ILLINOIS POLLUTION CONTROL BOARD
April 15, 1999

IN THE MATTER OF:	)	
	)	
PETITION OF BIG RIVER ZINC	)	AS 99-3
CORPORATION FOR AN ADJUSTED	)	(Adjusted Standard - RCRA)
STANDARD UNDER 35 ILL. ADM. CODE	)	
720.131(c)	)	

LEE R. CUNNINGHAM AND RICHARD M. SAINES OF GARDNER, CARTON & DOUGLAS APPEARED ON BEHALF OF PETITIONER; and

CHRISTOPHER P. PERZAN APPEARED ON BEHALF OF THE ILLINOIS ENVIRONMENTAL PROTECTION AGENCY.

OPINION AND ORDER OF THE BOARD (by K.M. Hennessey):

Petitioner Big River Zinc Corporation (BRZ) operates an electrolytic zinc refinery in Sauget, St. Clair County, Illinois. BRZ uses various zinc-containing materials as feedstock for its refinery. One of the zinc-containing materials that BRZ would like to use is recovered from dust emitted from electric arc furnaces used to produce steel. This secondary zinc oxide material would ordinarily be considered a "solid waste" and a "hazardous waste" under the Resource Conservation and Recovery Act (RCRA), 42 U.S.C. §§ 6901 *et seq.*, and corresponding Illinois hazardous waste laws and regulations. BRZ would like to use this secondary zinc oxide material without becoming subject to Illinois' hazardous waste requirements.

To that end, BRZ has filed a petition for an adjusted standard under 35 Ill. Adm. Code 720.131(c). Section 720.131(c) allows the Board to determine that certain materials are not solid wastes, and therefore not hazardous wastes, if they meet certain criteria. BRZ asserts that zinc oxide material recovered from electric arc furnace dust (EAF dust) by a high temperature metals recovery process meets these criteria. BRZ also proposes several conditions on the adjusted standard. The Illinois Environmental Protection Agency (IEPA) recommends that the Board grant the adjusted standard, subject to certain conditions.

The Board finds that BRZ has established that zinc oxide material recovered from EAF dust by a high temperature metals recovery process is not a solid waste. The Board therefore grants BRZ's petition for an adjusted standard, subject to the conditions set forth in the order that follows this opinion.

PROCEDURAL HISTORY

On September 24, 1998, BRZ filed a petition for an adjusted standard, subject to conditions. On October 15, 1998, the Board accepted this matter for hearing and on

October 16, 1998, IEPA filed a response to the petition. In that response, IEPA recommended that the Board grant BRZ's request for an adjusted standard with conditions, subject to certain additional conditions. On October 27, 1998, BRZ filed a reply in which it proposed new and modified conditions on the adjusted standard, including the conditions that IEPA requested.[1]

Hearing Officer John Knittle held a hearing on the adjusted standard petition on December 17, 1998. BRZ presented one witness, whom the hearing officer found to be credible. BRZ also introduced four exhibits, each of which the hearing officer admitted.[2] At hearing, BRZ proposed to amend one of the conditions it had proposed for the adjusted standard. Tr. at 5-6; Exh. 4. Counsel for IEPA stated at hearing that IEPA agreed to all of the conditions that BRZ had proposed both before and at hearing. Tr. at 24. IEPA offered no testimony or exhibits. The parties chose not to file posthearing briefs.

LEGAL FRAMEWORK

The status of materials as "solid wastes" is significant because under the laws and regulations that Congress and the United States Environmental Protection Agency (USEPA) have established, only those materials that are "solid wastes" can be regulated as "hazardous wastes" under RCRA and corresponding Illinois hazardous waste laws and regulations. Accordingly, materials that are not solid wastes are not subject to Illinois' hazardous waste regulations, which impose various requirements on persons who generate, treat, store, dispose, recycle, or transport hazardous waste. See 35 Ill. Adm. Code 722-726, 728.

Generally, a solid waste is any discarded material. See 35 Ill. Adm. Code 721.102. A solid waste is a hazardous waste if it exhibits a "characteristic" of hazardous waste (*i.e.*, it is toxic, corrosive, ignitable, or reactive) or if it is "listed" as hazardous waste (*e.g.*, it comes from a specific type of process, such as electroplating). See 35 Ill. Adm. Code 721.103, 721, Subparts C and D.

BRZ would like to reclaim zinc from zinc oxide material that has been recovered from EAF dust without becoming subject to Illinois' hazardous waste regulations. Exh. 3 at 2, 21. BRZ asks the Board to determine that zinc oxide material recovered from EAF dust with a high temperature metals recovery process, which the Board will refer to as "EAF zinc oxide," is not a solid waste. BRZ seeks this determination under 35 Ill. Adm. Code 720.131(c). That provision establishes standards and criteria for the Board to use in determining whether certain materials are not solid wastes. See 35 Ill. Adm. Code 720.130(c). Section 720.131(c) reads as follows:

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[1] BRZ's petition, which was entered into evidence at hearing as an exhibit, is cited as "Exh. 3 at _." The parties treat BRZ's reply as part of the petition and the Board will consider it as if it was entered into evidence at hearing with the petition. However, for clarity, the Board cites BRZ's reply as "Reply at _." IEPA's response is cited as "Resp. at _."

[2] The transcript of the hearing is cited as "Tr. at _." Hearing exhibits are cited as "Exh. _."

The Board will determine that those materials that have been reclaimed but must be reclaimed further before recovery is completed are not solid wastes if, after initial reclamation, the resulting material is commodity-like (even though it is not yet a commercial product, and has to be reclaimed further). This determination will be based on the following criteria:

1) The degree of processing the material has undergone and the degree of further processing that is required;

2) The value of the material after it has been reclaimed;

3) The degree to which the reclaimed material is like an analogous raw material;

4) The extent to which an end market for the reclaimed material is guaranteed;

5) The extent to which the reclaimed material is handled to minimize loss; and

6) Other relevant factors. 35 Ill. Adm. Code 720.131(c).

FINDINGS OF FACT

In this section of the opinion, the Board sets forth its findings of fact regarding (1) zinc, (2) BRZ's current operations, (3) EAF dust, (4) EAF zinc oxide, and (5) BRZ's proposed operations.

Zinc

In 1997, the total world production and consumption of zinc was approximately 8.5 million tons. Zinc can be used to galvanize products; to produce brass; to create alloys used to produce such items as door handles and carburetor parts; to create chemicals such as zinc powder for alkaline batteries and zinc oxide; to coat steel; and for various other uses. Exh. 3 at 3, Att. B at 5. The average annual growth in consumption of zinc in the western world was 2.4% from 1988 to 1997. Exh. 3, Att. B at 1. The price of zinc is established by supply and demand on the London Metals Exchange (LME). Exh. 3 at 3.

BRZ's Current Operations

BRZ's Products

BRZ operates an electrolytic zinc refinery in Sauget, St. Clair County, Illinois. Exh. 3 at 1, 7. BRZ currently produces approximately 105,000 tons of zinc per year. Exh. 3, Att. J at 2.

parts, and produce zinc oxide (*e.g.* Exh. 3, Att. J at 2. BRZ

pound logs for large galvanizing lines. BRZ produces special high grade quality zinc (99.995% zinc), which is the most widely recognized standard for zinc. Depending on customer specifications, BRZ also debases its special high grade zinc to produce alloys that Exh. 3 at 19. BRZ has long-term end markets for all of its products. Att. N.

BRZ's Process

BRZ recovers zinc from two types of materials, the first of which is zinc sulfide concentrates that are mined. BRZ also recovers zinc from secondary zinc oxide material. Secondary zinc oxide material is a by-product of other industries that use zinc, including steel mills, brass mills, brass and bronze ingot factories, and galvanizers. The mined zinc sulfide concentrates arrive as wet filter cake; the secondary zinc oxide material arrives as wet filter cake or as dry material in "supersacks." Exh. 3 at 2, 4, 10-11, 14, 17, 20, Att. J at 2.

In the first step of BRZ's process, BRZ may use an acid solution to remove magnesium from the zinc sulfide concentrates to prepare them for further processing. Exh. 3 at 10-11. Secondary zinc oxide material does not require this initial step. Exh. 3 at 10-11, 17-18, Att. H, J at 2-3.

BRZ then processes zinc sulfide concentrates and secondary zinc oxide material in a fluid bed roaster. The roasting step removes sulfur from the feed material. Exh. 3 at 12, 19, Att. J at 2. BRZ then leaches the roasted material to separate zinc and various other metals. From the slurry that results, BRZ filters the solids, and puts the remaining solution through four purification stages. The purification process yields a purified zinc sulfate solution from which zinc is recovered through an electrolytic process. The electrolytic process yields zinc cathodes that are of special high grade quality (99.995% pure zinc). BRZ then melts the cathodes into one of six shapes for delivery to customers. Exh. 3 at 12-13, 19.

BRZ's refining process produces a number of by-products, including sulfuric acid, lead-silver concentrate, copper cement, copper-cobalt concentrate, cadmium oxide, and zinc sulfate monohydrate. BRZ has long-term end markets for these by-products. Exh. 3 at 12-13, 19-20.

[3] In this opinion, when the Board refers to a percentage of a constituent in a material, it does so by weight.

EAF Dust

EAF dust is a source of secondary zinc oxide material. EAF dust is generated in electric arc furnaces, which produce steel by heating steel scrap. These furnaces emit gases that contain EAF dust. Air pollution control equipment in these furnaces removes EAF dust from the gases. These furnaces generated approximately 900,000 tons of EAF dust in the United States in 1997. Exh. 3 at 5, 13-14.

EAF dust is composed of approximately 20% to 30% iron and 15% to 30% zinc. It also includes other constituents such as lead, cadmium, chloride, fluoride, aluminum, calcium, potassium, magnesium, manganese, sodium, and silica. Because of its high iron content and other impurities, zinc cannot be recovered directly from EAF dust in most, if not all, zinc smelting and refining operations. Exh. 3 at 5, 13-14.

In 1996, nearly 40% of the EAF dust generated in the United States was disposed of in landfills. Exh. 3 at 6. It costs approximately $80 per ton to dispose of EAF dust. Exh. 3 at 16.

EAF Zinc Oxide

High Temperature Metals Recovery

While zinc cannot be recovered directly from EAF dust in most zinc smelters and refineries, zinc oxide material recovered from EAF dust can be processed in zinc smelters and refineries. Zinc oxide material can be recovered from EAF dust when the dust is put through a high temperature metals recovery (HTMR) process. HTMR units include rotary kilns, rotary hearth furnaces, plasma furnaces, and electric furnaces. Exh. 3 at 6-7, 10, Att. F, H.

HTMR processing increases the levels of zinc, lead, and cadmium in EAF dust. These changes are desirable in the zinc refining process. HTMR processing also lowers the levels of constituents that are considered contaminants in the zinc refining process (*e.g.*, iron, calcium, magnesium, alumina), except for sodium, chloride, fluoride, and potassium. Exh. 3 at 10, 18, Att. H.

In 1994, approximately 1.2 million tons of EAF dust per year was processed worldwide, mostly to produce zinc oxide material. Exh. 3 at 18, Att. L. EAF dust processing is done in a variety of HTMR units and the resulting zinc oxide material is sold primarily to produce zinc, but also to produce zinc chemicals. Exh. 3 at 18, Att. L. Several facilities in the United States produce or are capable of producing EAF zinc oxide. Exh. 3 at 6, 18, Att. L, M. Markets for EAF zinc oxide exist in North America, Asia, and Europe. Exh. 3 at 19. Once EAF dust has been through the HTMR process, the value of the resulting zinc oxide material approaches the value of mined zinc sulfide concentrates (currently $250 to $300 per ton). Exh. 3 at 8, 16-17, 21.

BRZ would like to purchase EAF zinc oxide. Tr. at 13; Exh. 3 at 1-2, 6. BRZ intends to use the material as feedstock for its zinc refinery. Exh. 3 at 1, 8. EAF zinc oxide can substitute for and supplement mined zinc sulfide concentrates. Exh. 3 at 2, 14. After washing EAF zinc oxide (described below), BRZ plans to use the material in the same manner it uses the mined zinc sulfate concentrates. The products and by-products from EAF zinc oxide would be essentially indistinguishable from those of the mined materials. Exh. 3 at 16, 19, 21.

Not all zinc oxide material recovered from the HTMR processing of EAF dust would be suitable feed for BRZ's refinery. Exh 3. at 7. To be economical for BRZ, EAF zinc oxide must meet the following specifications (on average):

> 50% zinc;

< 20% lead;

< 5% iron;

< 4% total gangue materials (silica plus calcium plus magnesium); and

< 2% chloride or capable of being water washed to achieve < 2% chloride. Exh. 3 at 7.

For BRZ to be able to wash EAF zinc oxide to < 2% chloride, the feed should arrive at BRZ's facility with < 13% chloride. Reply at 5-6, Att. O. In addition, BRZ could accept EAF zinc oxide produced during the three-month start-up period of an HTMR unit with up to 7% iron. Tr. at 5-6; Exh. 4.

AmeriSteel, Inc.'s HTMR Process

One of the companies that processes EAF dust with an HTMR unit is AmeriSteel, Inc. (AmeriSteel). AmeriSteel is a steel manufacturer located in Jackson, Tennessee. AmeriSteel's HTMR unit is a rotary hearth furnace. Exh. 3 at 8-9.

To process EAF dust, AmeriSteel first mixes the dust with a source of carbon (commercial grade coal or coke purchased on the open market) to form briquettes. The carbon acts as a reducing agent. AmeriSteel places the briquettes in the rotary hearth furnace to recover both zinc oxide material and an iron material. Materials that volatilize at lower temperatures vaporize and leave the furnace in a gas stream. These materials then oxidize, form a solid, and are collected in an air pollution control device called a baghouse. This material collected in the baghouse is EAF zinc oxide. Tr. at 18-19; Exh. 3 at 9-10; Reply at 3, Att. P. Once AmeriSteel achieves full capacity, it is expected to produce approximately 9,600 tons per year of EAF zinc oxide from the 24,000 tons of EAF dust that Ameristeel generates annually. Exh. 3 at 10.

AmeriSteel's EAF Zinc Oxide

AmeriSteel's HTMR process increases the zinc content of EAF dust from 20-25% to 59.5%, increases the lead content from 3% to 7.5%, increases the cadmium content from 0.05% to 0.1%, and decreases the iron content from 19-24% to 0.1%. AmeriSteel's HTMR process lowers the levels of constituents that are considered contaminants in BRZ's refining process, except for sodium, chloride, fluoride, and potassium. Exh. 3 at 10, 18, Att. H, K.

BRZ has determined that, except for the chloride level of the material, AmeriSteel's EAF zinc oxide is an ideal feed for its zinc refinery. Exh. 3 at 8. Ameristeel's EAF zinc oxide is chemically similar to mined zinc oxide and zinc sulfide concentrates:

Constituent	Mined Concentrates		AmeriSteel's EAF Zinc Oxide
	Zinc Oxide	Zinc Sulfide	
% zinc	54	59.1	59.5
% lead	4.9	1.2	7.5
% cadmium	0.38	0.5	0.1
% iron	2.5	1.5	0.1
% copper	0.02	0.3	0.1
% sulfur	< 1	31	< 1
% arsenic	.7	< 0.02	< 0.01
% calcium	2.4	1	0.05
% silica	14.8	0.8	0.02
% magnesium	0.6	0.4	0.01
% alumina	2.7	0.1	0.02
% sodium	N/A	< 0.02	3
% chloride	0.07	< 0.1	8
% fluoride	0.03	0.05	0.15

Exh. 3 at 14, 17, Att. D, H, K. With the exception of chloride and fluoride, AmeriSteel's EAF zinc oxide also meets typical zinc refiner specifications for zinc sulfide concentrate blends and falls within the range of secondary feed specifications that zinc refiners have established. Exh. 3, Att. F, H, K.

EAF zinc oxide produced by AmeriSteel and others has levels of zinc comparable to that of mined concentrates. Exh. 3 at 17, Att. D, H, K. If used in BRZ's refining process, EAF zinc oxide would have chemical advantages and disadvantages compared to mined concentrates. The primary advantages of EAF zinc oxide are that it is higher in lead than mined concentrates and lower in sulfur than mined zinc sulfide concentrates. AmeriSteel's EAF zinc oxide has the additional advantage of being lower in iron than mined concentrates. Exh. 3 at 14, 17-18, Att. D, H, J at 3, K.

EAF zinc oxide has two primary disadvantages when compared to mined concentrates. First, EAF zinc oxide has higher levels of sodium, chloride, fluoride, and potassium, which are present as inorganic salts. While EAF zinc oxide can be introduced directly to BRZ's roaster, inorganic salts in the material could corrode BRZ's refining equipment if their levels are not first reduced. However, as discussed below, BRZ plans to wash EAF zinc oxide to reduce its levels of inorganic salts. Tr. at 13-17; Exh. 3 at 11, 14, 17-18, Att. D, H, J at 3, K.

The second primary disadvantage of EAF zinc oxide is that it may be in the form of dry dust rather than wet filter cake. Exh. 3 at 14. The dry dust is more difficult to handle. Exh. 3 at 14, Att. J at 3. As discussed below, however, BRZ's washing process will turn this dry dust into wet filter cake that BRZ can then put through its refinery equipment.

BRZ's Proposed Operations

EAF zinc oxide is expected to arrive at BRZ's Sauget facility in the form of dry dust. BRZ plans to keep the dry EAF zinc oxide totally enclosed from unloading until washing. BRZ has designed a material handling/wash system to handle that material. Exh. 3 at 14, 20, Att. J at 3-4. On September 22, 1998, IEPA granted BRZ an air pollution control permit to construct the system. The construction permit limits emissions of particulate matter from the handling/wash facility to 1.68 tons per year. Exh. 2; Exh. 3, Att. J.

Dry secondary zinc oxide material is expected to arrive at BRZ's Sauget facility in bulk or in supersacks. Approximately 90% of this material is expected to arrive by rail. BRZ plans to unload railcars of the bulk material through ventilated air slides to silos equipped with High-Efficiency Particulate Air (HEPA) filters. Ultimately, BRZ plans to add four silos, each with a capacity of 1.5 railcars. BRZ proposes to locate the silos on concrete or asphalt pads that BRZ could wash into a sump. BRZ plans to pump the sump contents into the washing process. Exh. 3 at 15, Att. J at 4.

Supersacks of the material are expected to arrive by boxcar or truck. BRZ plans to leave supersacks in boxcars for intermediate storage. The boxcars would be unloaded at a covered loading dock that is to be attached to the washing plant. Supersacks that arrive by truck would be stored inside the washing plant. BRZ would be able to store approximately 150 tons of that material inside the washing plant. Exh. 3 at 15, Att. J at 4.

BRZ plans to use a truck to move the supersacks to a supersack discharge station to empty them. BRZ proposes to maintain the discharge station under negative pressure to avoid fugitive emissions. BRZ would vent the discharge station through a baghouse to collect any secondary zinc oxide material. Exh. 3 at 15, Att. J at 5.

BRZ proposes to convey the secondary zinc oxide material (from the silos and the supersack discharge station) in an enclosed, ventilated conveyor (or by pneumatic conveyor) to a tank where BRZ would mix the material with water. BRZ proposes to pump the resulting slurry into a washing tank. BRZ plans to add soda ash to the washing tank to raise the pH to a

level that would not dissolve zinc and other heavy metals but would dissolve the inorganic salts that could corrode BRZ's refining equipment. Exh. 3 at 11, 15-16, Att. J at 5.

After washing, BRZ proposes to create wet filter cake by removing water from the slurry with a pressure filter. BRZ plans to transport the filter cake by enclosed conveyor belts to the concentrate storage building. In the concentrate storage building, BRZ would blend the washed secondary zinc oxide material with zinc sulfide concentrates to create feed for the roaster, after which the material would go through the refining process outlined on page four of this opinion. Exh. 3 at 15-16, Att. J at 5.

Some producers of EAF zinc oxide may wash the material before delivering it to BRZ. In that case, the material would arrive at BRZ's Sauget facility as wet filter cake, which BRZ can handle in the same manner that it currently handles filter cake feed material. Tr. at 14-15; Exh. 3 at 14, 20. Typically, the largest suppliers of secondary zinc oxide material either wash the material at their facilities to produce wet filter cake or ship the material as dry dust in pneumatic trailers. Smaller suppliers typically package the secondary zinc oxide material in supersacks. Exh. 3, Att. J at 4.

BRZ's Proposed Contract With AmeriSteel

BRZ and AmeriSteel have reached agreement on contract terms under which BRZ plans to buy AmeriSteel's full production of EAF zinc oxide. Tr. at 17-18; Exh. 3 at 8, Att. G at 1. AmeriSteel's full monthly production is estimated to be approximately 800 tons. Exh. 3, Att. G. Under the contract, the price of EAF zinc oxide is based on a percentage of its zinc content and the LME price for zinc. Exh. 3, Att. G at 2. Because EAF zinc oxide can substitute for and supplement BRZ's mined zinc sulfide concentrates, BRZ would pay AmeriSteel a high percentage of what it would normally pay for mined zinc sulfide concentrates. Exh. 3 at 8, 17. BRZ is willing to pay a price for EAF zinc oxide that far exceeds its cost of freight. Tr. at 13; Exh. 3 at 17.

The AmeriSteel contract would be effective upon execution and continue until December 31 of the year following the year in which BRZ begins commercial operation of its washing plant. Thereafter, the contract would continue from year to year "with annual negotiation of the terms to reflect current market conditions." Exh. 3, Att. G at 1-2. As proposed, either party could cancel the contract by giving the other party 180 days notice of cancellation. Exh 3, Att. G at 2. AmeriSteel has indicated that it will not execute the contract "until all regulatory issues have been resolved, including this adjusted standard proceeding." Tr. at 17-18; Exh. 3 at 9.

DISCUSSION

In this section, the Board first discusses whether EAF zinc oxide is a solid waste. The Board then discusses whether the provision under which BRZ seeks this determination is available in this case. Next, the Board evaluates each of the factors upon which this

determination is based. Lastly, the Board discusses the conditions that apply to this determination.

Status of EAF Zinc Oxide

Section 720.131(c) allows the Board to determine that certain materials that would otherwise be solid wastes are not solid wastes if certain conditions are met. Therefore, the Board initially must determine that EAF zinc oxide is a solid waste; if it is not, BRZ has no need for an adjusted standard.

A "solid waste" is any discarded material not otherwise excluded in the regulations. See 35 Ill. Adm. Code 721.102(a)(1). One of the several ways that a material may be considered "discarded" is by being "recycled" in a manner specified in Section 721.102(c) of the regulations. See 35 Ill. Adm. Code 721.102(a)(2). Section 721.102(c)(3) specifies, in part, that if a "listed sludge" is recycled by being "reclaimed," it is a solid waste. See 35 Ill. Adm. Code 721.102(c)(3) and 721.Appendix Z.[4]

The Board finds that EAF zinc oxide fits within this category. First, EAF zinc oxide is considered a "listed sludge." A "sludge" includes a "solid . . . waste generated from [an] . . . air pollution control facility . . . ." 35 Ill. Adm. Code 721.101(c)(2); 35 Ill. Adm. Code 720.110. EAF dust, from which EAF zinc oxide is recovered, is generated from an air pollution control facility and is therefore a sludge. Furthermore, EAF dust is "listed" because it is listed as a hazardous waste from a specific source under 35 Ill. Adm. Code 721.132 (listing emission control dust/sludge from the primary production of steel in electric furnaces as hazardous waste K061).

While this listing applies to EAF dust rather than EAF zinc oxide, Sections 721.103(c)(2)(A) and (d)(2) further provide that a material derived from the treatment of a listed hazardous waste is itself the listed hazardous waste. See 35 Ill. Adm. Code 721.103(c)(2)(A) and (d)(2). USEPA, which promulgated the federal regulations upon which these regulations are based, explains that "all of the residues from treating the original listed wastes are likewise considered to be the listed waste . . . ." 54 Fed. Reg. 1056, 1063 (Jan. 11, 1989). Therefore, EAF zinc oxide is also considered a listed sludge.[5]

Second, the Board finds that EAF dust and the resulting EAF zinc oxide are being recycled by reclamation. A material is "reclaimed" if it is:

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[4] For a detailed discussion of how materials become solid wastes, please refer to Petition of Chemetco, Inc. for Adjusted Standard From 35 Ill. Adm. Code 720.131(a) and (c) (March 19, 1998), AS 97-2, slip op. at 11-12.

[5] Compare Petition of Recycle Technologies, Inc. for an Adjusted Standard Under 35 Ill. Adm. Code 720.131(c) (September 3, 1998), AS 97-9, slip op. at 7-8 (if used antifreeze (spent material that is not a listed hazardous waste) is a characteristic hazardous waste, the initially but yet to be completely reclaimed material derived from that used antifreeze is a hazardous waste only if it exhibits a characteristic of hazardous waste).

> processed to recover a usable product, or if it is regenerated. Examples are recovery of lead values from spent batteries and regeneration of spent solvents. 35 Ill. Adm. Code 721.101(c)(4).

When USEPA promulgated the federal regulation upon which this regulation is based, it explained that materials are reclaimed if "material values . . . are recovered as an end-product of a process (as in metal recovery from secondary materials)" or if they are "processed to remove contaminants in a way that restores them to their usable original condition." 50 Fed. Reg. 614, 633 (Jan. 4, 1985). The Board finds that EAF dust that is processed by HTMR into zinc oxide material is being "reclaimed." The Board also finds that EAF zinc oxide that is washed to remove contaminants (inorganic salts) is being "reclaimed." See 35 Ill. Adm. Code 721.101(c)(4). Because EAF zinc oxide is a listed sludge that is recycled by being reclaimed, it is a solid waste.

Availability of Section 720.131(c)

Generally, a waste being reclaimed remains a waste until reclamation is completed. See 50 Fed. Reg. 614, 620, 633-634, 655 (Jan. 4, 1985). Section 720.131(c) provides an exception to this principle for material that is initially reclaimed, but that requires further reclaiming before recovery is completed.

In discussing the federal counterpart to Section 720.131(c), USEPA explains that the provision is designed to address those situations in which "the initial reclamation step is so substantial that the resulting material is more commodity-like than waste-like even though no end-product has been recovered." 50 Fed. Reg. 614, 655 (Jan. 4, 1985).

The Board finds that EAF dust that has been processed in an HTMR unit has been initially but not fully reclaimed. HTMR processing increases the eventual recovery of zinc, lead, and cadmium values from EAF dust. HTMR processing also decreases the levels of materials that are considered contaminants in BRZ's refining process, such as iron, calcium, magnesium, and alumina. However, EAF zinc oxide requires further processing to recover end products. First, BRZ must wash the EAF zinc oxide to remove inorganic salts before it can be roasted in BRZ's roaster. BRZ then must put the washed material through its refining process, during which BRZ would roast, leach, purify, and further recover the material. The refining process recovers various metals, including a special high grade quality zinc.

The Board finds that Section 720.131(c) is available in this case because once EAF dust has been processed in an HTMR unit to create EAF zinc oxide, it has been initially but not completely reclaimed.

Section 720.131(c) Factors

The Board must determine whether EAF zinc oxide is commodity-like based on the Section 720.131(c) factors set forth on page three of this opinion. The Board finds that EAF

zinc oxide is commodity-like based on these factors. The Board addresses these factors in turn.

The Degree of Processing the Material has Undergone and the Degree of Further Processing That is Required

When explaining the federal counterpart to Section 720.131(c), USEPA stated, "the more substantial the initial processing, the more likely the resulting material is to be commodity-like." 50 Fed. Reg. 614, 655 (Jan. 4, 1985). Here, the initial processing is HTMR. HTMR is a physical and chemical process that is performed in certain equipment, such as a rotary kiln, rotary hearth furnace, plasma furnace, or electric furnace.

HTMR processing of EAF dust can more than double the levels of zinc in EAF dust, and it can substantially increase its levels of lead and cadmium. The increased concentrations of these metals are desirable for BRZ's refining process. HTMR processing also reduces the levels of numerous undesirable constituents in EAF dust. Without HTMR processing, EAF dust is not suitable to directly produce zinc in most, if not all, zinc smelting and refining operations. HTMR processing increases the value of EAF dust from a negative $80 per ton (its cost of disposal) to a value that approaches the value of mined zinc sulfide concentrates (currently $250 to $300 per ton).

After undergoing HTMR processing, EAF dust can be refined directly. However, BRZ proposes to wash EAF zinc oxide to reduce the inorganic salts that could corrode BRZ's refining equipment. After washing the material, BRZ plans to roast, leach, purify, and further process the material. This refining process recovers various metals, including a special high grade quality zinc.

BRZ and IEPA maintain that EAF zinc oxide will be fully reclaimed after the wash, *i.e.*, that the wash alone constitutes all of the "further processing that is required." BRZ and IEPA view the washed EAF zinc oxide as a product, not a waste, and thus do not view the subsequent refining as relevant to this factor. Exh. 3 at 13-16; Resp. at 3-4. In support of its position, BRZ introduced a letter from the State of Tennessee Department of Environment and Conservation that indicates that secondary zinc oxide material recovered by HTMR processing is fully reclaimed without any washing. See Exh. 3, Att. A. The Board notes, however, that USEPA guidance indicates that putting secondary zinc oxide material derived from K061 through an electrolytic zinc refining process constitutes further reclamation under RCRA. See RCRA Permit Policy Compendium, 9444.1994 (09) (December 19, 1994 letter to Paul R. DiBella from David Bussard, Director, Characterization and Assessment Division, Office of Solid Waste and Emergency Response, USEPA). This USEPA guidance suggests that the subsequent refining is relevant to this factor.

The Board finds that even if the subsequent refining is relevant, the HTMR processing is substantial, both in terms of the process itself and its effect on EAF dust. The Board therefore finds that this factor supports BRZ's claim that EAF zinc oxide is commodity-like.

The Value of the Material After It Has Been Reclaimed

USEPA states that "the more valuable a material is after initial processing, the more likely it is to be commodity-like." 50 Fed. Reg. 614, 655 (Jan. 4, 1985). As noted above, once EAF dust has been through the HTMR process, the value of the resulting secondary zinc oxide material approaches the value of mined zinc sulfide concentrates. BRZ and AmeriSteel have reached agreement on contract terms and the price of EAF zinc oxide is to be based on a certain percentage of the zinc content of the material and the LME price for zinc. BRZ would pay AmeriSteel a high percentage of what BRZ would normally pay for mined zinc sulfide concentrates. BRZ is prepared to pay a price for EAF zinc oxide that far exceeds its cost of freight.

The Board finds that EAF zinc oxide has significant value.

The Degree To Which the Reclaimed Material is Like an Analogous Raw Material

According to USEPA, "[i]f the initially-reclaimed material can substitute for a virgin material, for instance as a feedstock to a primary process, it is more likely to be commodity-like." 50 Fed. Reg. 614, 655 (Jan. 4, 1985). EAF zinc oxide can substitute for zinc sulfide concentrates from mines. While not identical, the two materials are chemically similar. Both materials typically would require some form of contaminant removal before BRZ would introduce them to its roaster (*i.e.*, BRZ processes mined concentrates with an acid solution to remove magnesium; BRZ proposes to wash EAF zinc oxide with a mixture of water and soda ash to reduce levels of inorganic salts). After the wash, BRZ plans to use EAF zinc oxide filter cake in the same manner it uses the filter cake of mined concentrates. The products and by-products from EAF zinc oxide would be nearly identical to those of the mined materials. Aside from its chloride and fluoride levels, AmeriSteel's EAF zinc oxide meets the specifications of a typical zinc refiner for zinc sulfide concentrate blends.

The Board finds that EAF zinc oxide is very similar to mined zinc sulfide concentrates and can be substituted for the mined concentrates.

The Extent To Which an End Market for the Reclaimed Material is Guaranteed

In discussing this factor, USEPA states:

> If the [petitioner] can show that there is an existing and guaranteed end market for the initially-reclaimed material (for instance, value, traditional usage or contractual arrangements), the material is more likely to be commodity-like. 50 Fed. Reg. 614, 655 (Jan. 4, 1985).

In this case, the evidence established that EAF zinc oxide is sold primarily to produce zinc, but also to produce zinc chemicals. Several facilities in the United States produce or are capable of producing EAF zinc oxide. There are markets for EAF zinc oxide in North America, Asia, and Europe.

BRZ's contract with AmeriSteel would provide another end market for the EAF zinc oxide that AmeriSteel produces. AmeriSteel's EAF zinc oxide meets specifications necessary for BRZ to economically process the material. With the exception of chloride and fluoride, AmeriSteel's EAF zinc oxide also meets typical zinc refiner specifications for zinc sulfide concentrate blends and falls within the range of secondary feed specifications that zinc refiners have established. BRZ also established that there are end markets for its products and by-products. These factors corroborate that a market for feed material exists.

The Board finds that there is an end market for EAF zinc oxide.

The Extent To Which the Reclaimed Material is Handled to Minimize Loss

USEPA states that the "more carefully a material is handled, the more it is commodity-like." 50 Fed. Reg. 614, 655 (Jan. 4, 1985). Typically, the largest suppliers of secondary zinc oxide material either wash it themselves and deliver it as wet filter cake (which BRZ can handle as it currently handles filter cake feed material) or ship the material as dry dust in pneumatic railcars. Smaller suppliers typically package the secondary zinc oxide material in supersacks.

BRZ proposes to handle dry secondary zinc oxide material, which is expected to arrive in bulk or in supersacks, in a totally enclosed facility. Railcars of the bulk material are to be unloaded through ventilated air slides to silos with HEPA filters. The silos are to be on concrete or asphalt pads with sumps to transfer any spillage to the washing process. Supersacks of the material are to be stored in enclosed areas and emptied under negative pressure in a discharge station with air filters. IEPA issued an air pollution control construction permit that limits emissions of particulate matter from the handling/wash facility to 1.68 tons per year.

The Board also notes that producers of EAF zinc oxide and BRZ have financial incentives not to lose the material: if producers lose the material, they have less to sell to BRZ; if BRZ loses the material, it has less feedstock for its refinery.

The Board finds that EAF zinc oxide will be handled to minimize loss.

Other Relevant Factors

The Board will not consider any additional factors based on this record. When discussing Section 720.131(c)(6), BRZ states that the grant of an adjusted standard will encourage the recycling of EAF dust and decrease the amount of the material that is landfilled. Exh. 3 at 21; Reply at 3. While the Board encourages recycling, the Board may consider "other relevant factors" only to the extent that they are relevant to whether EAF zinc oxide is commodity-like. BRZ has not established that an increase in EAF dust recycling is relevant to that question.

Board Determination

The Board finds that BRZ has established that EAF zinc oxide is commodity-like. Accordingly, the Board determines that EAF zinc oxide is not a solid waste.

Conditions on the Adjusted Standard

The Board will first set forth the conditions that BRZ proposes on the adjusted standard, and then set forth the Board's findings on those conditions.

BRZ's Proposed Conditions

BRZ proposes the following conditions on the adjusted standard, which it amended to reflect the conditions that IEPA requested:

a. The material accepted shall consist of zinc oxide reclaimed from EAF dust (K061) using an HTMR process;

b. The material accepted shall meet the following specifications as monthly averages[:]

(1) > 50% zinc;

(2) < 20% lead;

(3) < 5% iron;

(4) < 4% total gangue materials (silica plus calcium plus magnesium); and

(5) < 13% chloride; provided, however, that the material accepted may contain up to 7% iron for a period of up to three months during the start-up of the process producing the materials;

c. BRZ shall maintain records which document the sources of the reclaimed zinc oxide and which are adequate to demonstrate that the materials accepted meet the specifications set forth in Condition b, above; and

d. BRZ shall maintain the records required under Condition c, above, for a period of three years and shall make such records available for inspection and copying at any reasonable time during normal business hours upon request by Illinois EPA.

Tr. at 5-6; Exh. 4; Reply at 6.

BRZ proposes to "take representative samples from the shipments of reclaimed zinc oxide . . . and composite them on a monthly basis." Reply at 5. BRZ would analyze the monthly composites for zinc, lead, iron, chloride, silica, calcium, and magnesium to determine compliance with its proposed specifications. *Id*. BRZ maintains that it should be able to "accept the infrequent individual shipment which exceeds these specifications if the normal production of the supplier meets specifications and those shipments can be blended with other shipments such that the blended materials meet the specifications." *Id*. at 4. IEPA has agreed to all of these proposed conditions. Tr. at 24.

Board Findings

BRZ's proposed conditions (b) and (c), and the manner in which BRZ proposes to comply with these conditions, raise a number of questions. Initially, it is unclear how BRZ would composite samples. For example, it is unclear whether a composite of samples from each shipment would be tested individually or whether samples from multiple shipments would be composited for testing. It is also unclear whether samples of shipments from different producers would be composited or whether separate composites would be tested for each producer.

In addition, it does not appear that BRZ would keep shipments of EAF zinc oxide segregated and unprocessed while it awaits test results. Accordingly, if a composite sample exceeds the proposed specifications, it is unclear how BRZ could identify the shipment in order to blend it "such that the blended materials meet the specifications." In addition, by the time BRZ receives test results on a composite sample, BRZ may already have blended the material with other feed material and, in fact, may already have refined the material.

It is also unclear how BRZ ever could violate these conditions of the adjusted standard as BRZ interprets them. If a test shows that material greatly exceeds the specifications, BRZ could comply by simply mixing portions of that material in piecemeal fashion with compliant materials until all of the noncompliant material is used. It is also unclear whether BRZ would have to test the blend to confirm compliance.

These proposed conditions also raise environmental and regulatory concerns. First, if an adjusted standard is granted, RCRA regulations would not apply to the materials during their shipment to BRZ, and during their storage and processing at BRZ. If BRZ could blend noncompliant material (*e.g.*, material that exceeds the lead limit) until the blend met the specifications, transporters would be able to transport in Illinois (and BRZ would be able to handle and store) material that exceeds the specifications without being subject to Illinois' hazardous waste regulations. Likewise, an Illinois producer of EAF zinc oxide with material intended to be shipped to BRZ that exceeds the specifications could handle and store that material without being subject to Illinois' hazardous waste regulations.

Second, the specifications on the contents of EAF zinc oxide relate directly to BRZ's ability to economically use the material. The failure of the material to meet the specifications calls into question the degree of processing that the HTMR unit provided, the value of the

material, the degree to which the material is like mined zinc sulfide concentrates, and the extent to which there is an end market for the material. Thus, to the extent that material fails to meet these specifications, the Board would be less likely to find that the material is commodity-like under Section 720.131(c).

In order to protect the environment and to ensure the commodity-like character of EAF zinc oxide that BRZ accepts for processing, the Board will limit the applicability of this adjusted standard to EAF zinc oxide that meets the specifications. Representative samples of each shipment of EAF zinc oxide must be collected, composited, and tested in accordance with generally accepted practices, such as those specified in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," EPA Publication No. SW-846 (Third Edition).

In addition, the Board's determination applies only to EAF zinc oxide to be processed through BRZ's electrolytic zinc refinery in Sauget, Illinois. BRZ cannot accept the material under the adjusted standard for a different use or for processing at a different facility.

Of course, the Board is not determining the status of EAF zinc oxide intended for BRZ when that material is outside of Illinois. The Board's determination applies only to EAF zinc oxide when it is in Illinois. If EAF zinc oxide is produced outside of Illinois, the composite sampling of each shipment must meet the specifications before the shipment to BRZ enters Illinois.

In addition, the Board's determination applies only to EAF zinc oxide that has arrived at BRZ's Sauget facility or that is under a legally binding contract for sale to BRZ. Without this requirement, an unscrupulous generator of EAF zinc oxide could accumulate the material at its facility and seek to evade Illinois' hazardous waste regulations by claiming that it plans to sell the material to BRZ.

BRZ has several options if it objects to the conditions that the Board has placed on this adjusted standard. First, under the Board's procedural rules, BRZ may move the Board to reconsider the conditions that the Board has placed on this adjusted standard. Second, BRZ may appeal the Board's adjusted standard to the Illinois Appellate Court. Third, BRZ may choose to consider EAF zinc oxide a solid waste in lieu of accepting the material under the conditions of the adjusted standard.

CONCLUSION

The Board finds that BRZ has established that zinc oxide material produced by subjecting EAF dust to an HTMR process is commodity-like. Accordingly, the Board finds that EAF zinc oxide is not a solid waste and grants BRZ's petition under Section 720.131(c) for an adjusted standard, subject to the conditions set forth in this order.

The Board emphasizes that this determination applies only to EAF zinc oxide to be processed through BRZ's electrolytic zinc refinery in Sauget, St. Clair County. That EAF zinc oxide also must meet certain specifications. In addition, this determination applies only to

EAF zinc oxide when it is in Illinois and either at the Sauget facility or under a legally binding contract for sale to BRZ.

This opinion constitutes the Board's findings of fact and conclusions of law in this matter.

ORDER

1. The Board finds that zinc oxide material produced by subjecting electric arc furnace (EAF) dust from the primary production of steel (K061 under 35 Ill. Adm. Code 721.132) to a high temperature metals recovery (HTMR) process is not a solid waste and grants Big River Zinc Corporation (BRZ) an adjusted standard under 35 Ill. Adm. Code 720.131(c).

2. The adjusted standard is subject to the following conditions:

   a. The determination described in paragraph one of this order applies only to zinc oxide material:

      (1) that is to be processed through BRZ's electrolytic zinc refinery in Sauget, St. Clair County, Illinois;

      (2) that is in Illinois;

      (3) that has arrived at BRZ's Sauget, St. Clair County, Illinois facility or that is under a legally binding contract for sale to BRZ; and

      (4) that meets the following specifications by weight:

         (a) > 50% zinc;

         (b) < 20% lead;

         (c) < 5% iron (or < 7% iron in material produced by an HTMR unit during the first three months that the HTMR unit produces zinc oxide material from EAF dust from the primary production of steel (K061 under 35 Ill. Adm. Code 721.132));

         (d) < 4% total gangue materials (silica plus calcium plus magnesium); and

         (e) < 13% chloride;

b. BRZ must maintain records that document the sources of all zinc oxide material that BRZ accepts under this adjusted standard;

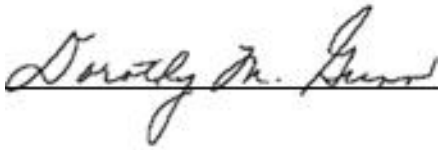
c. BRZ must maintain records that demonstrate that each shipment of zinc oxide material that BRZ accepts under this adjusted standard meets the specifications set forth in paragraph 2(a)(4) of this order; for this demonstration, representative samples of each shipment of zinc oxide material must be collected, composited, and tested in accordance with generally accepted practices, such as those specified in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," EPA Publication No. SW-846 (Third Edition); and

d. BRZ must maintain the records required under paragraphs 2(b) and 2(c) of this order for a period of three years and must make such records available for inspection and copying at any reasonable time during normal business hours upon the Illinois Environmental Protection Agency's request.

IT IS SO ORDERED.

Section 41 of the Environmental Protection Act (415 ILCS 5/41 (1996)) provides for the appeal of final Board orders to the Illinois Appellate Court within 35 days of service of this order. Illinois Supreme Court Rule 335 establishes such filing requirements. See 172 Ill. 2d R. 335; see also 35 Ill. Adm. Code 101.246, Motions for Reconsideration.

I, Dorothy M. Gunn, Clerk of the Illinois Pollution Control Board, hereby certify that the above opinion and order was adopted on the 15th day of April 1999 by a vote of 7-0.



Dorothy M. Gunn, Clerk
Illinois Pollution Control Board