accumulate at the bottom of an impoundment in order to avoid overestimating infiltration from the impoundment, as explained in the preamble to the proposed rule (see 65 FR 55698). The algorithm was used for assessing risks from wastewaters that are managed in surface impoundments, none of which were proposed to be listed as hazardous in the September 14, 2000 notice.

EPA is in the process of revising the 3MRA models in response to peer review and public comments received on them during the HWIR rulemaking. Once these revisions are completed, EPA plans to submit the models for additional review by EPA's Science Advisory Board (SAB).

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<sup>28</sup> TLVs and Other Occupational Exposure Values CD-ROM, ACGIH, Cincinnati, OH, 2000.



However, EPA wishes to reiterate that the listing determinations that were proposed and are being finalized in the final rule do not use the 3MRA models.

Comment 23-6: Proposed Regulatory Actions Relevant to Manganese Will Have Far-reaching Impacts Not Addressed in EPA's Economic Impact Analysis

EPA's economic impact analysis does not include any potential impacts on industries/companies/facilities outside the inorganic chemical industry that are generating manganese-containing waste streams, other than those proposed for listing. Eastman believes this is naive, and that the inclusion of LDR standards/UTS levels for manganese will have far-reaching, potentially very costly consequences. Given the low regulatory levels proposed for manganese under the LDR program, the potential exists for a number of additional waste streams to be subject to treatment prior to land disposal. This may well be the case at Eastman facilities, though we lack data at this time to state that with any certainty. The reason Eastman and others lack data and the ability to understand the impact of such a listing is that manganese has never been known to be even a remote concern for EPA's Office of Solid Waste. Although Eastman and others may have data for zinc, vanadium, cobalt and other non-Appendix VII/VIII constituents as a result of EPA's addition of these constituents to the 40 CFR Part 268 UTS list and the 40 CFR Part 264 Appendix IX list for purposes of information gathering, manganese is not currently included in ANY list or regulation in 40 CFR Parts 260 through 280. It will take time for Eastman and other companies to generate the needed data to determine the impacts of manganese regulation. In addition, the regulation of manganese under the RCRA program may have delisting consequences for a number of companies. Still another factor is the potential impact on waste streams that are hazardous because of a characteristic.

It is EPA's responsibility, not industry's, to determine the economic impacts of a regulatory action it is considering. EPA should not proceed with this rule until it has researched thoroughly the potential impacts on other waste streams and other industries. If the Agency does proceed, as per its Court-related deadline, it should exclude manganese as a chemical of concern and abandon its attempts to add manganese to the lists of regulated RCRA hazardous constituents. This can and should be done, both because its low toxicity and its low absorption rate through oral ingestion do not substantiate a hazardous constituent determination, and because EPA has not determined the potential costly impact on industries outside the inorganic chemical industry. This proposal is likely a "significant" regulatory action, given that the potential monetary impacts on facilities throughout all industries may exceed the \$100 million mark, and given the "novel" issue of the much greater impact this rule could have on industries not intentionally targeted for regulation within the rule.

Response 23-6: EPA is deferring our decision on manganese. Please see section IV.B. of the preamble for further clarification.

Conclusions

Eastman believes the Agency must exclude manganese from the list of chemicals of concern addressed by this rulemaking. Manganese simply doesn't have the level of toxicity or absorption rate when ingested that would warrant the expenditure of EPA resources or industry resources in more stringent management practices. Dollars related to human health and environmental protection could and should be allocated to better uses. EPA also must consider the impacts on entities outside the inorganic chemical industry, which may be significant, before proceeding with any RCRA regulation of manganese.



**Comment ICMP-00024, Envirocare**

Comment 24-1: In the preamble for the proposed rules, EPA cites exclusions from hazardous-waste regulation for leachate discharge, specifically that "industrial wastewater discharges that are regulated under the National Pollutant Discharge Elimination System (NPDES) Permit Program are specifically excluded from regulation as hazardous wastes under 40 CFR 261.4(a)(2)." Inferred assumptions for leachate that is discharged in this manner may include the following: (1) that the leachate is from a RCRA landfill cell of structural integrity, (2) that the leachate has not been commingled with groundwater prior to collection, and (3) that the leachate has not been consequently diluted by such groundwater prior to such discharge.

Where RCRA landfill facilities discharge leachate under a NPDES permit or similar program, EPA should ensure by regulation that such landfills are of structural integrity, have reliable and functional leak detection systems, are not being infiltrated by groundwater, and produce leachate that meets discharge standards without dilution from local groundwater prior to collection.

Response 24-1: The text cited by the commenter was presented in the preamble in our discussion on how we assessed risks presented by releases to surface water (footnote 21, 65 FR 55700). However, the commenter apparently is specifically concerned about discharges of landfill leachate. As noted in the proposal, direct discharges to surface waters are regulated by the Clean Water Act under the NPDES permit system. The regulation in 40 CFR 261.4(a)(2) excludes any industrial wastewater point source discharges that are "subject to regulation under section 402 of the Clean water Act, as amended." This language follows closely the statutory exclusion that is given in the definition of solid wastes (Section 1004(27) of RCRA). The regulations do not include any limitations on the types of landfills that might use such a permitted discharge.

Any changes in this exclusion are well beyond the scope of the current rulemaking. In any case, the commenter did not present any reason as to why regulations might be needed to ensure dilution from local groundwater does not occur prior to collection. We note that regulations are already in place for the design and operation of leachate collection systems for municipal (40 CFR 258.40) and Subtitle C landfills (40 CFR 264, Subpart N). At this time we do not see any need to regulate the leak detection systems of landfills under this exclusion.

## Comment ICMP-00025, Steel Trade Associations

Introduction: On behalf of the Steel Manufacturers Association ("SMA"), American Iron and Steel Institute ("AISI"), and Specialty Steel Industry of North America ("SSINA"), we hereby submit the following comments regarding the proposed listing of manganese in Appendix VIII of 40 CFR Part 261 ("Appendix VIII") and establishment of a universal treatment standard ("UTS") for this metal. 65 FR 55684, 55767-769 (Sept. 14, 2000). As discussed below, SMA, AISI, and SSINA, are extremely concerned by the failure of the U.S. Environmental Protection Agency ("EPA" or "the Agency") to provide adequate notice to all affected parties of the proposed actions affecting manganese, as well as the Agency's insufficient analysis of the technical basis and impact of the proposals. EPA's refusal to grant a 30-day extension to the comment period to remedy, in part, these critical defects is equally disturbing.

Background SMA, AISI, and SSINA together represent almost 100 percent of the steel manufacturing capacity in the United States. The steel industry is the largest consumer of manganese in the United States, and manganese may naturally be present at relatively low levels in a variety of steel products, including slag. Accordingly, SMA, AISI, and SSINA are interested in ensuring that any regulation of manganese is supported by sound science and appropriate data. The current proposals to establish a UTS and list manganese in Appendix VIII are not so supported.

The proposed manganese actions suffer from a number of legal, procedural, and analytical deficiencies that merit more thorough consideration than EPA has afforded. As the following comments discuss in detail, EPA has unlawfully or improperly:

- Failed to provide adequate notice to all affected parties, including the steel industry;
- Failed to consider the economic impact on industries other than the inorganic chemical manufacturing industry;
- Failed to determine the achievability of the proposed UTS for manganese-bearing wastes from other industries;
- Used improper procedures for listing manganese as an Appendix VIII constituent;
- Failed to support its contention that manganese meets the criteria for listing as a hazardous constituent by conducting a thorough and reasoned analysis of all available manganese health data;
- Proposed a UTS that is below the level where manganese presents any cognizable risk to human health; and

- Failed to consider the impact of naturally occurring levels of manganese on achieving the UTS.

Comment 25-1: EPA Has Not Provided All Affected Parties With Sufficient Notice And Opportunity To Comment

By burying the proposed manganese UTS and Appendix VIII listing in a 98-page proposed rulemaking specific to the identification and listing of certain inorganic chemical manufacturing wastes, EPA failed to provide sufficient notice to stakeholders from other industries, including the steel industry. The proposed manganese actions will have broad regulatory impacts on a number of industry sectors other than inorganic pigments and industrial inorganic chemicals that were identified as the only potentially affected industries in the preamble. 65 FR 55685. EPA's intent to add to Appendix VIII a widely used and ubiquitous metal such as manganese clearly merits separate and more general notice to the regulatory community. In fact, by stating in the proposal that "it is important for you to comment if you are in any way interested" (65 FR 55768), it is clear that EPA knew that the proposed manganese actions had broad regulatory impacts. Given this, a separate rulemaking -- or, at a minimum, separate and much broader notice of the proposed manganese actions -- should have been provided.

On November 3, 2000, in light of the concerns expressed above, SMA, AISI, and SSINA requested a 30-day extension of the comment period to address the manganese issues raised in the proposal. It is our understanding that other parties affected by the manganese proposals made similar requests. EPA rejected the Associations' request by stating that (1) 60 days "generally provides sufficient time for the public to review and develop comments on proposed listing decisions"; and (2) the Agency is under severe time constraints for developing the final rule due to a court-ordered deadline. See Letter dated November 7, 2000, from David Bussard, EPA, to John L. Wittenborn, *et al.*

Neither reason provides a satisfactory basis for denying a 30-day comment extension to affected parties who did not receive adequate notice of the proposed manganese actions. First, in this instance, at least with respect to industries other than the inorganic chemical manufacturing industry to whom the notice was directed, 60 days is not sufficient time for comment. The proposed manganese UTS and Appendix VIII listing are not individual hazardous waste listing determinations directed at a specific industry, but rather regulatory actions with broad impacts across a number of industries. Yet EPA buried the manganese proposals in only a few sentences of the preamble to a rule directed at inorganic chemical manufacturing wastes, and did not even reference manganese in the table of contents. Moreover, EPA failed to include any meaningful discussion of the technical basis for the proposed Appendix VIII listing in the preamble, thereby requiring interested parties to obtain the background documents to evaluate this issue. Because EPA buried the manganese proposals, SMA, AISI, and SSINA did not become aware of them until well over a month into the comment period. Hence, the steel industry lacked sufficient time to collect and analyze

data regarding manganese concentrations in waste streams or the achievability of the proposed UTS. Burying the manganese UTS and Appendix VIII listing amid a 98-page proposal specific to the inorganic chemical manufacturing industry hardly provided the steel industry and other affected stakeholders with any notice of the proposed actions, let alone a full 60 days in which to develop meaningful comments.

Presumably, EPA has been working on this proposed manganese listing for months, if not years, without attempting to involve the obviously affected stakeholders. To provide those stakeholders only a few weeks to identify the issues, evaluate EPA's technical analyses, and respond with meaningful comments is not the hallmark of a reasonable or "reinvented" rulemaking process.

Second, a court-ordered deadline does not provide an excuse for the Agency to provide inadequate notice or an opportunity to comment by all affected stakeholders. Moreover, the court-ordered deadline for making the K178 listing determination has no direct bearing on establishing a UTS and Appendix VIII listing for manganese. The court did not order EPA to make a determination on adding manganese to Appendix VIII or setting a UTS for manganese.<sup>29</sup> Rather, the court only required EPA to consider titanium dioxide and certain other production wastes from the inorganic chemical manufacturing industry. Accordingly, EPA should, and still could, extend the comment period only for the manganese UTS and Appendix VIII listing portions of the proposal, while proceeding with the bulk of its rulemaking without delay.

Response 25-1: EPA is deferring our decision on manganese. Please see section IV.B. of the preamble for further clarification.

Comment 25-2: EPA Has Failed To Consider The Impact Of The Manganese Proposals On Other Industries

The proposed actions involving manganese will have significant impacts on industries other than inorganic chemical manufacturing, including the iron and steel industry. Indeed, the proposals, if finalized, would require a number of characteristic hazardous wastes generated by the steel industry that contain manganese to be treated to meet the UTS for manganese as an underlying hazardous constituent ("UHC") prior to being land disposed. See 40 CFR

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<sup>29</sup>As discussed in more detail below, if EPA wished to rely on manganese as a hazardous constituent for consideration in making listing determinations, the Agency should first have embarked on a separate rulemaking, involving full opportunity for notice and comment, to list manganese under Appendix VIII and establish a UTS. Only if manganese was listed after such a rulemaking process should EPA then have relied on manganese in making the K178 listing determination. Having failed to pursue the appropriate rulemaking process, rather than depriving affected parties of a full and fair opportunity to comment, EPA should now consider the court-ordered listing determinations without reference to manganese. The Agency certainly can do so without prejudice to its rulemaking since it has also identified thallium, which is already an Appendix VIII hazardous constituent, as a basis for listing K178.

§ 268.48. Similarly, the manganese UTS would have broad implications for RCRA corrective actions undertaken at steel facilities involving solid wastes that contain manganese. The proposal also would impose significant additional costs for treating, storing, and disposing of a variety of steel industry characteristic hazardous wastes under 40 CFR § 261.24.

Despite these and other such impacts, EPA has failed to consider the economic impact of the proposals on industries other than inorganic chemical manufacturing, including the steel industry. EPA also has failed to determine whether and to what extent manganese will be present as a UHC in other wastes, or to assess the treatment capacity for handling the additional volume of wastes from all industries that would require treatment to meet the manganese UTS. These failures reflect EPA's incomplete consideration of the proposed manganese actions and render the Agency's actions arbitrary and capricious.

Response 25-2: EPA is deferring our decision on manganese. Please see section IV.B. of the preamble for further clarification.

Comment 25-3: Proposing To List Manganese As An Appendix VIII Hazardous Constituent After Conducting The Risk Assessment On The Proposed K178 Hazardous Waste Listing Is Procedural Error And Poor Policy

EPA may list a solid waste as a hazardous waste if it "contains any of the toxic constituents listed in appendix VIII" and is capable of posing a substantial hazard to human health or the environment when improperly managed. 40 CFR § 261.11(a)(3) (emphasis added). In the 1980 regulations establishing the listing procedures, EPA noted that the "first inquiry which must be made . . . is whether the waste contains any of the toxic constituents listed in Appendix VIII." 45 FR 33084, 33107 (May 19, 1980) (emphasis added). Similarly, EPA has explained that the "significance of including a compound in Appendix VIII is . . . the compound then can be cited as a basis for listing toxic wastes." 51 FR 28296 (Aug. 6, 1986) (emphasis added). Hence, EPA regulations make clear that the listing of hazardous constituents must precede the use of such constituents as part of a hazardous waste listing determination. This procedure makes sound policy sense because Appendix VIII listing decisions have significantly broader impacts than do specific waste stream listing determinations.

EPA's proposal to simultaneously list manganese as an Appendix VIII hazardous constituent and to list K178, in part, because it contains manganese violates this established procedure. In fact, EPA's proposal turns the process on its head: the preamble makes clear that EPA first developed a risk assessment for K178 and then, after deciding to list K178, proceeded to propose identifying manganese as an Appendix VIII hazardous constituent. See 65 FR 55763 ("In addition, we are proposing to add manganese to the list of hazardous

constituents in Appendix VIII to Part 261." ).<sup>30</sup>

In addition to violating Agency procedure,<sup>31</sup> EPA's decision to proceed in this fashion also has stifled the complete consideration of the merits of the proposed manganese UTS and Appendix VIII listing. Many stakeholders have been denied a meaningful opportunity to comment on the Appendix VIII listing for manganese, which has a significantly broader impact than the specific K178 listing. Sound policy dictates that the Agency should first complete rulemaking proceedings regarding the listing of manganese as an Appendix VIII constituent before relying on that constituent as the basis of a listing determination.

Accordingly, EPA should defer the proposed UTS and Appendix VIII listing of manganese until full notice and comment rulemaking procedures can be pursued. At a minimum, as already requested by several affected parties, including SMA, AISI, and SSINA, additional time should be provided for all interested parties to comment on the manganese aspects of the proposed rule. To comply with the court order regarding the K178 listing, EPA must proceed with its assessment of that listing determination without reference to manganese.

Response 25-3: EPA is deferring our decision on manganese. Please see section IV.B. of the preamble for further clarification.

Comment 25-4: EPA Has Failed to Support the Proposed Appendix VIII Listing of Manganese<sup>32</sup>

Under 40 CFR § 261.11(a)(3), substances "will be listed on appendix VIII only if they have

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<sup>30</sup>The D.C. Circuit has only addressed in dicta a challenge to listing Appendix VIII constituents and dithiocarbamate-based hazardous wastes based on those constituents in the same rulemaking. See *Dithiocarbamate Task Force v. EPA*, 98 F.3d 1394, 1397-98 (D.C. Cir. 1996). In that case, the court rejected several EPA hazardous waste listing determinations based on the Agency's failure to address adequately all listing factors and to identify plausible mismanagement scenarios. *Id.* In so doing, while the court raised questions about the petitioners argument regarding the simultaneous listing of Appendix VIII hazardous constituents and specific waste streams, it did not rule on the merits of the argument. *Id.* at 1398. Moreover, unlike here, EPA first analyzed the merits of the Appendix VIII listings and then proceeded to conduct the risk assessment for the waste streams under consideration for listing. *Id.* at 1397 ("The first step in the process, adding chemicals to appendix VIII . . ."). As explained above, this is not the case here where EPA first decided on the K178 listing and then proceeded to propose the Appendix VIII listing.

<sup>31</sup>Such procedural error constitutes arbitrary and capricious rulemaking. See, e.g., *Ingram Barge Co. v. United States*, 884 F.2d 1400, 1405 (D.C. Cir. 1989).

<sup>32</sup>Set forth in Sections III and IV of these comments is a critique of the technical aspects of the manganese portions of the proposed rule. Unfortunately, these comments are limited by the inadequate time EPA has provided for comment. If given additional time, the steel industry and other industry stakeholders would be able to provide a more thorough analysis of the available manganese toxicity data, as well as treatment data relevant to the achievability of the proposed UTS.



been shown in scientific studies to have toxic, carcinogenic, mutagenic, or teratogenic effects on humans or other life forms." EPA has proposed adding manganese to Appendix VIII based on the assertion that "manganese has toxic effects on humans and other life forms." 65 FR 55763. EPA's risk assessment relies on toxicity data from oral ingestion studies to justify the Appendix VIII listing. See EPA, *Risk Assessment for the Listing Determinations for Inorganic Chemical Manufacturing Wastes: Background Document* at 6-31-33 (Aug. 2000) ("*Risk Assessment*"). As explained more fully in the comments submitted by The Ferroalloys Association ("TFA") and Eastman Chemical Company ("Eastman"), which are hereby incorporated into these comments by reference, EPA's contentions regarding manganese toxicity are seriously flawed and reflect an incomplete and inaccurate assessment of the available manganese toxicity data.

#### Comment 25-4a: The Data Do Not Support The Proposed Appendix VIII Listing

Manganese is a ubiquitous element and an essential nutrient that is critical to normal neurological development in humans and other animal species. See EPA, *Integrated Risk Information System Substance File: Manganese § I.A.* (1996) ("IRIS"). EPA's IRIS assessment for manganese makes clear that there is little available evidence associating manganese ingestion with toxicity, and that the evidence that does exist fails to demonstrate with any degree of confidence that manganese is toxic when ingested. In establishing the oral reference dose ("RfD"), EPA emphasized that, while inhalation exposures to manganese are associated with toxic effects, "much less is known, however, about oral intakes resulting in toxicity."<sup>33</sup> IRIS § I.A.2. Accordingly, EPA explained that, as a result of the lack of oral ingestion toxicity data for manganese, the IRIS assessment "focuses more on what is known to be a safe oral intake of manganese for the general human population." *Id.* EPA stressed that the RfD "is not meant to imply that intakes above the reference dose are necessarily associated with toxicity." *Id.* In other words, the RfD identifies an oral intake level that definitively poses no risk to a human adult over a lifetime of consumption, but does not purport to identify a toxic level for manganese.

The IRIS assessment is filled with language suggesting that manganese is of low toxicity when ingested orally, including, for example, the following statements:

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<sup>33</sup>Inhalation exposures to manganese typically result from mining operations or in other workplace settings that are addressed through Occupational Safety and Health Administration ("OSHA") standards. Manganese in waste poses no significant risk via inhalation, as EPA noted in the proposed rule:

For surface impoundments, we concluded that releases to air were not likely to present concerns. For most sectors, the constituents of concern are nonvolatile metals, and this makes volatilization a highly unlikely pathway for constituents from normal wastewater treatment practices . . . . For most wastes, the constituents of concern are nonvolatile metals, making volatilization a very unlikely pathway of release from tanks.

65 FR 55,693.

- "In contrast to inhaled manganese, ingested manganese has rarely been associated with toxicity." IRIS § I.A.4.
- "No reports of actual manganese toxicity or deficiency have been reported for infants." IRIS § I.A.4.
- "It is important to recognize that while the RfD process involves the determination of a point estimate of an oral intake, it is also stated that this estimate is associated 'with uncertainty spanning perhaps an order of magnitude.'" IRIS § I.A.5.
- "While the [National Research Council] determined an [estimated safe and adequate daily dietary intake] for manganese of 2-5 mg/day, some nutritionists feel that this level may be too low." IRIS § I.A.2.
- "When ingested, Mn is considered to be among the least toxic of the trace elements." IRIS § I.B.4.

EPA's *Risk Assessment* also concedes that "the evidence is limited" with respect to the toxicity of manganese from oral exposure. *Risk Assessment* at 6-32.

Further, none of the studies evaluated in the IRIS assessment provide definitive data on the toxicity of ingested manganese. The primary study involving manganese in drinking water (Kondakis *et al.*, 1989), upon which the recommended RfD modifying factor of 3 is based, purports to demonstrate a correlation between intake of naturally high manganese levels in water and neurological impairment. The IRIS summary, however, indicates that the study design and findings were flawed in several ways, including: (1) the small number of individuals tested; (2) the lack of scatter data; (3) the lack of information provided on social and other dietary and drinking water factors that may have contributed to the identified effects; and (4) the study may have been biased because the examining neurologists were listed as authors of the paper. Additional sources of bias and/or confounding variables include: (1) the population studied was not representative of a normal population (all subjects were older than 50 years of age, with an average mean group age over 65); (2) the neurological effects exhibited by the subjects are also manifestations of Parkinson's and other neurological diseases which were not controlled for; (3) possible occupational exposures to manganese were not considered; and (4) there was no baseline or concomitant control for the study -- all the subjects had been drinking the water for at least 10 years. In addition, the study did not provide a reliable estimate of the total oral intake of manganese or drinking water in the study, and, hence, the IRIS summary states that "[b]ecause of the uncertainty in the amount of manganese in the diet and the amount of water consumed, it is impossible to estimate the total oral intake of manganese in this study." IRIS § I.A.2. EPA further noted that "[t]hese limitations preclude the use of this study to determine a quantitative dose-response relationship for the toxicity of manganese in humans." *Id.*



Finally, in evaluating the Kondakis study the Agency for Toxic Substances and Disease Registry ("ATSDR") concluded only that "this study supports but does not prove that chronic oral intake of manganese can lead to neurological changes in humans." See ATSDR, *Draft Toxicological Profile for Manganese* 47 (Sept. 1997) ("ATSDR"). Moreover, Vieregge *et al.* (1995) directly contradicts the results of this study by finding that long-term exposure to drinking water containing manganese (at concentrations ranging from 0.3 to 2.16 mg/L) has no neurological effects.

Other studies cited in the IRIS summary also are not reliable for assessing the toxicity of manganese:

- The only epidemiological study describing toxicological responses in humans consuming large amounts of manganese dissolved in drinking water (Kawamura *et al.*, 1941) involved extraordinary amounts of manganese (approximately 14 to 28 mg/L) and failed to provide information regarding dietary levels of manganese. IRIS § I.A.4. Further, ATSDR found with respect to this study that "while there is no doubt these people were exposed to manganese, there is considerable doubt that all of the features of this outbreak (particularly the deaths) were due to manganese alone." ATSDR at 45.
- The case study examined by Banta and Markesbery (1977) reported no quantitative data and involved a man who consumed large doses of vitamins and minerals for 4 to 5 years. IRIS § I.A.4.
- Another case study by Ejima *et al.* (1992) involved an individual receiving intravenous nutrition for 23 months, resulting in an oral intake equivalent of 40 mg/day of manganese. IRIS § I.A.4.
- A third case study (Devenyi *et al.*, 1994) involved a patient with impaired liver function. IRIS § I.A.4.

Thus, the studies cited in IRIS regarding manganese toxicity via oral ingestion are plagued by numerous uncertainties and reflect unique exposure circumstances. In summary, the International Programme for Chemical Safety ("IPCS") concluded that the "available evidence for adverse effects associated with chronic ingestion of excess manganese is suggestive but inconclusive." See IPCS, *Concise International Chemical Assessment Document on Manganese and Its Compounds* (No. 12). Thus, these studies do not support a toxicity finding for Appendix VIII listing purposes. Moreover, EPA has made no attempt to demonstrate that the exposure circumstances under which toxic effects may be exhibited have any reasonable likelihood of occurring in the context of the waste streams proposed for listing.

The uncertain and incomplete toxicity data for manganese stand in stark contrast to the overriding fact that manganese is essential to normal human neurological functioning. See IRIS § I.A.2. Similarly, the IRIS summary cites numerous studies regarding adverse health effects associated with manganese *deficiency*. See IRIS § I.A.4.

The evidence does not lend itself to a finding that manganese is "toxic" for Appendix VIII listing purposes, which requires that toxicity "must be shown" prior to listing. At most, the pervasive uncertainties highlighted in the IRIS database demonstrate that further research on manganese toxicity is warranted. The studies relied on by EPA in the IRIS summary do not establish the toxicity of manganese through ingestion with any degree of confidence, and simply do not provide sufficient data to conclude that manganese toxicity has been "shown" to support an Appendix VIII listing.

Response 25-4a: EPA is deferring our decision on manganese. Please see section IV.B. of the preamble for further clarification.

Comment 25-4b: EPA's Risk Assessment For Manganese Is Flawed

For the manganese risk assessment, EPA used the RfD modified by a "recommended" factor of 3 for ingestion via drinking water, resulting in an RfD of 0.047 mg/kg-day. As detailed in the TFA comments, application of the modifying factor of 3 to the RfD value is inappropriate for a number of reasons, including:

- As discussed above, the Kondakis study lacks accurate data on manganese consumption and drinking water levels, and cannot be used to support the proposed modifying factor;
- The safe level of manganese ingestion (0.14 mg/kg-day) has been established; and
- No instances of actual manganese toxicity have been reported for infants.

See IRIS § I.A.

Accordingly, as the TFA comments explain, EPA's risk assessment should utilize the more appropriate 0.14 mg/kg-day RfD value. When this value is used, a hazard quotient ("HQ") for adults of greater than 1 (1.4) is only present at the 99th percentile; an HQ for children greater than 1 but less than 2 (1.8) occurs only at the 97.5th percentile; and the HQ for children at the 99th percentile is reduced by 60 percent (from 8.6 to 2.9). Consistent with the Agency's findings regarding antimony in titanium dioxide wastewaters, EPA should conclude on the basis of these HQ results that manganese in the proposed K178 waste stream presents little risk. Hence, the Appendix VIII listing and proposed UTS for manganese should be unnecessary and, given the potentially widespread impact of the listing, should

not be pursued in the context of this rulemaking.

Finally, EPA's analysis ignores a major caveat of the IRIS summary that states that an "issue of great importance to consider in the risk assessment for manganese concerns the bioavailability of different forms of manganese consumed under different exposure conditions." IRIS § I.A.4. As discussed in the TFA comments, EPA's risk assessment does not identify the form of manganese used in the Agency's modeling or discuss the bioavailability of the various forms of manganese. This failure further highlights the unreliability and incomplete nature of EPA's consideration of the technical basis underlying the manganese listing.

Response 25-4b: EPA is deferring our decision on manganese. Please see section IV.B. of the preamble for further clarification.

Comment 25-5: The Proposed Universal Treatment Standard for Manganese Is Not Appropriate

The proposed UTS for manganese is not appropriate for several reasons, and a review of EPA's supporting documentation indicates that the Agency failed to consider a number of critical factors in developing the treatment standard.

First, EPA clearly lacks a sufficient database to establish a representative and demonstrated treatment standard for the wide array of manganese-containing wastes generated by a number of industries. EPA admits that "we lack studies demonstrating treatment effectiveness for highly concentrated manganese nonwastewaters" and that "we are unsure whether these treatment standards would be achievable in a waste with the significantly higher concentrations of manganese found in K178." 65 FR 55768. As EPA should be well aware from the time it takes the Agency to develop RCRA treatment standards, 60 days is simply not sufficient time for commenters, who were previously entirely unaware that EPA intended to offer its manganese proposals for comment, to collect and analyze the information necessary to address these considerable – and acknowledged – uncertainties. Unfortunately, to this point, EPA has elected not to extend the comment period. As a result, the Agency's treatability database for manganese is far too limited and non-representative to be used for the purpose of establishing the best demonstrated available technology for manganese.

Second, there is no indication that EPA has considered the amount of manganese naturally present in the environment when calculating the proposed UTS. Manganese is ubiquitous in the environment and the twelfth most common element in the Earth's crust. Background levels of manganese in soil range from 40 to 900 mg/kg with an estimated mean of approximately 300 mg/kg. See IPCS at 9. Thus, EPA is proposing to set treatment standards at levels that are well below those at which manganese exists in the natural environment. These relatively high and variable background levels must be factored in when assessing the achievability of the manganese UTS. It is clear that background levels, in

some cases, could be higher than the treatment standard. This is particularly important outside of the context of treating K178 wastes, such as when the UTS would be relevant to RCRA corrective action. For example, a treatment standard established without consideration of the variability of background levels could compel the treatment of naturally occurring manganese when contaminated soil that exhibits the toxicity characteristic for other metals is actively managed. This result is nonsensical.

Third, in developing the UTS, EPA only applied a variability factor of 2.8 to "account for variations arising from mechanical limitations in the treatment equipment." 65 FR 55768. An additional variability factor should be applied to account for dilution and adsorption to soil that will occur prior to contact with groundwater aquifers or surface water bodies. Given that the risk assessment for manganese is geared towards drinking water – that is, EPA has modified, erroneously as explained above, the RfD by a factor of 3 to account for drinking water ingestion – dilution and soil adsorption should be factored in when establishing the UTS. EPA's failure to do so results in a UTS that is unnecessarily stringent.

Finally, the proposed UTS would unlawfully require treatment of manganese-containing wastes beyond the point at which there is no threat to human health or the environment. The D.C. Circuit has ruled that technology-based treatment requirements are unreasonable when promulgated "without regard to whether there might be a threat to man or nature." *Hazardous Waste Treatment Council v. EPA*, 886 F.2d 355, 362 (D.C. Cir. 1989).

The proposed UTS for non-wastewaters of 3.6 mg/L TCLP is well below the established safe threshold for human exposure represented by the RfD of 0.14 mg/kg-day (or 10 mg/day for the average 70 kg adult). The average adult, therefore, would have to consume almost three full liters a day of pure TCLP leachate at the proposed UTS level to reach the RfD – which represents a safe consumption level over a lifetime. Even if the recommended modifying factor of 3 is applied to the RfD for drinking water (resulting in an overly protective RfD of 3.29 mg/day for the average adult), consumption of the TCLP leachate would approximate the RfD. These conclusions do not even consider likely dilution and soil adsorption of manganese that will occur prior to the leachate reaching drinking water supplies. When such factors are considered, it is abundantly clear that the proposed UTS requires treatment well beyond the level that at which there is a threat to human health.<sup>34</sup>

The proposed UTS requires treatment beyond the point where there is no threat to human health and the environment. The excessive stringency of the proposed treatment standard is underscored by the remarkable statement in the IRIS summary, as noted above in Section III.A. of these comments, that the RfD for manganese "focuses more on what is known to be a safe oral intake of manganese for the general human population," rather than what is known

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<sup>34</sup>EPA also requests comment on the option of setting the manganese UTS at 0.20 mg/L TCLP based on stabilization treatment. Needless to say, this more stringent UTS would require treatment even further beyond that necessary to protect human health and is entirely inappropriate.

to be a toxic level for manganese. IRIS § I.A.2.

Accordingly, EPA has failed to demonstrate that manganese poses a cognizable threat to human health or the environment at the levels at which the Agency has proposed to set treatment standards. If EPA wants to set a treatment standard for manganese it must establish a level at which there is sufficient evidence that manganese causes toxic effects and repropose a standard set on the basis of that determination for public comment.<sup>35</sup>

If EPA believes that it is not legally required to establish (and does not finalize) a UTS for manganese, or otherwise decides to defer finalizing a UTS in order to allow itself more time for thoughtful consideration of the implications of its manganese proposals, then EPA also should decline to list manganese as an Appendix VIII constituent in this rulemaking. Given the fact that EPA has an independent basis to list K178 due to the presence of thallium, listing manganese at this time is unnecessary. Such a listing also would be ill-advised in light of (1) the considerable controversy over whether sufficient evidence exists to justify the listing, as well as the substantial impacts that listing would have on numerous industries not evaluated in the proposal, and (2) EPA's failure to provide adequate time for a full airing of the merits and implications of listing manganese and establishing a UTS for it.

In sum, it would be unlawful for EPA to promulgate the technology-based UTS it has proposed for manganese. Even if EPA had the authority to promulgate that UTS – a proposition that we dispute – as a matter of sound public policy the Agency should not exercise that authority in the context of this rulemaking in order to allow for more thorough consideration of the issue.

### Conclusion

For the foregoing reasons, SMA, AISI, and SSINA believe that the proposed UTS and Appendix VIII listing for manganese are unlawful, unjustified, and unnecessary (even if lawful). If EPA nonetheless insists on pursuing a manganese UTS and Appendix VIII listing, then it should, at a minimum, pursue a separate rulemaking. Given the lack of opportunity provided for all interested parties to comment meaningfully on the proposed manganese actions – which will impact significantly numerous industries beyond the inorganic chemical manufacturing industry that was the subject of the rulemaking notice – deferral of these issues for consideration in a separate rulemaking proceeding is the only reasonable alternative.

Response 25-5: EPA is deferring our decision on manganese. Please see section IV.B. of the preamble for further clarification.

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<sup>35</sup>Reproposal is necessary because the new health-based standard would not be a logical outgrowth of EPA's proposed technology-based standard and would be based on a toxics effect determination by EPA that interested parties would see for the first time.

**Comment ICMP-00026, CPC**

Comment 26-1: These comments are submitted by Chemical Products Corporation (CPC), a Georgia corporation which produces barium and strontium chemicals at its facility in Cartersville, Georgia. These comments are directed to the contents of Table 111-54. "Characterization of Wastewater Treatment Solids from the Chloride-Ilmenite Process, Titanium Dioxide" in the proposed rule published in the September 14, 2000 Federal Register (65 FR 179) at pages 55683 to 55782. Specifically, CPC wishes to comment upon EPA's Health Based Limit (HBL) for Barium, shown in Table III-54 as 1.1 mg/L.

CPC believes that EPA has not employed sound science in the determination of this 1.1 mg/L value for the HBL for Barium. The drinking water standard, both the MCL and the MCLG, for Barium is 2.0 mg/L. This untenable HBL for Barium may be derived from the Oral Reference Dose for Barium and Compounds in the IRIS Substance File. EPA's IRIS database bases its Oral Reference Dose determination on a human epidemiological study and a short-term human study; these data represent only a lower bound on safe dose because a "lowest observed adverse effect" dose could not be identified; no adverse effects were observed in the test subjects.

An independent panel of expert scientists and risk assessors met on June 15, 1999 to review an Oral Reference Dose determination sponsored by Chemical Products Corporation. This peer review meeting was conducted by Toxicology Excellence for Risk Assessment (TERA), a nonprofit organization dedicated to the best use of toxicity data in risk assessment. Expert peer reviewers donated their time and talents to provide an independent review of the assessment.

The Oral Reference Dose determination sponsored by Chemical Products Corporation was prepared by University of Georgia toxicologists. It developed an Oral Reference Dose (RfD) for Barium and Compounds based on kidney effects seen in the 1994 National Toxicology Program (NTP) drinking water studies of barium chloride dihydrate in rats and mice. The peer review panel reached unanimous consensus that available human studies were of lesser quality and the 1994 NTP study was the most appropriate choice for the basis of an oral RfD. The panel unanimously agreed that kidney effects, rather than cardiovascular effects, are the critical effect for barium and that the high dose in the male rat reported in the 2-year NTP study (60 mg Barium/kg/day) is the appropriate NOAEL from which to derive an oral RfD. The oral RfD found in IRIS is based upon the lesser quality human studies in which no adverse effects were observed at a drinking water intake level of 0.21 mg Barium/kg/day.

CPC respectfully requests that EPA immediately initiate a review and revision of its untenable HBL for Barium. CPC further requests that the HBL for Barium be based upon the kidney effects observed in the NTP 2-year drinking water studies of barium chloride dihydrate in rats



and mice.

Response 26-1: We thank CPC for their comments on the HBL for barium. We have not predicted that barium concentrations in any of the wastes reviewed in this rulemaking will exceed the health-based threshold we used in the proposal. Consequently, this rule will impose no impacts on this commenter even if we continue to use that health-based level for barium. concerns. The Office of Solid Waste is not planning to undertake a review of the HBL for barium at this time.

**Comment ICMP-00027, CPC, 11/9/2000**

Introduction These comments are submitted by Chemical Products Corporation (CPC), a Georgia corporation which produces barium and strontium chemicals at its facility in Cartersville, Georgia.

These comments are directed to EPA's proposed rule to place manganese in Appendix VII and Appendix VIII in 40 CFR 261.41 and in the UTS table at 40 CFR 268.48. They address three separate issues relating to this proposed rule, (1) that there is a deficiency as to EPA's notice to the public about this aspect of EPA's September 14, 2000 Federal Register Notice, (2) that this proposed rule is not based upon sound science, and (3) that EPA should extend the comment period for this proposed rule because of difficulty experienced by CPC and possibly others in obtaining the scant information summarized in Appendix B. Numerical Treatment Standard Development for Manganese. These issues will be addressed separately in the following comments.

Comment 27-1: EPA has not properly provided public notice concerning the proposed rule to place manganese in Appendix VII and Appendix VIII in 40 CFR 261.41 and in the UTS table at 40 CFR 268.48.

The proposed rule published in the September 14, 2000 Federal Register at page 55683 through page 55782, does not mention manganese in its Table of Contents. Manganese does not appear in the proposed rule until the end of the fourth page, page 55687. The proposed rule concerning addition of manganese to Appendix VII, Appendix VIII, and the UTS table is effectively "buried" in the Federal Register notice. We do not believe that EPA has met its legal obligation regarding public notice and therefore has not provided sufficient opportunity for concerned parties to comment.

There may be a number of the parties impacted by this proposed rulemaking that are not aware that manganese is being proposed for addition to Appendix VII, Appendix VIII, and the UTS table. We believe that EPA should, as a procedural matter, make the proposal to add manganese to Appendix VII, Appendix VIII, and the UTS table in an entirely separate rulemaking. Alternatively, EPA could repropose this entire rule, highlighting the manganese aspect of the rulemaking in the table of contents, the title and the introductory language to the preamble.

Response 27-1: EPA is deferring our decision on manganese. Please see section IV.B. of the preamble for further clarification.

Comment 27-2: The proposed rule to add manganese to Appendix VII, Appendix VIII, and the UTS table is not based upon sound science.

CPC submitted comments dated November 3, 2000 stating CPC's belief that, in the case of



manganese, EPA has not met the requirements for placing a substance in Appendix VII and Appendix VIII. CPC believes that EPA lacks sound scientific evidence that manganese in solid waste presents a hazard to human health or the environment. We brought to EPA's attention the document written by ATSDR personnel, Johnson and DeRosa (1997) which characterized the sound science relating to manganese toxicity as consisting of only four inhalation studies.

We wish to bring to EPA's attention another document, "Influence of the route of administration and the chemical form ( $MnCl_2$ ,  $MnO_2$ ) on the absorption and cerebral distribution of manganese in rats"; H. Roels, G. Meiers, M. Delos, I. Ortega, R. Lauwerys, J. P. Buchet, D. Lison; Archives of Toxicology; Volume 71; Issue 4; pages 223-230 (1997). We believe that this study demonstrates that the available inhalation toxicological information for manganese cannot be employed to arrive at a scientifically sound dose-response assessment for ingested manganese compounds.

Roels et al. (1997) dosed groups of adult male rats with either  $MnCl_2 \cdot 4H_2O$  or  $MnO_2$  once a week for 4 weeks at doses of either 24.3 mg Mn/kg body weight by oral gavage (g.), or 1.22 mg Mn/kg body weight by intraperitoneal injection (i.p.) or intratracheal instillation (i.t.). Four days after the fourth dose was administered, the rats were sacrificed and the manganese concentration in blood, hepatic and cerebral tissues was measured. The liver manganese concentration was not affected by the treatments whatever the chemical form or the route of administration.

Administration of  $MnCl_2$  by g., i.p., and i.t. routes produced equivalent blood manganese concentrations; however, manganese concentrations were increased in the cerebral cortex to different degrees depending upon the route of administration (g., 22%; i.p., 36%; i.t., 48%). Manganese concentrations were also higher in the cerebellum after i.p. and i.t. administration of manganese chloride than after oral gavage.

Administration of  $MnO_2$  by i.p. and i.t. routes led to increased manganese concentrations in blood and cerebral tissues which were similar to those measured after  $MnCl_2$  administration. In contrast,  $MnO_2$  given orally did not significantly increase blood and cerebral tissue manganese concentrations.

The authors conclude that the variation in manganese concentrations in the brain according to the route of administration and the chemical form of the manganese compound may be explained by differing toxicokinetics. This further confirms that inhalation data cannot be used to arrive at a scientifically sound estimate of the risk associated with ingestion of manganese compounds.

Response 27-2: EPA is deferring our decision on manganese. Please see section IV.B. of the preamble for further clarification.

Comment 27-3: In attempting to evaluate the studies upon which EPA is basing its determination that a UTS level for manganese of 3.6 mg/L in TCLP extract is technically appropriate, CPC has not yet been able to obtain the studies cited in "Appendix B. Numerical Treatment Standard Development for Manganese." An extension of the comment period is requested to allow us to obtain the documents referred to in Appendix B, study them, and comment upon their adequacy as a basis for setting a standard for manganese in the UTS table.

Response 27-3: EPA is deferring our decision on manganese. Please see section IV.B. of the preamble for further clarification.

## Comment ICMP-00028, Cookson Group plc

The Cookson Group plc (Cookson) is pleased to present these comments to EPA regarding the proposed listing of certain materials as listed hazardous wastes under the Resource Conservation and Recovery Act (RCRA). 65 FR 55684 (September 14, 2000). In this rulemaking, the EPA proposes to include "slag from the production of antimony oxide" as a listed hazardous waste under RCRA.

### Introduction

Cookson provides these comments in order to address issues related to historic blast furnace (smelter) slags generated at its former manufacturing plant in Laredo, Texas. This is the only facility of its kind in the United States and therefore the comments provided herein are applicable, at this time, only to the historic blast furnace slag pile at this site. Cookson addresses the impact of the current listing description on wastes produced from the smelting process that, based upon the generic waste description in the proposed rule could arguably be included within the scope of the rulemaking. However, the smelter slags have significant differences in chemical makeup, leachability and toxicity characteristics from the slags evaluated under this rulemaking.

The production processes studied by EPA under this rulemaking consisted of finished antimony oxide production facilities that perform secondary refining of crude antimony oxide or direct burning of sodium antimonate and antimony metal. No smelters or smelter slags were studied as part of the rulemaking. The purpose of these comments is to differentiate the primary smelting process from the inorganic chemical production processes studied by EPA as well as to point out the differences in the blast furnace slag created during the primary processing of antimony bearing materials from the wastes studied by EPA. Cookson respectfully requests a clarification in EPA's rulemaking that slag from the primary processing of antimony-bearing materials in a smelter or blast furnace is not considered a listed hazardous waste. Without this clarification, EPA arguably includes within the scope of this proposed rule materials for which there is no support in the administrative record.

### Comment 28-1: Primary Smelting of Antimony Ores Is Not A Covered Process Under This Rulemaking

EPA's current rulemaking is being issued under the 1984 Hazardous and Solid Waste Amendments (HSWA) to RCRA which require EPA to make listing determinations for several specified categories of wastes, including "inorganic chemical industry wastes". EPA studied various characteristics of wastes generated from fourteen (14) production processes in the inorganic chemical manufacturing industry (Standard Industrial Classification (SIC) Code 2819). One of the categories of wastes included in the study was waste from the production of antimony oxide. EPA now proposes to list several wastes from these industries as hazardous, including slag generated in the production of antimony oxide. In making this

determination, EPA studied the processing plants for six (6) producers of finished antimony oxide. The processes and wastestreams studied by EPA differ considerably from the primary smelting of antimony-bearing materials and the wastes generated therein.

The slags for which Cookson is providing comments today result from the Primary Smelting and Refining of Nonferrous Metals (Antimony refining, primary) (SIC Code 3339). As such, these wastes do not fall into the "inorganic chemical industry wastes" (SIC Code 2819) which were the subject of the EPA's rulemaking. Cookson respectfully requests that the EPA clarify that the slag generated from the primary smelting of antimony-containing materials (SIC Code 3339) be exempted from the description of hazardous wastes proposed for listing. As set forth in detail below, this clarification will not result in similar types of waste being treated differently; rather, the clarification will recognize that the wastes generated from primary smelting contain lower levels of hazardous constituents, are adequately regulated under non-hazardous waste regulations and therefore do not warrant additional regulation.

Response 28-1: See our response to comment L5-3.

Comment 28-2: Slags Resulting From The Primary Smelting Of Antimony Ores And Concentrates Contain Significantly Lower Percentages Of The Constituents Of Concern Than Those Studied Under This Rulemaking.

In the EPA's proposed rule, the EPA proposes to list as hazardous waste "[s]lag from the production of antimony oxide that is disposed of or speculatively accumulated." In making the determination that these slags should be listed as hazardous wastes, EPA considered information on the physical, chemical and leaching characteristics of three waste streams from two antimony producers in the United States. The processes and wastestreams studied by EPA differ significantly from Cookson's historic operations at their Laredo plant and the wastes generated therein.

#### Processes Studied by EPA Under This Rulemaking

The EPA included two of the four major antimony oxide manufacturing facilities operating in 1998 in its evaluation of the industry. The wastes studied by EPA were generated from rotary and fixed furnace technologies processing various antimony-bearing materials to produce finished antimony oxide. Based on the production and process technology and the end product purity requirements, the impurities from the raw materials collect in what is commonly referred to as 'slag'. These slag materials are necessarily high in impurity contents, and antimony. It is not surprising that antimony, and to a lesser extent, lead and arsenic leach from these materials at elevated levels. Slag which is not recycled within the manufacturing process at these facilities was sampled and analyzed to determine its hazardous constituents and leaching characteristics.

Two samples from the United States Antimony Corp. facility in Montana were generated in a

reduction furnace, which uses sodium antimonate as a feedstock. Slags containing low (< 5%) and high (5% to 10%) levels of antimony were sampled and tested in accordance with the Toxicity Characteristic Leaching Procedure (TCLP) and the Synthetic Precipitation Leaching Procedure (SPLP). These wastes leached between 55 and 211 ppm antimony, as well as between 2 and 3.8 ppm arsenic. Utilizing standard risk assessment techniques, EPA determined that this waste stream was eligible for listing as hazardous waste. This determination was based on the antimony content, its leaching characteristics, the use of area groundwater for drinking water, and the on-site accumulation (and potential future on-site disposal) of the waste materials.

One sample from the Laurel Industries facility in LaPorte Texas was collected from slags generated in an oxidation furnace, which uses antimony metal to produce finished antimony oxide. These slags exceeded the RCRA hazardous waste characteristic for lead.

Based on the evaluation of these wastestreams, EPA found that the slags from this industry generally should be included as listed hazardous wastes under RCRA.

Ores, concentrates and other low-grade antimony-bearing materials are smelted (sometimes called primary processing or primary smelting) to produce antimony metal or 'crude' (low grade) antimony oxide for further refining. This primary processing has historically been conducted in blast furnaces. The blast furnace process results in two products – a crude oxide or metal (depending on whether the furnace is operated in a reducing or oxidizing state), and a slag byproduct. The slag byproduct produced in the blast furnace is significantly different than the slag produced in later processing stages.

A blast furnace is designed to liberate antimony from its source; therefore the resulting slag is much lower in antimony content than the slags produced at later stages of the process. Blast furnace slag typically contains from one to three percent antimony. In comparison, the slags produced during secondary processing contain up to 60% antimony. The slags considered by EPA in this rulemaking contained up to 12.7% antimony. In addition, because a blast furnace typically operates at a significantly higher temperature than secondary processing furnaces, arsenic and lead impurities are preferentially segregated to the product output, and do not become incorporated in the slag. Thus, the lead and arsenic levels in blast furnace slags are typically in the non-detect range – significantly lower than the levels seen in secondary processing slags studied in this rulemaking.

Typical blast furnace slag historically produced at the Laredo facility consists of approximately 45% silica; 25% calcium oxides; 25% iron oxides; 1-3% antimony; and trace alumina and magnesium oxides. This content is stable regardless of the source or content of raw materials, and is necessarily kept constant through the addition of 'fluxes' or processing agents in order to maintain a stable production process. The resulting slag is a hard, brittle, glassy substance which is well suited for use as aggregate in asphalt or concrete.

More importantly, the leaching tests from blast furnace slag historically produced at the Laredo antimony oxide plant reflect the differences in process and chemical makeup. This process and the waste produced therefrom were not evaluated as part of this rulemaking. Recent TCLP and SPLP testing indicates that the leachable arsenic is non-detect, the leachable lead is 0.01 mg/l TCLP and 0.006 mg/l SPLP; and that the leachable antimony is 2.8 mg/l TCLP and 2.1 mg/l SPLP. A copy of the laboratory's analytical report is attached as Exhibit A.

Response 28-2: The Laredo facility was one of four facilities evaluated during the proposal. At the time of the proposal, the facility was owned by a company called Great Lakes Chemical Corporation (GLCC). GLCC purchased the facility from Anzon, Inc in 1997. Cookson is the parent company of Anzon. Cookson retained cleanup liability for the slag pile from the blast furnace and potentially other areas of the facility as well. GLCC completed a §3007 survey in 1998 based on their operations at the facility for the Inorganics listing determination. The survey response from GLCC makes brief mention of the blast furnace operations which were closed in 1993. However, the survey response neglected to mention the 60,000 MT slag pile on-site or the potential off-site uses of the slag. The facility used the blast furnace to reclaim antimony up until 1993 when the furnace was shut down and the company started using a facility in Mexico to recover antimony. As stated by the commenter, the blast furnace produced both antimony metal and crude antimony oxide. These materials were then used to produce higher grade antimony oxide sold by the company. As noted in the response to comments from U.S. Antimony regarding a similar issue (see our response to comment 16-4), when the low grade antimony oxide or metal is used for further antimony oxide production, we consider the low grade antimony oxide or metal to be a process intermediate in the production of antimony oxide and we consider the two furnaces to be steps in a single, integrated process designed to produce antimony oxide. We consider the wastes from these operations (i.e., the slag) to be wastes from the production of antimony oxide falling within the scope of the listing.

We conducted our risk assessment on the reduction furnace slag at U.S. Antimony. Unlike the impression given above by the commenter, the reduction furnace is not the primary antimony oxide production furnace at U.S. Antimony. Instead, it serves the same type of purpose as the blast furnace did at the Cookson/GLCC facility by producing an intermediate (in this case, antimony metal) that is then used to produce salable antimony oxide. Both the blast furnace and the U.S. Antimony reduction furnace use antimony source material plus coke or coal to make an intermediate product. The coke and coal both serve as the fuel and the reducing agent. Kirk-Othmer's Encyclopedia of Chemical Technology categorizes both the blast furnace and the reduction furnace as pyrometallurgical processes for the recovery of antimony, supporting our belief that these processes operate on very similar principles, using similar raw materials and creating similar wastes.<sup>36</sup> We have never taken the position that all facilities covered by a single listing investigation must have identical operations; rather, we evaluate, as a category, facilities that engage in similar operations. We have concluded that it is reasonable to consider the Laredo blast furnace as falling in the same general category of antimony oxide operations that we assessed

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<sup>36</sup> Kirk-Othmer citation.



for listing.

We disagree that the limited data provided by the commenter shows that the slag is significantly different from the U.S. Antimony slag that we assessed for the listing. The levels of antimony leaching from the blast furnace slag (2.1 mg/L SPLP and 2.8 mg/L TCLP) are somewhat lower than the levels we found in our samples (114-211 mg/L SPLP and 55.8-110 mg/L TCLP). However, the levels are still significant (up to 350 times the drinking water HBL for antimony). As explained elsewhere, we believe it is appropriate to assume that all or part of this risk may be disposed of off-site. See Comment Response set L-5. Leachate levels 350 times the antimony HBL would very likely exceed listing thresholds if modeled with the kind of dilution and attenuation factors (ranging from 3 to 9 at the 90<sup>th</sup> and 95<sup>th</sup> risk percentiles) we have found to be appropriate for other offsite scenarios in this rulemaking. In addition, the total levels of antimony of 1-3% (by weight) reported by the commenter are comparable to the levels we found in our samples of slag. In our risk modeling of U.S. Antimony's site, we used two samples of the U.S. Antimony slag that contained 1% antimony (sample AC-1-AO-01) and 12% antimony (sample AC-1-AO-06), respectively. Both samples were included in the distribution used to develop the Monte Carlo risk assessment which was the basis for listing.

The commenter's lead level (0.006 mg/L) is actually higher than the level found in the samples we used for modeling (<0.005 mg/L). Thus the lead levels do not convince us that the commenter's slag differs significantly from the U.S. antimony slag. Moreover, neither lead nor arsenic were a basis for listing. Consequently, we do not believe that it is necessary to show that the commenter's slag has comparable lead and arsenic levels to support listing it.

#### Comment 28-3: Comparison of Antimony Leaching Levels

The levels of antimony leaching from the Laredo blast furnace slag were 20 to 100 times lower than the levels leaching from the wastes studied by EPA under this rulemaking. In addition, arsenic did not leach at detectable concentrations. Finally, the TCLP levels for lead were 500 times lower than the 5.0 ppm regulatory threshold for regulation as hazardous waste. These leaching results indicate that the Laredo blast furnace slag is considerably less toxic and does not warrant regulation as hazardous waste.

Further demonstration of the limited leachability and low environmental threat of the blast furnace slag is found in environmental samples collected at the Laredo facility. During the construction of a stormwater collection and evaporation basin in 1992, an area of the Laredo plant, the historic location of significant blast furnace slag storage, was excavated and re-graded. During construction, several samples of soils immediately underlying the slag pile were sampled and analyzed for total and leachable antimony (see Exhibit B). Despite over fifty years of blast furnace slag storage, the antimony in the three samples collected ranged from 4.2 to 9.8 mg/kg (parts per million), while the leachable antimony by the TCLP was limited to between 0.61 and 0.77 mg/l (parts per million). This qualitative data indicates that the blast furnace slag material has a very limited leachability.

Response 28-3: See response to comment 28-2 regarding antimony levels in the waste and its leachate. While the commenter makes a claim that there is low environmental hazard from the slag, we note that the entire facility, including the slag pile, is currently under a State corrective action order due to antimony contamination. The soil samples illustrate that antimony is mobile and is leaching into the soils from the slag. The TCLP levels reported by the commenter for the soils are also up to 128 times the drinking water HB for antimony.

Comment 28-4: Historic Disposition Of Blast Furnace Slags

Historically, the blast furnace slag produced at the Laredo facility has been utilized as aggregate in the production of asphalt and concrete. In addition, the hard, glassy nature of the material does not lend itself to leaching. Finally, the use within the asphalt or concrete further inhibits any contact with water, thus limiting the leaching of any constituents from the slag.

Under 30 Texas Administrative Code (TAC) 330.41, the slag is classified as a Class I Waste. As such, it may not be disposed in a municipal landfill without the express permission of the Executive Director of the Texas Natural Resources Conservation Commission (TNRCC) upon a showing that it will be properly handled and safeguarded. In addition, the disposal of Class I wastes in Texas are regulated by TNRCC and limited to means which are protective of human health and the environment.

Based upon the historical disposition of this material, and its regulatory classification under Texas law, more stringent regulation under federal law is not necessary for the protection of human health and the environment. However, this additional regulatory burden has the potential to significantly deter the historic beneficial reuse and recycling of these materials.

Response 28-4: Although the slag may be a hard, glossy material capable of being used as aggregate, it is also capable of leaching antimony at levels up to 350 times the drinking water HBL for antimony. See Response 28-2 above.

The Agency is required by the consent decree to evaluate the risks from antimony oxide waste and determine if a listing is warranted. We have determined that based on antimony concentrations, slag associated with antimony oxide production, including slag from blast furnaces and reduction furnaces when producing process intermediates for antimony oxide production, warrant listing as a hazardous waste. If a waste meets this definition, then it is subject to the listing regardless of whether or not it is already regulated by a State. A nationally-applicable listing ensures that the waste will be subject to appropriate regulation even if it goes out of state.

In addition, the State of Texas does not currently regulate the slag as a hazardous waste. The basis for the listing is antimony. Since antimony is not regulated by the Toxicity Characteristic (40 CFR 261.24), the Texas regulations do not consider the antimony content of a non-hazardous waste when approving a beneficial use claim such as using the slag as aggregate in asphalt or concrete. Additional regulation is warranted because the antimony in this waste has the potential to cause



substantial hazards to human health when placed in an industrial landfill. We think it is reasonable to assume that the waste also would pose substantial hazards when used as road bed material. We note, however, that we recently informed the commenter that using the material as road bed prior to the effective date of the listing would not result in regulation as a hazardous waste, either now or in the future.

Comment 28-5: Cost Implications.

EPA advocates the recycling of the studied antimony slags as a cost-minimizing waste disposal alternative over landfilling in its justification for the proposed rule. See USEPA, Economic Analysis for Listing of Inorganic Chemicals, Notice of Proposed Rulemaking, July 2000 at 4-6 through 4-9. Because the smelter slags are very low in antimony and lead content, recycling for metals recovery is not a viable alternative for these wastes. In fact, blast furnace/smelter slags are the result of the recycling process which EPA advocates for disposal of the antimony slags studied in the formulation of the rulemaking. Thus, an important part of EPA's economic justification for the proposed rule does not apply to smelter slags.

In addition, the potential costs of disposing of the approximate 60,000 tons of smelter slag currently stored at the Laredo facility were not taken into consideration in evaluating the economic impacts of the rule. Using EPA's estimated costs for loading, transporting and disposing of hazardous and non-hazardous waste, today's rulemaking will increase the cost of disposal (should that option be pursued) of the historic blast furnace slag pile by approximately \$22.8 million over the average costs for non-hazardous waste disposal. In addition, because of the stigma associated with the material's classification as hazardous waste, this rulemaking threatens to seriously undermine attempts to pursue economically viable recycling options for these wastes, such as its use as aggregate in asphalt or concrete. Without a clear, demonstrated risk to human health or environment from this use, this cannot be EPA's intention.

Response 28-5: See our response to comment L5-1.

Conclusions/Recommendations

To address the concerns described above, EPA should make the following revisions to its Hazardous Waste Management System Listing Proposed Rule. The EPA should modify the description of proposed Waste Code K177 to exclude those slags generated in the primary smelting (e.g. in a blast furnace) of antimony-bearing materials, thus limiting the effect of the rulemaking to the specific types of slag materials studied under this rulemaking and the information in the administrative record. This can be accomplished by adding an explanatory note or footnote to the proposed waste description clarifying that slags generated during the primary smelting of antimony-bearing ores, which can be classified under SIC Code 3339, are not included in the category of wastes regulated under this rule.

Response to conclusion:

For the reasons stated above, in the preamble, and in responses to comment set L5, we have found that the slag at Cookson meets the definition of the K177 listed hazardous waste.

## Comment ICMP-00029, Waste Management

Introduction: Waste Management (WM) is pleased to comment on the EPA proposed Identification and Listing of Hazardous Waste: Inorganic Chemical Manufacturing Waste. WM is confining its comments to supporting the exclusion of leachate or gas condensate collected from landfills as found in the proposed language for Section 261.4.

Comment 29-1: WM's landfills generate hundreds of millions of gallons of leachate annually, all of which is managed in accordance with federal, state, and local regulations to ensure proper treatment prior to discharge. A variety of means are used for leachate management, to include recirculation back into the landfill, direct discharge to sewers for treatment at a Publicly Owned Treatment Works (POTW), truck hauling to a POTW, on-site pretreatment and hauling to an industrial wastewater pretreatment plant prior to POTW treatment, and direct discharge under terms of an National Pollutant Discharge Elimination System (NPDES) permit. In establishing its proposed Clean Water Act effluent guidelines for landfills (63 FR 6426), EPA determined that the practices described above which lead to treatment at a POTW were protective of public health and the environment, and has only identified standards for direct discharges.

The diverse methods that EPA now uses for listing hazardous waste demonstrates the need for a single, environmentally effective solution to the derived-from rule as it applies to MSW leachate. In the petroleum refinery listing, EPA employed a standard method for listing certain waste streams. As a result, with adequate records, MSW landfills could relatively easily identify whether any of the waste streams had been received prior to its designation as a hazardous waste, thereby triggering the concern with the derived-from rule for leachate. In the case of the listings for the pigment and dye industry, EPA employed a concentration-based approach, which significantly complicates the determination regarding the leachate because it requires knowledge and records not only of having received the waste stream, but also records of the precise concentration of contaminants of concern. In the listing for chlorinated aliphatics, EPA employs a third approach by granting a conditional exemption for MSW landfill leachate based on risk assessment methodology. Without judging the legitimacy of any of these approaches, WM is concerned that the result for the MSW landfill operator is one of increasing uncertainty of leachate management requirements based on which approach EPA may use for any individual listing. Although on a national scale the number of affected landfills may be relatively small for any individual listing, the cost implications for the individual landfill may be staggering, given the difference in management costs between ordinary MSW leachate and hazardous waste leachate. WM continues to believe that it is in the best interests of EPA and the MSW landfill operators, both publicly-owned and privately-owned, to develop a single solution for the derived-from issue as it applies to MSW leachate. The CWA effluent guidelines present such an opportunity, as does the pending proposed Hazardous Waste Identification Rule (HWIR), although there are now indications that EPA may not pursue the replacement of the derived-from rule with a comprehensive HWIR proposal in favor of selected management standards

(such as hazardous waste combustion ash). This liability limbo for leachate management costs will continue to be of concern as long as each new hazardous waste listing must re-address the MSW landfill leachate issue.

As in our comments to past listings, WM again encourages EPA to resolve this issue expeditiously.

Response 29-1: We are finalizing the revisions to the temporary deferral in §261.4(b)(15) with no change from the proposed rule. We appreciate the commenter's support for the temporary deferral. The purpose of the temporary deferral is to avoid disrupting ongoing leachate management and to allow EPA to decide if any further integration is needed of the RCRA and CWA regulations consistent with RCRA Section 1006(b)(1). EPA's Office of Water examined the need for national effluent limitations guidelines and pretreatment standards for wastewater discharges (including leachate) from certain types of landfills (see proposed rule at 63 FR 6426, February 6, 1998). EPA decided such standards were not required and did not issue pretreatment standards for Subtitle D landfill wastewaters sent to POTWs (see 65 FR 3008, January 19, 2000). The commenter suggested there were "uncertainties" in leachate management requirements, although the commenter did not identify any specific problems. At this time, we believe that it is appropriate to defer regulation on a case-by-case basis. A broader exemption for landfill leachate under another regulatory program is beyond the scope of the current rulemaking.

## Comment ICMP-00030, U.S. Borax

Introduction: This letter comments upon the U.S. Environmental Protection Agency ("EPA or "Agency") proposed rule concerning listing of wastes generated by the inorganic chemical industry,<sup>37</sup> specifically the aspects of the proposed rule regarding the production of boric acid by U.S. Borax, Inc. ("Borax"), at its Boron, California, facility ("Boron Operations").

Borax is very pleased with the Agency's proposal not to list waste generated by its Boron Operations boric acid production. As the record shows, these wastes do not merit listing based upon their characteristics and the waste management practices Borax employs for them. We have worked hard with staff to provide the information EPA needed for evaluation of our wastes. We appreciate the diligence and dedication demonstrated by EPA staff during the listing effort.

Comment 30-1: Bevill Status of Borax Boric Acid Wastes.

As Borax has asserted in prior rulemakings and in detail in the record for this rulemaking, the wastes generated from boric acid production at Boron Operations are excluded from regulation under the Resource Conservation and Recovery Act ("RCRA") by reason of the Bevill exclusion for wastes from the mining and beneficiation of ores and minerals.<sup>38</sup> As noted in the preamble to the proposed rule, the settlement agreement in EDF v. Browner (D.D.C. Cir. No. 890598) provides that EPA's inorganic chemical listing determinations need not include any mining wastes excluded from hazardous waste regulation under the Bevill amendment.<sup>39</sup> Accordingly, as Borax has asserted in submittals to the Agency during this rulemaking,<sup>40</sup> wastes generated from Boron Operations should not be listed because such wastes are exempt beneficiation wastes.<sup>41</sup> Nevertheless, as EPA notes in the preamble

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<sup>37</sup>65 FR 55684 (Sept. 14, 2000).

<sup>38</sup>See RCRA section 3001(b)(3)(a)(ii) and 40 CFR section 261.4(b)(7).

<sup>39</sup>65 FR 55684, 55687 (Sept. 14, 2000).

<sup>40</sup>For a detailed analysis of the Bevill-excluded nature of our boric acid operations see Exhibit C to Mark G. Ellis' letter of November 4, 1999, to Anthony Carrell of EPA. A version of this exhibit with the confidential business information redacted has been entered into the docket for this rulemaking. See Docket Number F-2000-ICMP-FFFFF, Document Number S010I, Exhibit C.

<sup>41</sup>This approach also is consistent with instructions provided by EPA in the survey the Agency conducted in support of this listing effort. EPA instructed survey respondents to use EPA's position in its "Final Technical Background Document - Identification and Description of Mineral Processing Sectors and Waste Streams." April 1998 ("Final TBD") for purposes of determining whether a waste stream is Bevill-excluded. 1998 RCRA § 3007 Survey of the Inorganic Chemicals Industry Instructions. OMB Clearance No. 2050-0159. The Summary of Findings in the Final TBD correctly identifies all wastes from the recovery of boron as Bevill-excluded mineral extraction and beneficiation wastes. Final TBD, page 785. EPA indicated in the instructions that when

to this proposed rule, the Agency has decided not to review the status of our wastes under the Bevill exclusion in the context of this rulemaking because it has determined not to list the wastes as hazardous under RCRA Subtitle C due to their nature and the manner in which we manage them.<sup>42</sup>

We concur that the wastes are not hazardous and should not be listed for this reason. However, we continue our strong belief that the boric acid operations clearly fit the criteria for exempt beneficiation waste, as demonstrated in the record for this rulemaking and in prior rulemakings, and should not be regulated for this reason as well.

Therefore, in the absence of Agency review of the Bevill-excluded status of our boric acid production wastes in this rulemaking, we believe it is essential that the record here accurately reflect the nature of our operations and avoid statements that might be misinterpreted as an EPA finding that our wastes do not meet Bevill criteria. The preamble discussion and technical background document in this rulemaking require only a little fine-tuning to accomplish these goals. The comments in the following section are directed at making the rulemaking record here as accurate and complete as possible.

Response 30-1: As noted in proposal, the Agency concluded that it was not necessary for this rulemaking to prepare a separate Bevill opinion for wastes from the production of boric acid at U.S. Borax. If the commenter wishes to obtain clarification of the Bevill status of wastes from its operation, it should seek that opinion from the authorized state or from the appropriate EPA region. The commenter's request to make a wide range of editorial changes to the preamble and related background documents would, in fact, lead to the defacto preparation of a Bevill opinion for this facility, an action the Agency does not believe is necessary to complete this rule. In addition, the Agency does not intend to release a revised version of the proposal. We will correct factual errors in the background documents. We did not receive any challenges to the no-list decision for the boric acid sector. Therefore, the Agency is not discussing the boric acid production process in any detail in the final rule, other than to confirm we are finalizing the no-list for that sector.

Comment 30-2: Correction of Technical Inaccuracies.

Comment 30-2a: Preamble Discussion.

In general, the preamble to the proposed rule for EPA's listing of hazardous wastes from inorganic chemical manufacturing is accurate with respect to boric acid production at Boron Operations. We offer the following minor corrections.

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companies used the Agency's position in the Final TBD regarding application of the Bevill exclusion to their wastes the companies were not acknowledging agreement or disagreement with EPA's position.

<sup>42</sup>65 FR 55684, 55712 (Sept. 14, 2000).



1. Page 55711. 3<sup>rd</sup> column, heading "d. *Agency evaluation of wastes generated by the kernite ore process.*" Here and in a number of other places in the preamble discussion of boric acid production at Boron Operations the words "process" or "processing" are used to describe Boron Operations. Borax does not engage in "processing" activity as that term is used in the context of the Bevill mining waste exclusion. Therefore, we request that the Agency substitute other terms that are Bevill-neutral in describing our activities here and in other locations of the preamble discussion, as indicated in the table attached as Exhibit A. In addition to the comments in Exhibit A, we also offer the following comments below.

2. Page 55709. 3<sup>rd</sup> column, 4<sup>th</sup> full paragraph. This paragraph states that the facility mines ore to produce boric acid through a "process" of dissolution, classification, "thickening," filtration and crystallization. As described above, Borax does not "process" ore to produce boric acid. Also, "settling" is probably a more precise description of what occurs during ore beneficiation than the term "thickening." Therefore, we suggest that the paragraph be amended to read:

"The second facility mines kernite ore to produce boric acid through a series of operations, including dissolution, classification, settling, filtration and crystallization."

3. Page 55711. last paragraph, 2<sup>nd</sup> sentence. This sentence states that the tailings include wastewaters and fine insolubles from "ore processing." As described above, Borax does not "process" ore as that term is used in the Bevill mining waste exclusion. Also, no tailings are generated during crushing and grinding of the ore prior to the dissolution step in boric acid production. The sentence should be changed to read, "The tailings include the wastewaters and fine insolubles from boric acid production."

4. Page 55712. Table III-7, footnote 2. The footnote states that:

"The boric acid coarse gangue is co-mingled with gangue from the other production process at the facility. That process is outside the scope of the consent decree."

Borax does not "process" any ore at Boron operations as that term is used in the Bevill exclusion. Rather, it produces boric acid and sodium borate from boron-rich ores in two separate operations. As described above, Borax believes that wastes from its boric acid production are excluded mining waste and thus outside the scope of the consent decree. The footnote should be reworded to read:

"The boric acid coarse gangue is co-mingled with gangue from sodium borate production at the facility. Sodium borate production is outside the scope of the consent decree."

5. Page 55712. 3<sup>rd</sup> column, last full sentence, beginning. "Finally, we note..." It may be misleading to state that the impoundments have a triple liner. The impoundments are lined with a double synthetic liner and two leachate collection and removal systems plus what the California Regional Water Quality Control Board terms a "redundant clay liner." The clay liner does not qualify as a third liner under the RCRA regulations, however. Therefore we suggest that the sentence be reworded to state, "Finally, we note that the impoundments in question are designed with a double liner, a double leachate collection system and a redundant clay liner."

Response 30-2a: See response to comment 30-1 regarding the Bevill determination for this facility. Since the Agency did not make a Bevill determination regarding this waste, the term "processing" used in the preamble is a generic term for an industrial activity. The Agency does not intend to release a revised proposed rule. In addition, since we are finalizing the no-list decision, we do not intend to discuss the boric acid sector in any detail in the final rule.

Comment 30-2b: Boric Acid Listing Background Document.

As part of this rulemaking, EPA prepared the "Boric Acid Listing Background Document for the Inorganic Chemical Listing Determination," dated August 2000 ("Boric Acid Background Document").<sup>43</sup> This document is more accurate in its descriptions of Boron Operations than prior EPA efforts, but clarification on a few points is needed. We hereby request that EPA amend the document in accordance with our comments below.

1. Page 14, last sentence carried over to the next page. It appears part of this sentence was inadvertently omitted. The sentence describes the two waste streams generated from this step in boric acid production, but does not mention that they are wastes or that they are captured in a scrubber. In addition to these two waste streams, the dissolution/leaching step generates an ore slurry that is further beneficiated during classification. We offer the following suggested language.

"The resulting ore slurry is conveyed to classifiers for removal of coarse insolubles. The dissolution/leaching step generates ore dust and vapor waste streams that are captured in a scrubber. A liquid waste stream is bled from the scrubber and sent to the tailings tank."

2. Page 15, first heading, "Classification." Classification is separation using a form of gravity. For clarification and for consistency with the following heading this heading should read, "Classification (Gravity Separation)."

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<sup>43</sup>This document is Document Number S0095 in the docket for this rulemaking, Docket Number F-2000-ICMP-FFFFF.

3. Page 16. This page is a process flow diagram ("PFD") for boric acid production at Boron Operations. Enclosed as Exhibit B is a copy of that PFD marked to show the changes described below. Borax regards these corrections as the most crucial to accurately depicting its boric acid production methods.
  - a. The long line running across the top of the diagram from the Belt Filters to the Dissolving/Leaching Unit should be labeled "Mother Liquor."
  - b. The Acid arrow should connect to the Mother Liquor line rather than the Dissolving/Leaching Unit box since acid is not added directly to the Dissolving/Leaching Unit. Rather, the pH of the Mother Liquor is adjusted with acid to form a dilute acid solution prior to the Mother Liquor entering the Dissolving/Leaching Unit.
  - c. There should be two additional arrowheads at the bottom of the PFD showing what enters the tailing tank. The scrubber bleed from the Dissolving/Leaching Unit that ultimately is sent to the Tailings Tank should have an arrowhead at the bottom. There also should be an arrowhead at the Tailings Tank indicating that the liquid waste streams all enter the Tailings Tank.
4. Page 17, section 3.2.2. The words "refining" and "process" are used in this section to describe Boron Operations. Borax does not engage in "refining" or "processing" activity as those terms are used in the content of the Bevill mining waste exclusion. Therefore, we request that the Agency substitute other terms that are Bevill-neutral in describing our operations. Specifically we ask that the third and fourth sentences of this section be changed to read.

"The off-spec product is collected in off-spec product hoppers and returned to the secondary crusher for reuse in boric acid production. Because the material is reused in on-site production units that present low potential for release, and because we evaluated production waste generated after the secondary material is reinserted into the operation, we do not believe that the off-specification product represents significant risks."
5. Page 17. Section 3.2.2 indicates that off-spec product is removed from the dust collectors every two months. More accurately, off-spec product is removed from the dust collectors when they are serviced. The time interval for servicing the dust collectors is not fixed; the maintenance is performed on an as-needed basis. The sentence "Additional off-spec product is removed from the dust collectors every two months" should be changed to read, "Additional off-spec product is removed from the dust collectors whenever they undergo periodic maintenance."

6. Page 17. section 3.2.3. The first sentence of the section headed "Waste Generation" states that "[t]ailings include the process wastewaters and fine insolubles from ore processing and boric acid production." As noted in our comments on the preamble above, Borax does not "process" ore as that term is used in the Bevill mining waste exclusion. Also, no tailings are generated during crushing and grinding of the ore prior to the dissolution step in boric acid production. The sentence should be changed to read, "The tailings include the wastewaters and fine insolubles from boric acid production."

6[sic]. Appendix A, Summary of Waste Generation and Management, page 2, footnote 5. This is the same comment as above on the Federal Register preamble. The footnote states that:

The boric acid coarse gangue is co-mingled with gangue from the other production process at the facility. That process is outside the scope of the consent decree."

Borax does not "process" any ore at Boron operations as that term is used in the Bevill exclusion. Rather, it produces boric acid and sodium borate from boron-rich ores in two separate operations. As described above, Borax believes that wastes from its boric acid production are excluded mining waste and thus outside the scope of the consent decree. The footnote should be reworded to read:

"The boric acid coarse gangue is co-mingled with gangue from sodium borate production at the facility. Sodium borate production is outside the scope of the consent decree."

7. Appendix A, Summary of Waste Generation and Management, page 3. This portion of the Appendix is a table listing the Bevill-exempt waste streams from boric acid production and the annual volume of them produced. At present the table lists only wastes generated by IMC Chemicals, wastes for which EPA made an affirmative Bevill finding in the context of this rulemaking. We ask that the table be modified to include a footnote stating,

"In the context of this rulemaking, EPA has declined to review the Bevill-excluded status of the wastes generated by U.S. Borax."

Response 30-2b: See response to comment 30-1. The Agency replaced the process flow diagram in the docket when this comment was received in November, 2000. Factual corrections will be made to issues discussed in items 1-3, item 5, changing the language in the first number 6 regarding ore processing, and item 7 above. Since the Agency did not make a Bevill determination regarding this waste, the term "processing" used in the preamble and background document is a generic term

for an industrial activity.

Comment 30-2c: Industry Overview for the Inorganic Chemicals Listing Determination.

The docket for this rulemaking contains a document titled "Industry Overview for the Inorganic Chemicals Listing Determination," prepared by Science Applications International Corporation and dated September 30, 1997 ("Industry Overview").<sup>44</sup> The purpose of the Industry Overview was to assist EPA in its information collection in support of the listing proposal.<sup>45</sup> The Industry Overview was based on published information and data collected by EPA in the 1980s.<sup>46</sup> In the case of boric acid, the information in the Industry Overview concerning Boron Operations is both outdated and highly inaccurate.

Since the preparation of the Industry Overview, EPA has obtained detailed information on boric acid production by Borax through the RCRA section 3007 inorganic chemical industry survey and from our voluntary information submittals. Borax has worked hard to present EPA with a true picture of its boric acid production and EPA has prepared an accurate description of our boric acid production (subject to the comments above) in the Boric Acid Listing Background Document.

Rather than submitting extensive comments correcting the many inaccuracies in the Industry Overview, Borax requests that a cover sheet be added to the Industry Overview that states:

"This document was prepared in anticipation of a rulemaking to make listing determinations for wastes generated by specific inorganic chemical industry sectors, as required by the settlement agreement in EDF v. Browner. (D.C. Cir. No 890598). Through the course of the rulemaking EPA has obtained extensive information on inorganic chemical production operations and waste management practices in the studied sectors and prepared a detailed background document on each industry sector. For an accurate discussion of any particular industry sector, the reader is referred to the background document on that sector in the docket for this rulemaking, Docket Number F-2000-ICMP-FFFFF."

Response 30-2c: We will add a cover sheet to this document to the copies currently in the docket for this rulemaking.

Comment 30-3: Document Missing From the Record.

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<sup>44</sup> This document is Document Number S0009 in the docket for this rulemaking Docket Number F-2000-ICMP-FFFFF.

<sup>45</sup> Industry Overview, section 1. I. (The Industry Overview has no page numbers.)

<sup>46</sup> Id.

The docket index for this rulemaking lists a document that EPA apparently has relied upon in preparing the proposed rule, but which is unavailable for public review. Document S0002 in Docket Number F-2'000-ICMP-FFFFF is listed in the docket index as, "General Listing Background Document for the Inorganic Chemical Listing Determination, May 15, 2000." When we requested a copy of this document to review from the RCRA Docket office we were informed that, as of November 9, 2000, a copy of the document had not been placed in the docket by the program office. Absent review of the document we must assume that it contains information relevant to our specific situation and the issue of Bevill-excluded mining wastes generally.

By this letter we are asking that the comment period for this rulemaking be extended by 30 days to allow time for the document to be placed in the docket and for interested parties to review the document and comment upon it if needed.

Response 30-3: When this comment was received in November 2000, the Agency informed U.S. Borax that the document was available in the docket and also on the Internet. We gave them the appropriate URL to locate the document on the Internet. We also informed them that we were not extending the comment period for the proposed rule.



**Comment ICMP-00031, Eaglebrook**

Introduction: Eaglebrook Inc. (“Eaglebrook”) markets and produces a full line of inorganic coagulants for use in wastewater and water treatment. Ferric chloride solution forms a significant part of Eaglebrook’s product line. Consequently, due to the potential adverse impact on an important commercial product, Eaglebrook submits the following comments on the *Proposed Rule for Hazardous Waste Management System; Identification and Listing of Hazardous Waste; Inorganic Chemical Manufacturing Wastes; Land Disposal Restrictions for Newly Identified Wastes; and CERCLA Hazardous Substance Designation and Reportable Quantities*, 65 FR 55,684 (September 14, 2000) (the “Proposed Rule”):

Comment 31-1: EPA’s decision not to list ferric chloride as a RCRA hazardous waste is a correct decision.

In the Proposed Rule, at pages 55759 to 55760, EPA analyzed the chemical stream (ferric chloride) derived from the chloride-ilmenite process for titanium dioxide production. EPA concluded that because ferric chloride exhibits certain RCRA characteristics, namely corrosivity and toxicity (for chromium and lead), listing ferric chloride as a hazardous waste would serve no regulatory purpose. Eaglebrook supports EPA’s listing decision for ferric chloride because, as described below, existing regulatory control of ferric chloride is protective of human health and the environment. Listing of ferric chloride will not significantly increase the protection of human health and the environment, but would result in an unsubstantiated bias against ferric chloride from the E.I. du Pont de Nemours and Company (“DuPont”) facility in Edge Moor, Delaware (the “Delaware Facility”) to the detriment of Eaglebrook and its customers.

Response 31-1: EPA acknowledge’s Eaglebrook’s support for the rule.

Comment 31-2: The ferric chloride produced at the Delaware Facility is a legitimate product.

At several points in the Proposed Rule, EPA discussed ferric chloride produced at the Delaware Facility from titanium dioxide production using the chloride-ilmenite process. EPA repeatedly questioned the legitimacy of ferric chloride as a product. For example, EPA stated:

EPA is not at this time assuming whether ferric chloride is a legitimate product.  
Proposed Rule, p. 55759.

Later EPA refers to “the questions framed above about the potential legitimacy of this facility’s use of ferric chloride as a product.” *Id.* at 55760. As discussed in greater detail below, ferric chloride produced by the Delaware Facility is a legitimate product. Moreover, Eaglebrook respectfully requests that EPA correct any misconceptions it has created in the

market place regarding the legitimacy of this product when it promulgates the final version of the Proposed Rule and all comments regarding the legitimacy of the sale should be stricken from the final rule.

Comment 31-2a: Eaglebrook has marketed 100% of the ferric chloride from the Delaware Facility as a legitimate product since October of 1994.

Eaglebrook purchases ferric chloride from the Delaware Facility for resale to its customers. Eaglebrook, through an affiliated entity, first acted as a distributor for DuPont by selling ferric chloride in Canada. In 1994, Eaglebrook and DuPont entered into an agreement whereby Eaglebrook purchased certain assets from DuPont (i.e., customer lists, equipment, and goodwill) associated with the ferric chloride product line. As part of that transaction, Eaglebrook entered into another agreement with DuPont to purchase the entire output of ferric chloride from the Delaware Facility for resale to Eaglebrook's customers. Needless to say, these transactions were the result of arms-length negotiations and resulted in a significant cost to Eaglebrook to acquire DuPont's ferric chloride business. In addition to ferric chloride purchased from the Delaware Facility, Eaglebrook also manufactures ferric chloride in Canada for sale to its customers and through an affiliate also manufactures and markets ferric chloride in Argentina.

Eaglebrook markets and distributes ferric chloride from the Delaware Facility in the same manner as all other products marketed and distributed by Eaglebrook, namely, in a safe and responsible manner. The ferric chloride produced at the Delaware Facility has obtained NSF certification. Also, attached as Exhibit A hereto is the American Water Works Association ("AWWA") standard for ferric chloride, which DuPont meets for its ferric chloride product. In addition, Eaglebrook is an active participant in the Responsible Care® program developed by the Chemical Manufacturers Association, of which Eaglebrook is a member. A description of the Responsible Care® standards is attached as Exhibit B hereto.

Response 31-2a: EPA acknowledges the comment. As stated in the proposal, EPA found metals and dioxins in the ferric chloride material. These findings are a matter of public record. EPA acknowledges that they may raise some questions about the suitability of the material as a product. EPA, however, did not evaluate the legitimacy of ferric chloride as a product in this rule.

Comment 31-2b: Ferric chloride is widely used for a variety of legitimate and environmentally beneficial purposes.

Ferric chloride is the most common inorganic coagulant used in the wastewater treatment industry and, in recent years, for the treatment of potable water. Eaglebrook's single largest market for ferric chloride is for removal of phosphate from municipal wastewater effluent. Under the Clean Water Act, EPA originally mandated phosphate removal primarily for the Great Lakes drainage basin and later expanded this successful practice to sensitive areas such as the Chesapeake Bay region. Excess phosphorus entering a lake, stream or bay can

overstimulate the growth of algae and deplete oxygen levels in the water body, creating a condition known as eutrophication.

The addition of ferric chloride to wastewater precipitates the soluble phosphate out of the effluent and into the biosolids. Phosphorus can be effectively removed from wastewater with aluminum, ferric iron, and ferrous iron (if aeration is present to oxidize the ferrous to ferric). Chemical precipitation of phosphorus with ferric chloride is a cost-effective treatment option for wastewater treatment plants (“WWTP’s”) that are required to remove phosphorus. Attached as Exhibit C hereto is a chart illustrating the correlation between removal of suspended solids and total phosphorus levels in effluent from a typical WWTP. Also, an ancillary benefit of chemical precipitation using ferric chloride is the precipitation of sulfides, which helps prevent the formation of odorous and corrosive hydrogen sulfide gas at the treatment works.

Eaglebrook also sells ferric chloride to municipal wastewater treatment plants for sludge conditioning, chemically enhanced primary treatment (“CEPT”), and struvite control. Ferric chloride is used in conjunction with organic polymers to condition sludge before filtering. The ferric chloride has a cationic charge that acts as a magnet to increase the particle size of the solids feeding the filter. Organic polymer is then added to enhance the effect of the ferric chloride. Again, an ancillary benefit of sludge conditioning using ferric chloride is the precipitation of sulfides, which helps prevent the formation of hydrogen sulfide gas in the filter area.

For CEPT, WWTP’s can increase their capacity by the addition of ferric chloride and organic polymer to the head of the plant. This forces the solids to settle in the primaries. This type of treatment also has been used when the secondary or aeration part of the plant is being rebuilt and not in service. The CEPT process can keep the treatment plant running as a primary plant and in compliance with EPA guidelines during the rebuilding process.

Struvite is magnesium ammonium phosphate and it forms in WWTP’s that use anaerobic digestion. Struvite accumulates in pipes and equipment, creating maintenance and operation problems. The addition of ferric chloride removes the phosphate, which is a precursor to the formation of struvite, and prevents its formation.

With respect to ferric chloride sold by Eaglebrook to municipal WWTPs, such sales are normally made through a bid process. Sales of ferric chloride, regardless of the source, therefore, depend upon the most competitive price rather than the particular characteristics of the ferric chloride. This market-driven price elasticity also demonstrates the legitimacy of ferric chloride as a product.

Eaglebrook also sells ferric chloride as a coagulant in industrial wastewater treatment. Ferric chloride is sold to industrial treatment plants for the co-precipitation of heavy metals from wastewater effluent, such as arsenic and selenium. It is also used to remove color such as

humic matter from wastewater. Ferric chloride is also used for sludge conditioning and to control hydrogen sulfide in industrial sludge conditioning applications.

Finally, Eaglebrook sells ferric chloride to municipal potable water plants for use as a coagulant. Ferric chloride coagulates tiny particles into larger particles that settle and clarify the water. The ferric ion has a cationic charge and in the coagulation process acts as a scavenger for coagulating organic matter prior to settling and filtration, thereby reducing the turbidity of the water. Ferric chloride works on a wider pH range than aluminum salts and is very effective at TOC removal. Ferric chloride is extremely effective in water plants that lime soften. For further information regarding the uses of ferric chloride, see the product literature attached hereto as Exhibit D.

Response 31-2b: EPA acknowledges the comment.

Comment 31-2c: Ferric chloride from the Delaware Facility is as effective as ferric chloride from other commercial sources.

Eaglebrook has been a manufacturer and distributor of inorganic coagulants since 1973. Eaglebrook's product line includes ferric chloride from other commercial sources as well as biochemical and aluminum-based alternatives to ferric chloride for water treatment. This diverse product portfolio enables Eaglebrook to routinely compare attributes and evaluate ferric chloride from the Delaware Facility against ferric chloride from other commercial sources.

In North America, ferric chloride is manufactured from raw materials such as ferrous chloride, chlorine, iron oxide, and scrap iron. Commercially available ferric chloride commonly contains impurities, such as metals and organic impurities, from the raw materials used to produce the ferric chloride. The concentration of such impurities do not exceed regulatory limits for use as a drinking water or wastewater reagent.

When ferric chloride from the Delaware Facility is compared to ferric chloride produced from other sources, the DuPont ferric chloride performs as well or better than other types of ferric chloride. Attached as Exhibit E hereto are results of a jar test comparison between DuPont ferric chloride and ferric chloride produced by another commercial source (which uses ferrous chloride as its raw material). From the trend of phosphorous removal as a function of iron dosage, the two products perform in an identical manner. Finally, attached as Exhibit E hereto, is an analysis of ferric chloride composition from the Delaware Facility and two other sources. Ferric chloride from the Delaware Facility exhibits higher levels of metals, such as aluminum, titanium, vanadium, and magnesium, all of which enhance the product's coagulant properties. Also, since the effective dose of ferric chloride is between 5 and 25 ppm, any impurities present are well below regulatory levels, even as a component of sludge associated with wastewater treatment.

Response 31-2c: EPA acknowledges the comment. As discussed in the proposed rule, EPA did not evaluate the legitimacy of use of the ferric chloride. These determinations are generally made on a site-specific basis by an authorized State or EPA Region.

Comment 31-3: The trace amounts of dioxins and furans detected in ferric chloride from the Delaware Facility are far below existing and proposed regulatory standards.

In the Proposed Rule, EPA mentioned that chlorinated dioxins and furans had been detected in samples of ferric chloride from the Delaware Facility. Proposed Rule, at 55759. Although the results were not produced in the Proposed Rule, the sample results from EPA's background technical document, *Titanium Dioxide Listing Background Document for the Inorganic Chemical Listing Determination*, dated August 2000 (the "Listing Document"), demonstrate that any dioxins or furans present in ferric chloride exist at levels far below any levels of regulatory concern. EPA sampled the ferric chloride chemical stream prior to placement in a storage pond at the Delaware Facility. The sample results indicated 2,3,7,8-tetrachloro-dibenzo-p-dioxin (dioxin) at less than .10 ng/L and other dibenzo-p-dioxins and dibenzofurans totaling 1.038 ng/L. See Table 3.21 of the Listing Document. These low concentrations are consistent with EPA's analysis of the formation of dioxins and formation in the chloride-ilmenite process of titanium dioxide manufacturing. EPA concluded that dioxins and furans are more likely to adhere to solid rather than liquid waste streams due to their low volatility and solubility. Listing Document, at 81.

The concentrations of dioxins and furans detected in ferric chloride at the Delaware Facility are significantly below both current and proposed standards for the protection of human health and the environment from these compounds. For example, EPA established a Maximum Contaminant Level ("MCL") under the Clean Water Act for dioxin of  $3 \times 10^{-8}$  mg/L. In addition, in a proposed standard for use of treated sewage sludge resulting from municipal wastewater treatment (e.g. biosolids), also issued under the Clean Water Act, EPA established a limit of 300 ng/L. See 64 FR 72045 (December 23, 1999). Finally, in 1999 EPA added dioxin and dioxin-like compounds to the list of toxic chemicals subject to reporting requirements under Section 313 of the Emergency Planning and Community Right to Know Act of 1986. In a draft guidance, issued in May 2000, EPA proposed requiring reporting for facilities that manufacture, process, or otherwise use 0.1 grams or more of dioxin or dioxin-like compounds on an annual basis. See *EPCRA Section 313: Guidance for Reporting Toxic Chemicals within the Dioxin and Dioxin-like Compounds Category* (May 2000).

Thus, under both current and proposed regulatory standards, dioxin and dioxin-like compounds were detected in ferric chloride from the Delaware Facility at levels far below regulatory requirements. This conclusion supports EPA's decision to not list ferric chloride as a listed RCRA hazardous waste and helps to alleviate some of the concerns expressed by EPA regarding use of ferric chloride as a product.



Response 31-3: See comment 31-2c. We note that the commenter's reference to the Listing Background Document takes our discussion (regarding the adherence of dioxin compounds to solids rather than liquid wastes) out of context, and ignores potential solubilizing effects of the extremely low pH of the ferric chloride acid. As a point of comparison, the ferric chloride dioxin levels are significantly higher than the dioxin levels we measured in wastewaters at the Edge Moor facility (0.00011 ng/L TCDD TEQ) and Johnsonville facility (0.00078 ng/L).<sup>47</sup>

EPA also disagrees with some of the commenter's favorable comparisons of detected dioxin levels to existing Agency risk thresholds. First, the commenter compares the 1.038 ng/L level of dioxin equivalents detected in EPA's ferric chloride sample to the MCL of  $3 \times 10^{-8}$  mg/L. When converted to ng/L, the MCL would be expressed as  $3 \times 10^{-2}$  ng/L, well below the levels measured in DuPont's ferric chloride acid. Second, the commenter inappropriately compares the measured ferric chloride acid concentration to the proposed 300 ppt (equivalent to 300,000 ng/kg) standard for biosolids. We point out that the proposed sludge standard was developed for (1) a solid matrix, and (2) a land application scenario, neither of which are relevant for assessing the potential risks associated with the liquid ferric chloride acid. Finally, the commenter references the TRI reporting limits for dioxin compounds. We point out that, based on our data, the ferric chloride acid would trigger the 0.1 gram reporting limit:  $1.038 \text{ ng/L} \times \text{L/kg} \times 1,100 \text{ kg/ton} \times 185,000 \text{ ton ferric chloride/yr} \times \text{g}/10^9 \text{ ng} = 0.21 \text{ g}$ .

Comment 31-4: Conclusion.

In sum, Eaglebrook supports EPA's decision to not list ferric chloride as a hazardous waste since existing regulatory controls provide protection of human health and the environment. Eaglebrook respectfully requests, however, that EPA clarify and correct any misconceptions created by EPA's comments concerning the legitimacy of ferric chloride as a product when EPA responds to comments during promulgation of the Proposed Rule as a final regulation.

Response 31-4: EPA acknowledges the comment. As stated in the proposal, EPA found metals and dioxins in the ferric chloride material. These findings are a matter of public record. EPA acknowledges that they may raise some questions about the suitability of the material as a product. As discussed in the proposed rule, EPA did not evaluate the legitimacy of use of ferric chloride because it did not need to make such a determination to comply with its consent decree obligations to assess wastes from the titanium dioxide industry, and because it believed that it could not complete such a determination within the consent decree schedule for the rule. The commenter may request a legitimacy determination outside of this rulemaking. These determinations are generally made on a site-specific basis by an authorized State or EPA Region.

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<sup>47</sup>See Table 3.30 in the Titanium Dioxide Listing Background Document for the Inorganic Chemical Listing Determination, August 2000, in the docket for the proposed rule.



## **Comment ICMP-L0001, Color Pigments Manufacturers Association**

Introduction: I am writing on behalf of the Color Pigments Manufacturers Association, Inc. (the "CPMA") to comment on the Proposed Rule, Identification and Listing of Hazardous Waste, Inorganic Chemical Manufacturing Wastes, Land Disposal Restrictions for Newly Identified Wastes and CERCLA Hazardous Substance Designations, 65 FR 55684, September 14, 2000 (the "Proposed Rule"). The CPMA is an industry trade association representing color pigment companies in Canada, Mexico, and the United States. CPMA represents small, medium, and large color pigments manufacturers throughout Canada, Mexico and United States, accounting for 95% of the production of color pigments in North America.

Color Pigments are widely used in product compositions of all kinds, including paints, inks, plastics, glass, synthetic fibers, ceramics, colored cement products, textiles, cosmetics, and artists' colors. Color pigments manufacturers located in other countries with sales in Canada, Mexico, and the United States, and suppliers of intermediates to the color pigments industry are also members of the Association.

The following comments will address the basis for which the Environmental Protection Agency ("EPA") has made listing determinations under the Proposed Rule which appears to have changed considerably from the rationale used for listing azo pigments in EPA's proposed rule of December 22, 1994, and associated policy.

### Comment L1-1: Hazardous Waste Listing Basis

#### Background

In a proposed rule, entitled "Hazardous Waste Management System: Identification and Listing of Hazardous Waste; Dye & Pigment Industries; Hazardous Waste Listing Industries; Hazardous Waste Listing Policy", December 22, 1994, 59 FR 66071, EPA determined to list as hazardous, wastewater and wastewater treatment sludge from the production of azo pigments. The CPMA objected to and submitted extensive comments on the errors EPA made in deriving its conclusions and risk assessment.

CPMA comments covered extensively EPA's inappropriate use of worst-case management systems which are not utilized by the pigment industry, nor could such systems be utilized in light of physical, economic, regulatory and legal restrictions already in place. The use of the incorrect and inappropriate worst-case management systems resulted in a risk estimate that was overstated by many orders of magnitude. This was true, particularly for wastewaters, for which CPMA members do not use unlined impoundments as described by EPA. Additionally, CPMA reviewed in detail the damage incidents cited in the record as contributing to EPA's listing determination in the December, 1994 proposed rule. There were no historic damage incidents cited by EPA which reflected the production techniques

used by modern azo pigment production facilities.

In March of 1997, CPMA submitted supplemental comments discussing the conclusions EPA reached in the dithiocarbamate listing determination following review by the U. S. Court of Appeals for the District of Columbia Circuit (the "Court") in Dithiocarbamate Task v. EPA decided November 1, 1996, Case No. 95-1249. The supplemental comments also discussed the "Hazardous Waste Scoping Study", EPA completed in 1997 as part of its review of listing priorities. Similar to the conclusions reached by EPA in the Proposed Rule, both of these developments supported strongly the comments made by CPMA on the 1994 proposed rule.

### Discussion

The Proposed Rule presents several instances in which the listing determination parameters have been changed significantly from those applied to the 1995 proposed rule. In deciding to list azo pigment wastewaters as hazardous in 1994, the EPA decided to use unlined surface impoundments as a plausible worst-case management scenario. This decision was made even though the vast majority of the industry utilized tank treatment systems for wastewaters discharged to publicly operated treatment works. Only three facilities utilized lined surface impoundment systems. (Of these three facilities, one facility has ceased operation and decommissioned its wastewater system.)

In the Proposed Rule, EPA now states in reviewing an inorganic chemical waste stream that:

"The wastewaters are pretreated on-site in closed tanks prior to discharge to a POTW, which is regulated under the Clean Water Act. We conclude that the existing regulatory controls adequately reduce risks, and there are no exposure pathways of concern. These wastes do not pose a substantial present or potential hazard, and thus do not meet the criteria for listing set out in 40 CFR 261.11(a)(3)." 65 FR 55714/1

The existing regulatory controls cited above for the subject waste stream are identical to the controls which are in place for the azo pigment wastewaters EPA determined to list in the 1994 proposed rule.

Similarly, EPA's analysis of environmental damage incidents in the background documents supporting the 1994 proposed rule were much different than that described in the current Proposed Rule. In the 1994 proposed rule, EPA cited three facilities which manufacture pigments as applicable environmental damage sites. All three of these facilities were large multi-product facilities which had been operating for many years. In all three cases, the historic contamination found on these sites was not related to pigment production.

In contrast, EPA now finds in similar circumstances for all of the inorganic chemical waste

streams reviewed in the Proposed Rule that:

"Most of the [damage] cases found for these industries typical resulted from spills or releases of products, and did not provide any useful information of possible risks presented by the wastes we evaluated for listing. In a few cases we found sites on the Superfund National Priority List (NPL) that included inorganic manufacturing processes. However these sites usually encompassed a variety of chemical manufacturing and mining industries, and it is difficult to attribute the damage reported to the specific inorganic manufacturing wastes under evaluation. Furthermore, contamination at these sites appears linked to historical management practices at closed or inactive manufacturing plants, and these were not useful in assessing current or potential hazards for the wastes at issue. In addition, Federal and State regulatory controls are now in place that would prevent mismanagement. For example, many of the wastes examined in today's proposal are regulated as characteristic waste, and releases or disposal to the land are addressed under the existing RCRA regulations. We did not find any evidence of actual damage cases."  
65 FR 55691/2

The azo pigment sites EPA reviewed for environmental damage in its 1994 proposed rule also encompassed a variety of chemical manufacturing processes. None of the wastes encountered were associated with the manufacture of azo color pigments. Additionally, like the inorganic facilities described above, all of the azo pigment sites where environmental damage was cited were "linked to historical management practices at closed or inactive manufacturing plants" or processes. The sites reviewed by EPA for the support of the 1994 proposed rule should not have been found useful in any way in analyzing the current processes used in the color pigment industry.

We therefore request that EPA revise its earlier listing proposal for dyes and pigments to reflect the changes in policy which appear in several recent proposed rules and court decisions. The wastes listed by EPA in the 1994 proposed rule are not typically or frequently hazardous. A correct application of listing rules and policies would not find these wastes sufficiently hazardous to warrant listing. EPA's listing determinations for organic pigments should, therefore, be withdrawn, since existing management systems for these wastes are more than protective of public health and the environment.

Response L1-1: The issues addressed in the commenter's submission are beyond the scope of the Inorganics listing determination rulemaking. The commenter also submitted this set of issues to the dyes and pigment listing docket. The comments raised here will be addressed in future dyes and pigment rulemakings.

**Comment ICMP-L0002, Kerr McGee**

Introduction: Kerr-McGee Chemical LLC ("Kerr-McGee") hereby submits these additional supplemental comments to its supplemental comments submitted on November 13, 2000 regarding Detection of CDDs and CDFs and Possible Re-assessment of Bevill Exemption Status. In those comments, Kerr-McGee stated that it had not yet received the chain-of-custody report for the CDD/CDF sample and field blank for Kerr-McGee's Hamilton, Mississippi plant. As those comments were en route to be filed, Kerr-McGee received on November 13 the enclosed chain-of-custody reports for the CDD and CDF sample and other information from EPA. No chain-of-custody documentation was received for the field blank sample.

Comment L2-1: Kerr-McGee notes that the chain-of-custody report consists of two separate reports (the first lab to receive the sample initiated a new report) rather than one report running from the time the sample was taken until analysis was undertaken. Also, the second chain-of-custody report is missing one signature, and the handwriting is so similar across the relinquished/receipt line that one questions whether the same person entered all three entries. Deviation from chain-of-custody protocols injects an additional level of caution in using the data. Moreover, over three months elapsed between when the sample was taken (8-10-99) and when it was received by the lab that performed the analysis (11-18-99). In addition, temperature was not recorded on the APPL chain-of-custody report No. 5535 for sample 82713/KM-51-01, and is required for analysis of samples of this type. These issues regarding the handling of the sample raise questions as to the validity of the analysis.

Response L2-1: We decided to add the analyses of polychlorinated dibenzo-p-dioxins and furans (PCDDs/PCDFs) after the original Sampling and Analysis Plan (SAP) was prepared because we suspected that PCDDs/PCDFs may be present. A sub-aliquot of an original sample delivered to our contract laboratory (APPL) on August 10, 1999 was separated into a second container by APPL and delivered to PACE laboratory in November 1999. It is therefore appropriate for two separate chain-of-custody documents (COCs) to exist, one that accompanied the original samples and another for a sub-sample delivered from the first receiving laboratory (APPL) to the second analytical laboratory (PACE). Both COC forms recorded all required information and were properly signed by laboratory personnel who relinquished and received that sample. The date and time of their signatures were also entered on the form. All sample handling and shipment information were properly documented in the two COC forms. We see no problem in using two COC forms to substantiate the transfer activities of that particular sample. The sub-aliquot sample was transferred directly from APPL to Pace via FedEx, the signature box to be signed by the second relinquisher therefore did not need to be completed.

As stated previously in our response to comment 8-8b (Kerr McGee), the Agency removed the PCDD/PCDF holding times from Update IVB of SW-846 Chapter Two in November 2000. Previously, Update IVA Chapter Two drafted in January 1998, listed the holding times as 30 days until extraction and 45 days after extraction. The current version of Method 8290A also references the 30/45 day holding times in Section 6.4. However, there is a note following Section 6.4 which

states: "The holding times listed in Sec. 6.4 are recommendations. PCDD's and PCDF's are very stable in a variety of matrices, and holding times under the conditions listed in Sec. 6.4 may be as high as a year for certain matrices." Also it is important to note that even if the holding times were a concern due to the potential volatility and degradation of PCDDs/PCDFs, the reported results are still valid and would be considered minimum concentrations. Unless the samples were subjected to incineration-like heat during storage, it is highly unlikely PCDDs/PCDFs could have been produced during sample storage.

APPL typically records the sample cooler temperatures on a sample log-in check-list rather than the COC. This documentation is included with the final data report. The laboratory sample receiving temperatures are also reported in the final Analytical Data Reports prepared by SAIC.

In summary, we continue to believe that the PCDD and PCDF data in the Hamilton Data Report are valid and can be relied upon by EPA. Analysis of waste samples collected from other titanium dioxide producers also confirms the presence of PCDD/PCDF in wastes generated from manufacturing of titanium dioxide.

Comment L2-2: Kerr-McGee also requested audit reports on APPL and Pace Analytical. EPA's November 13, 2000 transmittal of this report states: "With regard to an audit report, the last audit of APPL was conducted in the early 1990s for a different project focusing on organic chemicals. It would not be of much assistance to you." The lengthy interval between APPL's metal analyses and the last audit report is an additional reason for treating these data with caution. EPA's November 13 transmittal does not mention Pace Analytical, nor was any audit information on Pace received. According to the "SAMPLING AND ANALYTICAL DATA REPORT FOR RECORD SAMPLING AND CHARACTERIZATION OF WASTES FROM THE INORGANIC SODIUM CHLORATE AND TITANIUM DIOXIDE MANUFACTURING SECTORS - Kerr-McGee Corporation (Hamilton, Mississippi) - August 10, 1999", Pace Analytical performed the CDD/CDF analyses. For these and the other reasons cited in Kerr-McGee's November 13 comments, the CDD/CDF data for the Hamilton plant should not be relied upon by EPA.

Response L2-2: Although we did not audit APPL or Pace Lab's for the Inorganic Chemicals Listing project, we have confidence in their qualifications and experiences performing analyses required for this project. Both APPL and PACE are frequently audited by government and commercial organizations as part of certifications they maintain for various analytical programs including the Air Force, Navy, and Army Corps of Engineers. As part of the certifications the laboratories are also required to analyze performance samples and report their results within acceptable ranges. The laboratories can also supply a list of applicable certifications from their current Qualification Statements. In addition, if necessary, copies of more current and appropriate audit reports along with performance sample analyses can be obtained from the laboratories.



**Comment ICMP-L0003, DuPont**

Comment L3-1: Pursuant to EPA's Notice of Proposed Rulemaking, appearing in the September 14, 2000 Federal Register (65 FR 55684) regarding the "Identification and Listing of Hazardous Waste: Inorganic Chemical Manufacturing Wastes," E. I. du Pont de Nemours and Company (DuPont) submitted comments on November 13, 2000 and indicated that the data validation package for our extensive sampling and analysis program would be forthcoming. The enclosed volumes provide the analytical results for these sampling programs following completion of data validation by Environmental Standards, Inc. of Valley Forge, PA. These materials supplement the data presented in Attachment 5.1.3-B of DuPont's November 13, 2000 submission (Docket No. 00022).

Volume 1 incorporates, in tabular form, all the corrections in results, minimum detection limits (MDLs), and reporting limits (RLs) determined by Environmental Standards, Inc. during validation of the 209 analyses of the 122 process samples plus QA/QC blanks. These data are presented in the same order as the initial unvalidated results provided in DuPont's November 13, 2000 comment submission. In general, the only changes to the dataset that have occurred as a result of validation, as reported in the Volume 1 summary, are the MDLs for some samples. The net effect of the changes in MDLs is that several previous results which were estimated between MDL and RL have been redesignated as nondetects. For ease of interpretation of the tables in Volume 1, the entire validated result for a given sample is presented in the right-most four columns. The entries in any of the left four columns represent changes from the data submitted on November 13, 2000. As noted above, the majority of these entries are MDL or qualifier entries.

The subsequent volumes provide details related to the data quality analysis of wastewater treatment sludge for each sampled impoundment, for each sampled process solids stream, or for each sampled wastewater stream. These volumes are organized as follows:

- Volume 1: Summary of all revisions in results, MDLs, and RLs from the November 13, 2000 submission
- Volume 2: Equalization Pond - Johnsonville
- Volume 3: Settling Pond - Johnsonville
- Volume 4: Hillside Pond - Johnsonville
- Volume 5: Equalization Basin - DeLisle
- Volume 6: Disengagement Basin - DeLisle
- Volume 7: Iron Rich - filter cake samples - Edge Moor
- Volume 8: Wastewater treatment sludge samples - Edge Moor
- Volume 9: Wastewater stream samples - Johnsonville
- Volume 10: Wastewater stream samples - DeLisle
- Volume 11: Wastewater stream samples - Edge Moor

Each volume is organized into 5 sections as follows:



- Section 1: Quality Assurance Review - Summary of the conclusions drawn about the dataset
- Section 2: Target Analyte Summary - Tabular presentation of all validated results for the dataset
- Section 3: Inorganic Data Support, Documentation - Raw laboratory data upon which the validation is based
- Section 4: Laboratory Case Narratives and Project Chain-of-Custody Records - Information pertaining to analyses or calculations performed or not performed by the laboratories and the rationale for such decisions
- Section 5: Project Correspondence - Clarifying correspondence between Environmental Standards, Inc. and the laboratories on analytical procedure or result questions.

DuPont submits that this validated dataset better represents the wastewater sludge and process solids streams for the constituents of concern as identified by EPA, as well as the wastewater streams potentially associated with generation of wastewater sludge, than the much smaller EPA dataset upon which the proposal is based.

Response L3-1: Please see EPA's background document *Assessment of DuPont's Analytical Data: Background Document for the Inorganic Chemical Listing Determination* (October 2001) for our detailed review of DuPont's data.

**Comment ICMP-L0004, DuPont**

Comment L4-1: Pursuant to EPA's Notice of Proposed Rulemaking, appearing in the September 14, 2000 Federal Register (65 FR 55684) regarding the "Identification and Listing of Hazardous Waste: Inorganic Chemical Manufacturing Wastes," E. I. du Pont de Nemours and Company (DuPont) submitted comments on November 13, 2000 and indicated that final groundwater modeling and thallium soil-water partition coefficient ( $K_d$ ) laboratory study reports would be forthcoming. The enclosed volumes provide these two reports and supplement comments in sections 7.7 and 7.6 of DuPont's November 13, 2000 submission (Docket No. 00022).

The enclosed groundwater modeling study report by HSI GeoTrans demonstrates that restricted uses for the placement of Iron Rich™ in an industrial corridor adjacent to the Edge Moor, DE plant are environmentally protective with respect to manganese and thallium. Additionally, evaluation of EPA's high end modeling suggests that land-based management of Iron Rich™ over the 100-mile radius considered by EPA would not pose unacceptable risk due to manganese or thallium when an incompatibility between parts of the saturated zone flow model used by EPA is resolved or when the behavior of metals in the subsurface is more fully considered. While the saturated zone flow model incompatibility discussed by HSI GeoTrans concerns the numerical solution approach used in the version of EPACMTP used by EPA for the proposed rule, we understand that related 1995 and 1990 Science Advisory Board (SAB) reviews of this model concentrated on the analytical solution for saturated zone flow modeling and therefore this incompatibility issue may not have been addressed by the SAB.

Response L4-1: EPA has reviewed the commenter's ground water modeling analyses that supplement their comments they submitted during the public comment period. As discussed elsewhere (see EPA's response to comments 22-7d and 22-7g), EPA does not agree with aspects of the commenter's characterization of the hydrogeology of the industrial corridor nor with the commenter's proposed modifications to the EPACMTP model related to the incompatibility issue. Moreover, DuPont has now stated it no longer intends to market the waste material as described in its comments. This indicates that the material will likely be disposed outside the industrial corridor. For all of these reasons, EPA continues to be concerned about the potential risks associated with management of the waste.

Concerning the Science Advisory Board (SAB) reviews of the EPACMTP model, the 1990 review (EPA-SAB-EEC-90-009) was conducted to assess various technical aspects of the 3-dimensional transport code. Based on the SAB recommendations, the CANSAZ (Combined Analytical-Numerical SATurated Zone) code was modified and utilized as the main component of the saturated zone flow and transport module within EPACMTP. The 1995 review (EPA-SAB-EEC-95-010) was conducted to evaluate the EPACMTP model in several specific areas, one of which was a regional site-based Monte-Carlo methodology using hydrogeologic environments. In this approach, the saturated zone hydrogeologic parameters are correlated with one another using data from a data base (HGDB) of site-specific data. The SAB concluded at that

time that the regional site-based methodology was an improvement over the previous national. (EPA notes, however, that the SAB was not asked to review the model's treatment of infiltration and recharge and the SAB did not comment on the specific issue raised by the commenter.)

Comment L4-2: The  $K_d$  study report presents thallium  $K_d$  data for a range of soils, including one representative of the dredge spoils in the overburden of the Iron Rich™ industrial corridor. The lab study confirms that the thallium  $K_d$  increases as dissolved thallium concentration decreases. Centre Labs refers to GLP in their test protocol in the overall report because, unlike the DuPont-sponsored thallium study, many of their soil adsorption studies are conducted to meet FIFRA requirements. However, since these  $K_d$  results are intended for RCRA, rather than FIFRA use, not adhering to strict FIFRA GLP requirements should not affect the usability of the results from Centre Labs. The study is summarized and its results are presented in the initial 17 pages of the first volume of the 3-volume report from Centre Labs. The remainder of the 3-volume report is supporting information, including raw analytical output. The Centre Labs data, relating to the groundwater modeling study, are further summarized in Appendix F of the groundwater modeling report.

Response L4-2: EPA acknowledges receipt of the report of the Center Labs study and appreciates the commenter's efforts in undertaking such a study and helping address an important gap in the scientific understanding of the soil-water partitioning behavior of thallium. The study was well designed and implemented and was generally done in accordance with available guidance for conducting such studies. Noteworthy is the study's finding that the soil-water distribution coefficient ( $K_d$ ) for thallium increases with decreasing concentration.

The Centre Labs data indicate that at low concentrations (e.g., on the order of 0.01 mg/L), thallium  $K_d$ 's lie within the upper end of the range used in the risk assessment for the proposed rule. Specifically, the data indicate that the  $K_d$ 's range from >300 to ~800 L/kg, while the  $K_d$  values used in the modeling for the proposal ranged from 1 to 1,000 L/kg, with a median of 30 L/kg. At higher concentrations (e.g., on the order of 0.3 mg/L), the  $K_d$ 's range from ~140 to ~320 L/kg, depending on the particular soil matrix (see Figure F-1 in DuPont's January 15, 2001 modeling report).

In subsequent comments, DuPont provided the results of a Monte Carlo run of the EPACMTP ground water model using a  $K_d$  of 300 L/kg. Compared to EPA's original Monte Carlo ground water model run for the Iron Rich material, the 10<sup>th</sup> percentile DAF (dilution and attenuation factor) for thallium increased from 3.9 to 119, a 30-fold increase. In its January 15, 2001 submission, DuPont identified one of the three soil matrices analyzed in the Centre Labs study as being particularly comparable to the soils in the vicinity of the Edge Moor facility (i.e., the Baptistown, New Jersey loam). However, graphical analysis of the measurement data indicates that at a concentration level corresponding to EPA's TCLP value (i.e., 0.28 mg/L) the thallium  $K_d$  for the Baptistown loam is approximately 200 L/kg. (See Figure F-1 in DuPont's January 15, 2001 modeling report.) Had DuPont used this value for  $K_d$  in its Monte Carlo analysis, the resultant DAF would have been lower than 119. Furthermore, data for another soil matrix (i.e., the Lyngge, Denmark sandy loam) shows an even lower  $K_d$  (~140 L/kg) at this concentration level. A  $K_d$

value this low would result in yet lower modeled DAF's. Given the variability typically seen in the soil-water partitioning behavior of metals, EPA believes the full range of  $K_d$  measurements are relevant to any assessment of the mobility of thallium in the subsurface environment.

Comment L4-3: Comments submitted by DuPont on November 13, 2000 were based on preliminary groundwater modeling results more extensively described in this groundwater modeling report and on the initial results of the laboratory study for thallium  $K_d$ .

Key observations and conclusions from the modeling and data analysis in support of related DuPont comments are as follows:

- Groundwater in the area of planned uses of Iron Rich™ flows primarily toward the Delaware and Christina Rivers.
- Tidal attenuation ensures that worst-case groundwater manganese concentrations would not cause exceedance of surface water quality criteria for manganese.
- Modeling comparable to worst-case groundwater modeling used in the Inorganic Chemical Manufacturing proposal indicates that actual chloride-ilmenite wastewater treatment sludges would screen out from listing for manganese and thallium.
- Groundwater modeling using location-specific factors for the industrial corridor adjacent to the DuPont Edge Moor, DE plant where DuPont commits to restrict land-based uses of Iron Rich™ results in manganese dilution attenuation factors (DAFs) an order of magnitude higher than EPA's high end modeling. When the saturated zone flow modeling incompatibility is discounted, manganese and thallium DAFs for this industrial corridor increase by several orders of magnitude.

Response L4-3: As indicated previously, Du Pont has now stated it no longer intends to market the waste material as described in its comments and that the material will be disposed outside the industrial corridor. Therefore, the particular site-specific conditions in the corridor area, including its proximity to the tidal waters of the Delaware River Estuary and the Christina River, is not indicative of contaminant fate and transport and potential risks posed by management of the waste elsewhere. In addition, note that EPA is deferring our decision on manganese. Please see section IV.B. of the preamble for further clarification.

#### Tidal attenuation of ground water concentrations

The above notwithstanding, EPA has scientific and technical concerns with the commenter's assessment of the impact of tidal attenuation on contaminant concentrations in ground water. Specifically, the methodology as described by the commenter applied, is likely to over estimate DAF's and, therefore, under estimate metals concentrations because a) steady-state conditions are not reached and b) the transport equation used does not account for the change of storage due to the fluctuation of water table, as explained below.

Steady-state conditions are not reached

The model developed for Holocene deposits/dredge spoil materials overlying the Columbia formation is a one-dimensional transport model for a constant source located at a fixed distance from a discharge boundary (i.e., the rivers adjacent to the industrial corridor). Two distances, 50 and 100 feet, were used for the transport simulations. Other parameter values used in the analysis are also shown in the table. Based on the parameters given in the table, it is possible to determine the time required for a fluid particle to travel from the source to the discharge point. In actuality, the time required to reach steady-state concentrations may be much longer than the calculated first arrival times of fluid particles from the source.

Maximum simulation periods are also listed in table. For the dredge spoils, the maximum simulation periods were 18 years for Scenario 2a and 137 years for Scenarios 2b and 2c. These periods are much shorter than the time required for respective maximum concentrations to appear at the discharge boundary. Therefore the DAF's for Scenarios 2a, 2b, and 2c are likely to be substantially overestimated.

Scenario	Scenario 2a Transport through Dredge Spoils	Scenario 2b Transport through Dredge Spoils	Scenario 2c Transport through Dredge Spoils
Parameters			
Domain length, distance to discharge point (ft)	100	50	50
Depth of aquifer (ft)	30	30	30
Porosity	0.3	0.3	0.3
Hydraulic conductivity of aquifer (ft/day)	0.0283	0.0283	0.00283
Hydraulic gradient	0.01	0.01	0.01
Maximum simulation time (yrs)	18	137	137
DAF at the end of simulation	6,636	2,656	10,423
Calculated soonest arrival time of maximum concentration (yrs)	290.4	145.2	1,452

The transport equation does not account for storage due to a fluctuating water table

The one-dimensional vertically integrated transport equation (Equation (6) in Yim and Mohsen (1992)) on which the calculation of DAF's is based, is formulated for a flow situation in which the change of storage (water volume in the pore space in a vertical water column) due to the fluctuation of piezometric surface is almost negligible. However, a transport equation which does not account for the change of storage due to the fluctuation of water table tends to artificially dilute chemical concentrations, thereby overestimating DAF's at the exit point.

A transport equation which accounts for the change in storage, due to transient motion of piezometric surface, is given by:

$$\frac{\partial (Bn_e + Sh)C}{\partial t} = -\partial \frac{Bn_e CV}{\partial x} + \frac{\partial [(Bn_e)D \frac{\partial C}{\partial x}]}{\partial x} \tag{1}$$

This equation is very similar to the following equation:

$$\frac{\partial (Bn_e)C}{\partial t} = -\partial \frac{Bn_e CV}{\partial x} + \frac{\partial [(Bn_e)D \frac{\partial C}{\partial x}]}{\partial x} \tag{2}$$

where:

- $C$  = contaminant concentration
- $B$  = aquifer thickness
- $S$  = storage coefficient
- $h$  =  $h(x, t)$ , the rise and fall of piezometric surface from its mean position at  $x$  and  $t$
- $V$  = groundwater velocity
- $D$  = dispersion coefficient
- $x$  = distance from the river bank
- $t$  = time
- $n_e$  = effective porosity

Equation (2) is essentially Equation (6) in Yim and Mohsen (1992) multiplied throughout by  $B n_e$  to facilitate a direct comparison with Equation (1). The only difference between the two equations is the storage term on the left hand side which accounts for the tidal movement. Equation (1) is derived from the principle of mass conservation (Bear 1972) and integrated vertically over the thickness of the aquifer. The aquifer is assumed to be confined which is consistent with the assumption of Todd (1959) and Yim and Mohsen (1992). The above equation may be applicable to unconfined aquifers when  $h \ll B$ . By accounting for the change of storage as shown in Equation (1), no artificial dilution is allowed during the falling tide period. In addition, clean water is not allowed to travel too far upgradient from the bank during the rising tide period.

The value of the storage coefficient in the transport simulation was 0.15 and the tidal range was 5.2 feet. Therefore, the change of storage caused by the transient tidal motion is not insignificant and should not be excluded from the transport equation. Equation (6) of Yim and Mohsen (1992)



ignores the change in storage due to transient tidal motion, thus, leading to artificial dilution of contaminant concentrations.

#### Saturated flow modeling

EPA has examined the saturated zone flow modeling incompatibility issue raised by the commenter. EPA acknowledges the potential for inconsistencies to exist between values specified for infiltration and recharge and the hydraulic properties of the aquifer using the regionalized approach to ground water modeling. However, despite its limitations, EPA believes the regionalized approach is appropriate for modeling ground water transport, particularly as concerns off-site management.

As discussed in detail below, the commenter's proposed approaches fall short on technical grounds.

#### Non-mounding procedure violates laws of physics

The commenter's "non-mounding" procedure eliminates recharge (i.e., infiltration of ground water beyond the bounds of the waste management unit) to make the groundwater velocity along the major flow direction as close as possible to the regional gradient-based velocity. In addition, the procedure reduces infiltration of leachate by a factor of  $F$  and, to compensate for this reduction, decreases the retardation factor for the vadose zone by the same factor ( $F$ ). Furthermore, the procedure then increased concentrations at receptor wells by the factor  $F$  to compensate for the decrease in contaminant flux at the water table because of the decrease in infiltration rate. A value for  $F$  of 20 was assumed without further justification.

The weakness of this procedure is that the application of the  $F$  factor and assumptions are arbitrary and unrealistic. Elimination of recharge contradicts the fact that recharge does occur in the area. The report, *The Availability of Groundwater in New Castle County, Delaware*, published by the University of Delaware in 1971 states that nearby annual recharge to the Columbia aquifer is approximately 21 inches (0.53 meters/ year or 1,000,000 gallons/ day/ square mile). (For comparison, the recharge rate used by EPA in the risk assessment for the proposed rule to represent the 100-mile radius region centered on the Edge Moor facility ranged from 0.16 to 0.26 meters per year, which is in reasonable agreement with this report.)

Also, arbitrary increases and decreases of parameters in the model are not consistent with the physical principles on which EPACMTP is based. If the original retardation factor for the vadose zone (calculated from the partition coefficient, solid density, porosity, and water saturation) for a metal is 12, for example, then using  $F = 20$  results in a retardation factor of 0.6, which is not physically possible (a retardation factor below unity leads to the calculation of a negative amount). Even if the resulting retardation factor is greater than one, mass distribution in the vadose zone (in the solid and aqueous phases) no longer reflects a distribution consistent with the partition coefficient.

As explained elsewhere, EPA chose a different approach for addressing the mounding issues that

DuPont identified.

DAF's are based on metal decay assumptions

The commenter used decay constants to simulate recharge dilution. The use of decay constants to incorporate the dilution effects due to recharge is not supported by the laws of physics. Metals do not decay and cannot be destroyed. Assuming metals do decay destroys contaminant mass in a manner that compounds over the time period of the simulation, thereby violating conservation of mass.

In addition, using a decay constant to incorporate the dilution effects due to recharge is not supported by the physics of transport in a three-dimensional porous medium. The use of a decay constant decreases the contaminant concentration throughout the saturated thickness. Recharge normally enters the water table vertically and tends to push the contaminant plume vertically downward towards the bottom of the saturated zone. It does not dilute the plume appreciably; instead, the increased vertical depth enables the plume to disperse and diffuse to a greater extent than when recharge is absent.

The commenter states that the decay constant is based on the following equation:

$$\frac{\partial V_i}{\partial x_i} = \frac{I}{T} ; i = 1, 2, 3$$

where

- $V_i$  = groundwater velocity in the direction of  $x_i$
- $x_i$  = Cartesian coordinates in the i-th direction ( $x_1, x_2, x_3$  correspond to x, y, and z, respectively)
- $I$  = infiltration rate
- $T$  = saturated thickness.

However, the above equation contradicts the principle of mass conservation which, for homogeneous incompressible fluid (fluid with constant density), states:

$$\frac{\partial V_i}{\partial x_i} = 0 ; i = 1, 2, 3$$

The above equation holds for water as it is almost incompressible and water density in a shallow aquifer may be regarded as constant.

Procedure for limiting infiltration/recharge produces unrealistic inputs

The commenter also tries a second approach in which the recharge and infiltration rates are capped in order to prevent mounding and unrealistic flow conditions. In this approach, if the integrated vertical flux per unit width of aquifer from the upgradient end of the waste management

unit to a receptor well location,  $I(X_W + X_{WELL})$ , is greater than the regional gradient flux per unit width of aquifer,  $K I_{RG} Z_b$ , then the infiltration and recharge rates are given by:

$$I = R_{factor} \frac{K I_{RG} Z_b}{X_W + X_{WELL}} ; R = I$$

where:

- $I$  = infiltration rate
- $R_{factor}$  = recharge factor which can vary from 0 to 1
- $K$  = aquifer hydraulic conductivity
- $I_{RG}$  = regional groundwater gradient
- $Z_b$  = saturated thickness
- $X_W$  = waste management unit dimension along the major flow direction
- $X_{WELL}$  = distance to receptor well from the downgradient edge of waste management unit along the major flow direction
- $R$  = recharge rate

These conditions were incorporated in EPACMTP and the model was run with  $R_{factor} = 0.2, 0.5,$  and 1.0.

Using these modifications, EPA generated a distribution of recharge rates with  $R_{factor} = 1$ , which implies that the recharge and infiltration rates are kept at 100% of the well-distance-weighted regional flux. A comparison of EPA's original recharge distribution used in the risk assessment for the proposed rule and the commenter's recharge distribution is presented in the following table.

Value	Original Recharge Distribution (m/ yr)	Recharge Distribution with $R_{factor} = 1$ (m/yr)
Minimum	0.164	0.0000366
10th Percentile	0.201	0.000945
25th Percentile	0.201	0.00407
50th Percentile	0.201	0.0380
75th Percentile	0.261	0.201
90th Percentile	0.261	0.210
Maximum	0.261	0.261

It can be seen from this table that imposing these conditions results in unrealistic recharge rates for

both the industrial corridor and for the 100 mile radius region. For example, the median recharge rate of 0.038 m/ yr is more than an order of magnitude lower than the University of Delaware value of 0.53 m/yr mentioned above and is well below the HELP model-generated values used in EPA’s ground water modeling analysis.

Alternative screening approach shows minimal effect on DAF’S

EPA applied a simple screen to the ground water model input data to eliminate physically unrealistic combinations using the water table elevation in relation to the ground surface as a criterion. Specifically, if the sampled combination of hydrogeologic parameters results in a model-generated water table that is higher than the ground surface elevation, that combination is rejected and another combination of parameters is sampled from the hydrogeologic database.

To measure the impact of unrealistic parameter combinations on the model results, EPA applied the screen to the modeling of ground water transport of thallium for the waste. The results are shown in the following table.

Metal	DAF <sub>2.5</sub>	DAF <sub>5</sub>	DAF <sub>10</sub>	Remarks
Thallium	2.07	2.63	4.03	Screened
	1.97	2.58	3.91	Unscreened

The table compares the 2.5<sup>th</sup> , 5<sup>th</sup>, and 10<sup>th</sup> percentile DAF’s (which correspond to the 97.5<sup>th</sup> , 95<sup>th</sup>, and 90<sup>th</sup> percentile receptor well concentrations, respectively) for the original and screened results. For thallium, the differences between the DAF’s based on screened and unscreened combinations are small. (EPA notes that, due to the number of combinations that screened out, the unscreened results are based on 10,000 realizations whereas the screened results are for 2,700 realizations.)

EPA concludes that, with realistic recharge rates (consistent with published values) and hydrogeologic parameters that are compatible with these rates of recharge, the lower percentile DAF’s (or conversely, the upper percentile ground water concentrations) are not greatly affected for the set of conditions of interest for this waste.

Comment L4-4: DuPont hereby submits an original and two (2) copies of these supplemental comments. This submission totals three (3) boxes (1 box per comment set). DuPont understands that EPA will consider these supplemental materials as part of DuPont’s timely filed comments on this proposed rulemaking.

Response L4-4: EPA wrote a letter to DuPont on January 23, 2001 clarifying that the Agency considered the comments late but that we would make every effort to review them.

Comment L4-5: DuPont would appreciate the opportunity to review the groundwater modeling report with EMRAD given the significance of our EPACMTP model findings to the

Inorganic Chemical Manufacturing rulemaking, as well as to other ongoing EPA regulatory initiatives that make use of the EPACMTP model. DuPont is interested in working with EPA to improve the EPACMTP model as well as the model input information for metal partition coefficients.

Response L4-5: EPA met with Du Pont on February 23, 2001 to discuss their ground water modeling analysis. EPA asked a number of questions of Du Pont and inquired about the availability of additional information pertaining to a number of issues, including issues relating to the hydrogeology of the industrial corridor and the thallium soil-water partitioning study. Subsequently, Du Pont submitted additional information on these topics. (See the docket for the final rule.) The discussion also covered Du Pont's proposed modifications to EPACMTP to address the incompatibility issue mentioned previously.

Comment L4-6: In the Federal Register notice (p. 55762 - 55763), EPA notes the following in reference to Iron Rich™ :

The TCLP results for this waste indicate even higher mobility of metals than those modeled for the industrial landfill scenario using the SPLP. The TCLP concentrations for manganese and thallium exceed the SPLP levels by factors of 15-fold to 23-fold, respectively. We expect, therefore, that HQs resulting from disposal in a landfill with municipal waste would like be higher by an order of magnitude than the industrial landfill scenario we modeled.

However, using a municipal landfill scenario would also necessitate consideration of the municipal landfill's liner as part of the conceptual model since (pursuant to 40 CFR 258) active municipal landfills reasonably expected to receive this material would be expected to meet regulatory liner standards. Previous modeling experience with modeling landfills that have 40 CFR 258-equivalent composite liners (as part of evaluation of EPA's June 1999 draft Industrial Waste Management Evaluation Model) indicates very high DAFs for composite-lined landfills (HSI GeoTrans, 1999). Therefore, HQs for municipal landfill disposal are expected to be much lower than those computed by EPA for its worst-case industrial landfill scenario.

Response L4-6: EPA has promulgated regulations governing the design and operation of municipal landfills (see 40 CFR Part 258). However, we chose to model a landfill without the full liner system described in the regulations, because it is reasonable to assume that many landfills now and in the future may not have composite liners. The design criteria in 258.40 apply only to new units or lateral expansions of existing units. Existing landfills (i.e., those in existence prior to the effective date as defined in §258.1(e)) do not have to meet the design requirements in §258.40 (e.g., liner systems). Furthermore, the regulations allow exemptions from the standards depending on the location and size of the landfill (Section 258.1(f)), and States may approve alternative designs for new units or lateral expansions based on performance standards (§258.40(a)(1)). For example, the Delaware Solid Waste Authority (DSWA) operates a landfill near DuPont's Edge Moor plant ("Cherry Island" landfill) that does not have a composite liner

system with a synthetic liner for its active units. Given the existing exemptions in the regulations, and the uncertainty in how many landfills have liner systems, we believe it is prudent to base our modeling on landfills without a liner.<sup>48</sup>

Another reason the modeling of unlined landfills appears prudent is because industrial wastes also can go to unlined landfills that do not take municipal waste (i.e., industrial nonhazardous waste landfills), and thus would not be subject to those standards. We are unaware of any legal requirement that these wastes could not go to such non-municipal waste landfills. Given the similarities in the disposal practices (municipal and industrial nonhazardous waste landfills), we believe that an unlined landfill scenario is reasonable.

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<sup>48</sup>Furthermore, even if a liner system was present at a landfill and such a liner was approximately 90 % effective in reducing the concentration of constituents of concern at a drinking water well, the levels would still present HQs of concern (i.e., greater than 1). For example, reducing the 95th percentile HQs for children by a factor of 10 would still leave an HQ of 3.7 for thallium.



## **Comment ICMP-L0005, Cookson**

### Summary

The Cookson Group plc (Cookson) presents these additional comments regarding inclusion of “blast furnace slag” within the definition of “slag from the production of antimony oxide” in the proposed hazardous waste listing under the Resource Conservation and Recovery Act (RCRA). 65 FR 55684 (September 14, 2000). Although the slag generated in the blast furnace process at the former Cookson facility in Laredo, Texas could be described as “slag from the production of antimony oxide”, the Laredo blast furnace slag is generated in a different process, covered under a separate NAICS/SIC Code, and possess different physical and chemical properties than the processes and wastes studied by EPA in support of its rulemaking. In addition, the costs to manage the Laredo blast furnace slag as hazardous waste were not considered by EPA in formulating the rulemaking. For these reasons, the administrative record does not support the inclusion of the Laredo blast furnace slag in this rulemaking. Along with the additional information presented below, Cookson is providing the additional cost information at the request of Ms. Sue Burnell, the EPA staff coordinating the listing process.

### Introduction

Cookson is the former owner of an antimony blast furnace in Laredo, Texas (the “Laredo Site”), where certain slag materials from historic operations are present. As discussed further below, the process utilized in generating the Laredo blast furnace slag differs significantly from the processes studied by EPA in this rulemaking. The distinct processing technique results in slag which contains significantly lower levels of antimony, lead and arsenic than those studied by EPA. Because of the much lower contaminant levels, had a risk assessment considering the Laredo blast furnace slag been performed, we do not believe that risks to human health or the environment would be indicated, thereby undermining the primary rationale for EPA’s listing. In addition, EPA has not considered the costs of treatment/disposal of the historic accumulation of the Laredo blast furnace slag, thereby underestimating the costs of its proposed rulemaking. In order to remedy the deficiencies in the administrative record for the proper listing of wastes from the primary smelting of antimony-bearing materials, EPA must either provide an exclusion from the hazardous waste category for these materials, or provide some justification in the administrative record for the inclusion of these waste materials in the rulemaking.

Comment L5-1: Inclusion of Costs for Regulation of the Laredo Blast Furnace Slag Increases the Costs of the Regulation by \$26 to \$32 million

At the request of Ms. Sue Burnell of EPA, Cookson’s environmental consultant, Arcadis G&M, has estimated the costs for management of slag from the former Anzon, Inc. facility in Laredo Texas assuming the proposed hazardous waste listing does and does not apply to the

material. It is currently estimated that 75,000 cubic yards (cy) of blast furnace slag material is present in a pile at the Laredo Site. In addition, it is estimated that an additional 75,000 cy of soils contaminated with blast furnace slag may be present within the plant process area. Based on the "mixture and derived from rule" (40 CFR 261.3(c)(2)) this contaminated soil may be considered a hazardous waste, should the listing be finalized in its present form.

Attached as Exhibit A is a breakdown of the costs to continue to recycle the slag as a non-hazardous waste under the existing Texas Natural Resources Conservation Commission (TNRCC) rules and for disposal of the material as hazardous waste. Current TNRCC rules allow the waste to be utilized beneficially, with adequate assurances of protection of the environment. The total estimated cost to excavate, crush and market the material is estimated at \$3 to \$4 million. These costs may be partially or totally off-set by revenues generated from the sale of the material.

In contrast, should the proposed listing be finalized in its present form, the estimated cost to excavate, crush, load, transport, treat and dispose of the Laredo blast furnace slag and associated soils is between \$32.9 and \$40.5 million. (See Exhibit A.) Because EPA did not consider the Laredo blast furnace slag in its study of the industry, the additional \$32.9 to \$40.5 million cost to dispose of the Laredo blast furnace slag was not considered in the rulemaking process. See generally USEPA, Economic Analysis for Listing of Inorganic Chemicals, Notice of Proposed Rulemaking, July 2000.

EPA estimates in support of the rulemaking indicate that the annual economic impact of its rulemaking on a typical facility would be \$13,423 to treat and dispose of the newly proposed waste as hazardous waste, or \$1,157 to recycle it. The recycling option considers that 15% of the material is recovered as antimony; obviously this is not possible in a slag that averages 1.5% antimony. Indeed, the only reason the Laredo blast furnace slag was disposed of was because all recoverable antimony had been removed. Given the quantity of the material and estimated costs for disposal of the Laredo blast furnace material, it is clear that EPA did not consider this material in formulating its proposed rule.

Response L5-1: The Laredo facility was one of four facilities evaluated during the proposal. At the time of the proposal, the facility was owned by a company called Great Lakes Chemical Corporation (GLCC). GLCC purchased the facility from Anzon, Inc in 1997. Cookson is the parent company of Anzon. Cookson retained cleanup liability for the slag pile and potentially other areas of the facility as well. GLCC completed a §3007 survey in 1998 on their operations at the facility for the Inorganics listing determination. The survey response from GLCC makes brief mention of the blast furnace operations which were closed in 1993. However, the survey response neglected to mention the 60,000 MT slag pile on-site or the potential off-site uses of the slag. The site has since been undergoing remediation activities under the State of Texas with Cookson as the primary party responsible for implementing the cleanup. The slag pile is one of many areas at the site that will require remediation due to elevated antimony levels. Had we been aware of the slag pile at the time of the proposal, we would have certainly included the off-site scenario in our risk

modeling for this waste.

The Agency is not required to take cost into account in issuing regulations under Subtitle C. However, had we known the pile existed we would have further examined the potential costs imposed by the listing which would not already be assessed as part of the remediation activities. When we became aware of the pile's existence through the public comment process, we requested further information from Cookson regarding the potential costs of the listing. Unfortunately, the information provided by the commenter does not fully address all the options that may be available to them. Instead, they only provided a comparison of the costs they attribute to addressing the pile through the on-going remediation as if there were no listing against the costs of full Subtitle C disposal.

The commenter has stipulated in meetings with EPA that it is possible to remove and manage the entire pile at the Laredo facility prior to the effective of the final listing. Therefore, this material (slag and dirt) would not be considered hazardous waste for purposes of this rulemaking. EPA also notes that the commenter's cost estimate is deficient because it fails to attribute transportation cost to the use of the material in road bed at the same time it attributes transportation cost for hazardous waste management. This overestimates the incremental cost attributable to Subtitle C management. In addition, the post-regulatory alternative that the commenter has modeled is not "least cost behavior." The commenter models treatment of its slag and dirt and placement in a Subtitle C landfill. Because the commenter's soil under slag pile exhibits antimony concentrations less than 10 times the Universal Treatment Standard for antimony of 1.15 ppm mg/l TCLP, this soil already meets Land Disposal Restriction standards under RCRA.

The commenter's data indicates that antimony concentrations in the slag average 1.5 percent. EPA's analysis indicates that this concentration of antimony is amenable to recovery through alkaline sulfide leaching at an average annual cost of \$3.2 million over a two year period.<sup>49</sup> Since this type of recycling for antimony oxide slag does not fall with the scope of the K177 listing, process residuals would not be subject to Subtitle C regulation. Because this \$3.2 million estimated annual recycling expenditure is in the range of the \$3 million to \$4 million the commenter has estimated for the use of the slag in roadbed, the incremental cost of this listing to the slag management is zero either because the pile would be remediated prior to the effective date or because it would be amenable to recycling at comparable cost to its use in roadbed after the effective date.

Comment L5-2: The Laredo Blast Furnace Process and Resulting Slag Differs Significantly From the Processes and Wastes Studied by EPA in Formulating its Proposed Rule

Between the late 1920's and 1992 various entities, including Cookson, operated an antimony blast furnace process at the location of the former Anzon, Inc. (now Great Lakes Chemical Corporation) facility at the intersection of Mines Road (FM1472) and IH-35 in

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<sup>49</sup> See "Cookson Antimony Process Slag Conceptual Treatment Plant Study" September 10, 2001 US EPA Office of Solid Waste, prepared by Montana Tech, Center for Advanced Mineral and Metallurgical Processing.

Laredo Texas. The blast furnace processed antimony-bearing ores, along with coke (fuel) and various fluxing agents to produce crude (low-grade) antimony oxide or antimony metal, along with a slag byproduct. The Laredo blast furnace slag is a hard, glassy material, consisting of between 1 and 3% antimony, 45% silica, 25% calcium oxides, 25% iron oxides, and trace alumina and magnesium oxides. Only when all recoverable antimony had been removed from the materials would Laredo blast furnace slag be discarded from the process.

The crude antimony oxide or antimony metal produced in the blast furnace process serve as raw materials for further processing in the manner studied by EPA in support of this rulemaking to produce finished (high-grade) antimony oxide. Slag and other antimony-bearing waste materials from the finished antimony oxide production process are routed to a blast furnace-type process for antimony recovery. EPA did not look at the process, nor did it sample, consider or evaluate the Laredo blast furnace slag (generated from the production of crude antimony oxide) in its evaluation of the antimony oxide production industry. Therefore, there is no support in the administrative record for regulating the Laredo blast furnace slag as hazardous waste.

The differences are made very clear by the fact that the blast furnace process has been identified as BDAT for treatment of wastes from the process studied by EPA (i.e., HTMR - high temperature metals recovery).

Response L5-2: See our response to comment 28-2. We have never taken the position that all facilities covered by a single listing investigation must have identical operations nor have we stated that we are required to sample wastes from every facility. Instead, we evaluate, as a category, facilities that engage in similar operations. As part of that evaluation, we conduct representative sampling of select facilities. As discussed in the response to comment 28-2, we find that the blast furnace process is sufficiently comparable to the reduction furnace that was evaluated for listing to be included within the scope of today's listing.

The fact that high temperature metals recovery may be BDAT for some wastes and some constituents is not really relevant here. In this case, HTMR is not reducing antimony levels in slag to levels below the LDR treatment standards. We proposed numerical treatment standards for K177. The nonwastewater treatment standard for antimony is 1.15 mg/L TCLP, for arsenic is 5.0 mg/L TCLP, and for lead is 0.75 mg/L TCLP. When K177 is promulgated, the Cookson slag will be subject to these requirements. The Cookson slag is reported to be 2.8-25.9 mg/L TCLP for antimony. Therefore, once the K177 listing and treatment standard are effective, the Cookson slag would have to be treated to reduce the leachability of antimony and any other constituents that exceed the applicable standards. While stabilization has generally been demonstrated to be effective for such wastes, any technology, other than impermissible dilution may be employed to achieve the reduction of soluble metals necessary to meet the treatment standards. In the event that there are wastewater treatment residuals from treatment of K177 (which under the derived-from rule also would be considered K177), the wastewater treatment standard for antimony is 1.9 mg/L, for arsenic is 1.4 mg/L, and for lead is 0.69 mg/L.

For the reasons stated above, in the preamble, and in responses to comment L5-1, we have found that the slag at Cookson meets the definition of the K177 listed hazardous waste. As explained in responses to more detailed comments below and in our preamble discussion, EPA's record contains sufficient relevant information to support a listing for the slag from the Laredo blast furnace.

Comment L5-3: Processes Included in this Rulemaking Are Covered Under NAICS Code 325188 (SIC Code 2819) While the Laredo Blast Furnace Process is Covered Under NAICS Code 331419 (SIC 3339)

The chemical processes studied by EPA in formulating the proposed rule are covered under the North American Industrial Classification System (NAICS) Code 325188 (former SIC Code 2819) - All Other Basic Inorganic Chemical Manufacturing. The slag at the Laredo facility was produced in a smelting process which is covered under NAICS Code 331419 (former SIC Code 3339) - Primary Smelting and Refining of Nonferrous Metal (except Copper and Aluminum). Because the inorganic chemical processes studied by EPA, and the wastes generated therefrom, differ significantly from those produced by the Laredo blast furnace, EPA should clarify that wastes generated from processes covered under different NAICS or SIC codes are not included in this rulemaking. The industries that EPA expected to affect with this rulemaking (and was required to address under its settlement with the Environmental Defense Fund) include NAICS Code 325188 (SIC Code 2819). See 66 FR 26241, 26242. See also 65 FR 55684, 55685. The EPA must clarify in its rulemaking that only wastes generated from processes covered under NAICS Code 331419 (SIC Code 2819) are subject to this rulemaking. Wastes, such as the Laredo blast furnace slag, generated from processes covered under other NAICS/SIC codes must be excluded from the rulemaking.

Response L5-3: The consent decree requires that EPA evaluate wastes from antimony oxide production (paragraph 1.g (as amended) of the consent decree). The consent decree does not limit the analysis to a specific set of SIC or NAICS codes. We have a standard practice of notifying the public, usually in a table and/or a paragraph at the beginning of the preamble to proposed and final rules, of our assessment of the potential industry groups that may be affected by the proposed or final regulation. Generally, we identify potentially affected industries by primary SIC/NAICS codes. We point out that in the table shown in section I.A of the proposed rule (65 FR 55685) we identify two SIC codes associated with industry groups that may be affected by the proposed regulations. However, in the language discussing the table, we state "the list of potentially affected entities may not be exhaustive...this action may affect other entities not listed in the table."

The two SIC codes identified in the proposed rule are general inorganic chemical manufacturing codes. We did not specifically include codes for primary smelting. To respond to this comment, we reviewed the SIC/NAICS codes for the companies in the antimony oxide sector. SIC/NAIC codes are assigned on a facility level, based on the primary activity of the facility. However, it is interesting to note that while the primary product for the four facilities evaluated for the listing is



antimony oxide, the facilities have various SIC/NAICS codes including: 2819/325188 - Inorganic Chemical Production; 3339/333314 - Primary Antimony Refining; and, from the commenter, 3339/331419 - Primary Smelting and Refining of Nonferrous Metal (except Copper and Aluminum).

The omission of other SIC/NAICS codes from the table in section I.A of the proposal should not be interpreted as meaning that we are restricting the proposed hazardous waste listing determinations on the basis of the SIC/NAICS codes shown. The SIC/NAICS codes are provided only as a reference and to provide a general assessment of the types of industries that may be affected by the proposed rule. We point out further that the paragraph in the proposal discussing the SIC/NAICS codes refers readers to the requirements described in 40 CFR 260 and 261 and the regulations at the end of the proposal to determine if a facility is potentially subject to the rule. Therefore, a facility is subject to the requirements of the rule based on whether a waste meets the listing description, not whether the facility is assigned a particular SIC/NAICS code.

Comment L5-4: The Laredo Blast Furnace Slag Contains Less Total and Leachable Antimony Than the Wastes Studied in Support of this Rulemaking

Attached as Exhibit B is a summary of analytical data from analysis of twelve (12) samples of the Laredo blast furnace slag. In contrast to the samples collected by EPA in support of the rulemaking, the antimony content of the Laredo blast furnace slag ranged from 0.4% to 2.5%, with an average concentration of 1.5%. The antimony TCLP concentrations of the Laredo blast furnace slag ranged from 2.84 mg/l to 25.9 mg/l with an average concentration of 7.6 mg/l. In contrast, the waste samples analyzed by EPA had antimony TCLP concentrations 3 to 15 times higher than this average concentration.

Response L5-4: See our response to comment 28-2. Note that the range of antimony TCLP concentrations is higher than the value reported in the November submission (comment 28). The TCLP levels reported here range from 2.8-25.9 mg/L. This range is up to 4,100 times the drinking water HBL for antimony.

Comment L5-5: The Risk Assessment Conducted by EPA In This Rulemaking Does Not Support the Inclusion of the Laredo Blast Furnace Slag in the Hazardous Waste Listing

Comment L5-5a: Substituting Analytical Data from the Laredo Blast Furnace Slag Directly Into EPA's Risk Assessment Would Likely Result In Acceptable Risk Levels

The leachable antimony concentrations in the Laredo blast furnace slag is much lower than the concentrations in the slag that was evaluated by EPA to model potential risks to human health and the environment. EPA's conclusions are biased by the results of a single sample with high antimony concentrations.

Twelve samples were collected from the Laredo blast furnace slag pile to obtain representative concentrations of various constituents. The analytical results of the twelve



Laredo blast furnace slag samples demonstrated that concentrations of lead and arsenic were not detected above the Toxicity Characteristic Leaching Procedure (TCLP) prescribed levels. Therefore, the levels of these two constituents already meet their respective Universal Treatment Standards ("UTS").

The risk assessment modeling completed by EPA relied on data from two waste samples collected at U.S. Antimony Corporation in Thompson Falls, Montana. These samples were collected from drums of "reduction furnace slag" that were designated as containing less than five percent antimony. Synthetic Precipitation Leaching Procedure ("SPLP") values from these samples were 114 and 211 mg/l, while TCLP results were 55.8 and 110 mg/l. EPA used the higher SPLP results in their analysis, citing the more neutral soil conditions found at on-site landfills.

Using the two data samples, as well as other site-specific soil and hydrogeologic data, the EPA completed Monte Carlo and deterministic risk assessments for antimony slag. The high-end deterministic risk assessment used the highest SPLP waste concentration (211 mg/l) and a drinking water well placed along the centerline of the modeled plume. The lower value of 114 mg/l was used as a representation of the average concentration. Both the Monte Carlo and high-end, deterministic risk analysis predicted hazard quotients (HQs) greater than one for adults and children drinking water from a downstream well. HQs based on average values were less than one. Based on the results of the high-end, deterministic risk assessment, EPA proposed to list the antimony slag as hazardous waste.

In comparison to these results, antimony TCLP data collected from the Laredo blast furnace slag ranged from 2.84 to 25.9 mg/l, with an average of 7.6 mg/l and a 95% upper confidence level (UCL) of 11 mg/l. The TCLP concentration is linearly related to the HQ determined in the risk assessment. If the TCLP concentration is reduced by an order of magnitude, the HQ for the deterministic analysis is also reduced by an order of magnitude, and the HQ for the Monte Carlo analysis is reduced by approximately an order of magnitude. Therefore, substituting the maximum value of 25.9 mg/l into the EPA analysis, all predicted HQs should be approximately an order of magnitude lower than that calculated by EPA. See EPA, Risk Assessment for the Listing Determinations for Inorganic Chemical Manufacturing Wastes, August 28, 2000, Table 6-20. For adults, the use of the data from the Laredo blast furnace slag would reduce the high-end HQ to 0.58, and all HQs up to the 97.5<sup>th</sup> percentile below one. For children, the high end HQ would be reduced to 1.2, and all HQs up to the 95<sup>th</sup> percentile would be below one. Using the 95<sup>th</sup> UCL as the high-end value (as is commonly done in risk assessments conducted in accordance with USEPA guidance) would reduce HQs even further. Therefore, the use of the TCLP data from the Laredo blast furnace slag would mean that the antimony slag would not exceed the potential risk threshold and would not qualify for listing as hazardous waste.

This discussion indicates that the Laredo blast furnace slag at the Laredo facility is such that it could remain in an uncontrolled state in conditions similar to those found at the site that

EPA studied and not result in a potential risk to human health and the environment. As discussed below, the site conditions at Laredo are considerably different, which, if considered, would lead to even lower risk estimates.

Response L5-5a: The commenter's summary of the risk basis for the proposed listing is incorrect. We relied upon the results from the Monte Carlo analysis as our basis for listing, not the deterministic assessment. We used two samples of the Montana slag in the risk modeling. Both samples were included in the distribution for in the Monte Carlo assessment. The results from the Monte Carlo analysis show risk above an HQ of one at the 90th percentile (2.2 for an adult and 4.6 for a child). Since both the 1% antimony slag and the 12% antimony slag from U.S. Antimony were included in the modeling which supports a listing decision, we find the Laredo slag, averaging 1.5% antimony, to be comparable.

Further, as noted in response to L5-4, the leaching results for the Laredo slag are significant. The Laredo slag leaches up to 4,100 times the antimony HBL. The commenter reports that TCLP leaching for the Laredo slag ranges between 2.8 and 25.9 mg/L, with an average of 7.6 mg/L. Our TCLP results from U.S. Antimony ranged from 55.8 (total 1% antimony sample, AC-1-AO-01) to 110 mg/L (total 12% antimony sample, AC-1-AO-06). Comparing the U.S. Antimony sample that is closest in total antimony concentration to the Laredo slag (i.e., the 1% U.S. Antimony sample), the U.S. Antimony sample only leaches 2.1 times more than the Laredo slag. Even looking strictly at the leach rates, this does not lead to an order of magnitude reduction in risk claimed above by Cookson. (Note: since lead and arsenic were not a basis for listing, their levels are not directly relevant.)

Finally, we disagree with Cookson's assessment of risks from their slag, which uses only one input specific to the Cookson slag - the leachate concentrations. Cookson's assessment relies on data relevant to the Montana slag for all other inputs, including waste volume. This approach overlooks other critical changes to modeling parameters that we would need to make to model risks from Cookson's slags. First, the volume of slag is much greater at the Laredo site than at U.S. Antimony. The commenter states that they have 60,000 MT of slag on-site (plus an additional 60,000 MT of contaminated media). U.S. Antimony slag volume was only 20 MT/year. Even taking into account the 30 year modeling period, U.S. Antimony's slag only totals 600 MT. The higher waste volume would result in lower DAFs and, therefore, higher risks. Next, and most importantly, in the November submission (comment 28), Cookson reported that the slags had been used as aggregate in asphalt and concrete. Further discussions with Cookson and the State of Texas have revealed that the company plans to pursue this use as part of the ongoing corrective action at the facility. They will ship the slag off-site for use as aggregate in road bed construction. Had we been notified of the pile's existence prior to the development the proposal, we would have modeled an off-site scenario rather than on-site disposal at the U.S. Antimony facility. We note that the DAFs at the U.S. Antimony site were unusually high, and are not likely to be appropriate for either the Cookson site or any reasonably plausible off-site disposal location for Cookson slag. See Response L5-5b. Therefore, Cookson's discussion of their site-specific parameters does not address all our concerns for the slag.

Comment L5-5b: Substituting hydrogeologic parameters from the Laredo Site into EPA's risk

assessment would further reduce estimates of risk from the Laredo blast furnace slag

There are significant differences between the geology present at the Montana Site and the conditions at the Laredo facility. The Montana Site showed a very consistent subsurface lithology dominated by gravel in an alluvial mountain valley hydrogeologic setting. The hydrogeology in the Laredo area is significantly different. The shallow unit is a terrace deposit that generally consists of unconsolidated silt, sand, and gravel. Beneath the terrace deposits is the upper weathered portion of the Laredo Formation. The base of the weathered zone of the Laredo Formation is a hard gray cemented sandstone with interbedded shale.

EPA used a hydrogeological model based on site characteristics for Thompson Falls Montana, including four residential wells within several miles of the facility, indicating that groundwater is a viable resource in the area. EPA modeled potential distances to wells from the facility's southern border to one mile away. In contrast, the TNRCC has concurred that, due to elevated salinity, the groundwater under the Laredo facility is not useable, nor actively used. In addition, the area surrounding the Laredo facility is serviced by the City of Laredo potable water supply. Therefore, it is unlikely that any domestic drinking water wells are or will ever be completed near the facility boundary.

Groundwater discharges to surface water bodies downgradient of a waste storage area will intercept groundwater flow, minimizing impact to receptors further downgradient. Past investigations at the Laredo facility have revealed that the nearest surface water, Manadas Creek, receives some groundwater discharge during portions of the year. Therefore, EPA's screening procedure, which is not complex enough to handle reductions in mass along the groundwater flow path, will over-estimate the mass that can migrate from the slag pile to potential downgradient receptors.

Precipitation that does not runoff or evapotranspire will ultimately percolate through the vadose zone to the groundwater system. The model used by the EPA uses infiltration and recharge values to represent the contribution of water from the soil surface to the groundwater system. The EPA should take into consideration the limited recharge to the groundwater system, as average precipitation in Laredo is 22 inches per year with evapotranspiration rates well in excess of the precipitation rate. A significant decrease in the infiltration rate and recharge will result in a proportional decrease in source loading to the groundwater system, thereby reducing the estimated risks from the Laredo blast furnace slag.

The aquifer thickness at the Montana Site was determined based on the borehole logs and water table data, which indicated a seasonally variable water table at the site, ranging from 11 to 60 ft. in thickness. In comparison, the saturated zone thickness at the Laredo facility is only about 8 feet. Depth to groundwater is also much shallower at the Laredo Site as compared to the Montana Site. Typical depths to water range from 10 to 20 feet below ground surface. However, a layer of cemented sandstone occurs beneath the land surface (hardpan or caliche) which helps to inhibit infiltration (also limiting natural recharge).

In addition to significant differences in saturated thickness, recharge, and depth to groundwater, the hydraulic conductivity values used in the Montana simulation are significantly greater than those found at the Laredo Site. The simulated hydraulic conductivities for the Montana Site range from 28.8 feet per day to over 2,606 feet per day, while site-specific data (from aquifer tests) at the Laredo Site reveal hydraulic conductivities that range from 0.003 feet per day to 0.382 feet per day. The extreme difference (orders of magnitude) in hydraulic conductivity clearly indicates that the parameters used in the EPA modeling are not relevant to the Laredo Site.

It is unclear what the exact effect would be on model results if the site-specific values for hydrogeological parameters were used. However, it is clear from review of the antimony simulation that there is little similarity between the Montana and Laredo Sites and that the simulations are not representative of conditions at the Laredo Site. Furthermore, because of the limited percolation (recharge) in Laredo, the source loading should be significantly reduced which will reduce the hazard quotient.

Response L5-5b: Since Cookson is considering managing the slag off-site, EPA does not believe it is appropriate to draw conclusions based on the hydrogeology of the Cookson site. Thus, even though the ground water underlying the Cookson site has been designated non-potable, it is not appropriate to conclude that the slag poses no risks to human health from drinking water ingestion—it might pose risks if transported to a site with potable ground water. Moreover, EPA does not agree that the Montana site hydrogeology is likely to represent any of the off-site locations where the Cookson slag will be managed. Due to the presence of highly porous media such as sand and gravel at Thompson Falls (Montana), the hydraulic conductivity is very high. This, combined with the depth of the aquifer, results in a large amount of dilution of contaminants that leach into ground water beneath the site. For example, EPA's ground water modeling analysis for the proposed rule gave very high DAF's (dilution and attenuation factors) for antimony, even at the 5<sup>th</sup> and 10<sup>th</sup> percentiles of the distribution (2,000 and 3,800, respectively). DAFs at other sites are likely to be significantly lower. For example, the modeling of titanium dioxide wastes in off-site landfills resulted in DAFs for antimony on the order of 3 to 9 at the 5<sup>th</sup> and 10<sup>th</sup> percentiles.<sup>50</sup> It is unlikely that the hydrogeological conditions for the regional area near Laredo will result in a DAF that will support the commenter's claim that the risks from the Laredo slag would be lower than what was modeled for the listing.

#### Conclusions / Recommendations

Based on the foregoing and our November 13, 2000 comments, Cookson respectfully

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<sup>50</sup> See Table 6-24, "Comparison of DAFs for Antimony in Ilmenite Process Wastewater Treatment Sludge for 100 Percent and 10 Percent Waste Quantities," in *Risk Assessment for the Listing Determinations for Inorganic Chemical Manufacturing Wastes*, August, 2000. Note that although there is not a direct correspondence between DAF's and risk, lower DAF's result in higher risk. Therefore, the 5th and 10th percentile DAF's are of particular interest relative to high end risks, e.g., at the 90th and 95th percentiles of the risk distribution.

requests that EPA exempt from the hazardous waste listing blast furnace slag generated from the primary processing of antimony-bearing materials for the following reasons:

- EPA did not take into account the costs of managing the Laredo blast furnace slag in its analysis, thereby significantly underestimating the cost of its rulemaking;
- The Laredo blast furnace process is distinctly different than the processes studied by EPA, and similarly, the wastes generated are different, exhibiting much lower levels of hazardous constituents;
- The NAICS/SIC Code for the production process generating the Laredo blast furnace slag differs from the code for the processes generating the waste studied in this rulemaking;
- Substituting Laredo blast furnace slag data and/or Laredo Site hydrogeological parameters into EPA's modelling would significantly lower risk estimates such that hazardous waste listing would not be appropriate;
- The Laredo blast furnace slag is adequately regulated under state laws for protection of human health and the environment.

See original in docket for exhibits A and B

Response to Conclusion: We are not required to take cost into account in issuing regulations under Subtitle C. As shown in comments 28-2, L5-2 and L5-4, we have determined that the Laredo blast furnace process and associated wastes are within the scope of the listing. The NAICS/SIC is not a definitive regulatory category for hazardous waste listings. In fact, other antimony oxide producers have indicated that their SIC code falls within the same general category as that noted by the comment (i.e., primary smelting). As discussed in response to comment L5-5, we disagree with the commenter's conclusions regarding lower risk for the Laredo slag. Finally, Texas does not regulate the slag as hazardous.

Additional comment from Conference Call with Cookson on March 14, 2001:

Cookson stated that the MCL for antimony is based on organic soluble forms of antimony (specifically antimony potassium tartrate), which are much more bioavailable for uptake in organisms. The antimony oxide product and slags generated in Laredo are primarily inorganic oxides of antimony, which are essentially insoluble in water, and therefore not bioavailable to impart toxicity.

Response: The data available on both the Montana slags that we modeled for listing and the Cookson slag all demonstrate that the slags contain soluble compounds of antimony (as indicated by the high SPLP and TCLP measurements). Since we used leachate concentrations as the inputs to our model, we modeled only exposure to soluble antimony. The RfD derived from the

potassium antimony tartrate studies is presumed to be applicable to other soluble forms of antimony as well. In the absence of evidence to the contrary (e.g., from pharmacokinetic studies), we reasonably assume that the bioavailability of the soluble antimony is comparable to the bioavailability implicit in the toxicological studies done on potassium antimony tartrate.