UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY

BEFORE THE ADMINISTRATOR

In the Matter of:	)	
	)	
Carbon Injection Systems LLC,	)	
Scott Forster, and	)	**Docket No. RCRA-05-2011-0009**
Eric Lofquist,	)	
	)	
Respondents.	)	

INITIAL DECISION

DATED: March 17, 2015

PRESIDING OFFICER: Chief Administrative Law Judge Susan L. Biro

APPEARANCES:

For Complainant:

Catherine Garypie, Esq.
Jeffrey Cahn, Esq.
Office of Regional Counsel
U.S. Environmental Protection Agency, Region 5
77 West Jackson Boulevard (C-14J)
Chicago, Illinois 60604
(312) 886-5825

For Respondents:

Keven Drummond Eiber, Esq.
Meagan Moore, Esq.
Todd Baumgartner, Esq.
Brouse & McDowell
1001 Lakeside Avenue, Suite 1600
Cleveland, Ohio 44114
(216) 830-6830

Lawrence W. Falbe, Esq.
Quarles & Brady
300 North LaSalle Street, Suite 4000
Chicago, Illinois 60654
(312) 715-5000

I. PROCEDURAL HISTORY

A. PRE-HEARING HISTORY

On May 13, 2011, the Director of the Land and Chemicals Division at Region 5 ("Complainant") of the United States Environmental Protection Agency ("EPA" "U.S. EPA," or "Agency") initiated this proceeding by filing a Complaint and Compliance Order ("Complaint") against Carbon Injection Systems LLC, Scott Forster, and Eric Lofquist ("Respondents") pursuant to Section 3008(a) of the Solid Waste Disposal Act, as amended, also known as the Resource Conservation and Recovery Act, as amended by the Hazardous and Solid Waste Amendments of 1984 (collectively referred to as "RCRA"), 42 U.S.C. § 6928(a). The Complaint charges Respondents with ten counts of violating certain provisions of RCRA and the Ohio Administrative Code. For these alleged violations, the Complaint seeks the assessment of a civil penalty in the aggregate amount of $1,915,148 and the issuance of a compliance order against Respondents.

Through counsel, Respondents filed an Answer to the Complaint on July 15, 2011. In their Answer, Respondents admit to certain allegations but deny that their activities were subject to regulation under RCRA. They also raise seven affirmative defenses, including that the charges against them are barred by the doctrine of selective enforcement and an inability to pay the proposed penalty.

Pursuant to a Prehearing Order dated August 5, 2011, Complainant filed its Initial Prehearing Exchange on October 14, 2011. The parties simultaneously filed a Joint Motion for Entry of Stipulation and Protective Order Regarding Confidentiality, wherein they asserted that Complainant had obtained from Respondents and certain non-party entities numerous documents purported to contain confidential business information ("CBI") or privacy information and that the parties expected to generate additional documents containing such information. While Complainant had not yet determined whether the subject information was entitled to confidential treatment pursuant to the applicable regulations set forth at 40 C.F.R. Part 2, subpart B, it joined Respondents in requesting the entry of a proposed Stipulation and Protective Order Regarding Confidentiality to prevent the unauthorized disclosure of the information. This Tribunal subsequently issued a protective order on October 26, 2011, and directed that any document filed by a party and identified by the filing party as being entitled to confidential treatment would be treated as such in accordance with the terms of the order. Thereafter, Respondents filed an Initial Joint Prehearing Exchange on November 4, 2011, and Complainant filed a Rebuttal Prehearing Exchange on November 18, 2011.

By Order dated November 28, 2011, the undersigned scheduled this matter for hearing and established deadlines for a number of prehearing procedures. The parties subsequently engaged in extensive motions practice. In particular, on December 8, 2011, Respondents filed a motion seeking, among other requests, a 90-day extension of the established case schedule, leave

to depose a number of non-party witnesses, and the issuance of subpoenas compelling those witnesses to testify and produce certain documents at the depositions. In turn, on December 9, 2011, Complainant filed a Motion to Strike Respondents' Affirmative Defenses, in which Complainant sought to strike each of the seven affirmative defenses raised by Respondents in their Answer. The parties subsequently filed their respective responses and replies to these motions.

By Order dated December 27, 2011, the undersigned granted Respondents' request for leave to depose four proposed witnesses currently or formerly employed by International Flavors and Fragrances, Inc., and for the issuance of subpoenas for those individuals,[1] but denied Respondents' request for leave to depose seven additional proposed non-party witnesses as necessary. The undersigned simultaneously revised the prehearing deadlines and postponed the hearing until May of 2012, pending the conclusion of discovery. Because of the professed unavailability of one of Complainant's proposed witnesses during the month of May, the undersigned subsequently rescheduled the hearing in this matter to commence on June 18, 2012.

Thereafter, by Order dated February 14, 2012, the undersigned granted Complainant's motion to strike the second affirmative defense raised by Respondents that Complainant's claims were barred by its failure to provide adequate notice. The undersigned also granted Complainant's motion to strike the sixth affirmative defense raised by Respondents that Complainant's request for the assessment of a civil penalty be denied on the grounds of Respondents' inability to pay the proposed penalty, but only with respect to Respondents Scott Forster and Eric Lofquist. Conversely, the undersigned denied Complainant's motion to strike the first, third, fourth, fifth, and seventh affirmative defenses raised by Respondents, as well as the sixth affirmative defense with respect to Respondent Carbon Injection Systems LLC.

The parties subsequently filed competing motions for accelerated decision on March 16, 2012, followed by their respective responses and replies. By Order dated June 4, 2012, the undersigned found that genuine issues of material fact existed for hearing and, accordingly, denied the parties' cross motions for accelerated decision.

By leave of the undersigned, Complainant filed a First Amended Complaint and Compliance Order ("First Amended Complaint") on April 12, 2012, and a Second Amended Complaint and Compliance Order ("Second Amended Complaint" or "Compl.") on June 8, 2012. Respondents filed an Answer to U.S. EPA's First Amended Complaint and Compliance Order ("First Amended Answer" or "Ans.") on April 20, 2012, and because Respondents did not file an answer to the Second Amended Complaint, the First Amended Answer was deemed to respond to it. The undersigned also granted leave to the parties to supplement their prehearing exchanges on multiple occasions prior to the hearing.

[1] The undersigned subsequently reissued those subpoenas pursuant to Orders dated January 17, 2012, and February 13, 2012, to reflect new agreed-upon dates for the depositions.

The parties filed Joint Stipulations as to Facts, Exhibits and Testimony ("Joint Stipulations I" or "Jt. Stips. I") on April 9, 2012, and Joint Stipulations as to Expert Witness Qualifications ("Joint Stipulations II" or "Jt. Stips. II") on June 13, 2012.

On May 4, 2012, Complainant filed a Motion *in Limine* to Preclude Certain Testimony, Evidence, and Documents, while Respondents filed Motions *in Limine* to Bar Certain Testimony and/or Opinions of U.S. EPA's Fact Witness Michael Beedle, to Preclude U.S. EPA's Evidence of "Prior History," to Preclude Evidence or Testimony Relating to the "Prior History" of Scott Forster, and to Bar Evidence of the Financial Worth or Assets of Scott Forster and Eric Lofquist. Respondents also filed an Omnibus Motion *in Limine* on "Routine" Matters. The parties subsequently filed their respective responses. By Order dated May 31, 2012, the undersigned granted the parties' motions *in limine* with respect to evidence related solely to a respondent's ability to pay, such as real estate listings for various residential properties labeled as proposed Complainant's Exhibits 75-79, based upon the undersigned's conclusion that such evidence would be irrelevant and, therefore, inadmissible because all three Respondents had admitted that they were able to pay the proposed penalty by withdrawing that defense. In every other respect, the parties' motions *in limine* were denied.

Thereafter, the parties filed prehearing briefs. Finally, at the request of the parties, this Tribunal issued subpoenas compelling nine non-party witnesses to appear and testify at the hearing.

B. HEARING

The hearing in this matter commenced in Cleveland, Ohio, on June 18, 2012, and continued through June 29, 2012. On July 16, 2012, the hearing resumed in Augusta, Georgia.

At the hearing, Complainant introduced into evidence 164 partial or complete exhibits (nos. 1-15, 18-39, 42-72, 74, 80-90, 93-95, 97-103, 105-114, 116-142, 144, 153-156, 160-169, 174-200, 206-207) (hereinafter cited as "CX __"), and offered the oral testimony of nine witnesses: Michael Beedle, Richard J. Fruehan, Ph.D., David D. Clark, Francis Awanya, Respondent Forster, Respondent Lofquist, Gail B. Coad, David Shephard, and Thomas Guido. Respondents, in turn, introduced into evidence at hearing 72 exhibits (nos. 1, 3, 5-7, 9-10, 19-23, 31, 34-38, 40-45, 47-55, 60, 65-73, 75, 87-99, 104-107, 111-112, 114-115, 117, 119, 130-134) (hereinafter cited as "RX __"), and offered the oral testimony of 12 witnesses: Bruce Sass, Ph.D., Steven T. Charpia, Ernie M. Willis, Zygmunt Osiecki, Respondent Lofquist, Richard Murray, Robert Malecki, Respondent Forster, John Dzugan, Kenneth Bentfeld, Frederick Rorick, Jr., and Joseph J. Poveromo, Ph.D.

C. POST-HEARING HISTORY

On July 25, 2012, the certified transcript of the testimony taken at the hearing was received. By Order dated August 1, 2012, the undersigned scheduled the filing of any joint

motion to conform the transcript to the actual testimony and any post-hearing briefs. The parties subsequently filed a Joint Motion to Conform Transcript on August 10, 2012, which was granted with minor modifications by Order dated August 15, 2012.

Thereafter, the parties filed their respective initial post-hearing briefs and reply briefs. On November 19, 2012, Respondents filed their Joint Motion to Supplement the Record. Complainant filed its Response to Respondents' Joint Motion to Supplement the Record, or, in the Alternative, Complainant's Motion to Supplement the Record on December 3, 2012, and Respondents filed their Joint Reply to Complainant's Response to Respondents' Joint Motion to Supplement the Record and Opposition to Complainant's Motion to Supplement the Record on December 12, 2012. Rulings on these motions are set forth below.

II. MOTIONS TO SUPPLEMENT THE RECORD

As noted above, approximately four months after the conclusion of the hearing, Respondents filed a Joint Motion to Supplement the Record ("Respondents' Motion") with additional documentary evidence. Thereafter, Complainant filed a Response to Respondents' Joint Motion to Supplement the Record, or, in the Alternative, Complainant's Motion to Supplement the Record ("Complainant's Response").

The procedural rules that govern this proceeding, set forth at 40 C.F.R. §§ 22.1-22.32 and known as the Consolidated Rules of Practice Governing the Administrative Assessment of Civil Penalties and the Revocation/Termination or Suspension of Permits ("Rules of Practice"), do not expressly authorize or prescribe a standard for adjudicating motions to "supplement the evidentiary record" submitted after the adjournment of the hearing. However, the Rules of Practice do provide for filing of a "motion to reopen a hearing" to take further evidence that "must be filed no later than 20 days after service of the initial decision." 40 C.F.R. § 22.28(a). The Rule states that such motions shall "state briefly the nature and purpose of the evidence to be adduced; show that such evidence is not cumulative; and show good cause why such evidence was not adduced at the hearing." *Id*. The Rule does not specifically state a standard to be used in granting or denying such motions by this Tribunal, and there is limited relevant case law interpreting or applying the Rule specifically. However, the United States Court of Appeals for the Sixth Circuit ("Sixth Circuit") and others have held that a post-trial application to reopen the record prior to judgment is committed to the sound discretion of the trial court.[2] *See United States v. Hurd*, 1993 U.S. App. LEXIS 25718, at *6-7 (6th Cir. 1993) ("*Hurd*"); *United States v. Blankenship*, 775 F.2d 735, 741 (6th Cir. 1985) ("*Blankenship*"); *Henry v. United States*, 204

[2] Where an issue is not addressed by the Rules of Practice, the undersigned may rely upon the Federal Rules of Civil Procedure and federal court practice for guidance. *See, e.g., Euclid of Virginia, Inc.*, 13 E.A.D. 616, 657 (EAB 2008) ("[I]t is appropriate for Administrative Law Judges and the [Environmental Appeals Board] to consult the Federal Rules of Civil Procedure and Federal Rules of Evidence for guidance. . . ."); *City of Salisbury*, 10 E.A.D. 263, 285 n.31 (EAB 2002) ("[The Environmental Appeals Board] and the Agency's trial level administrative law judges may appropriately look to the federal courts for guidance."). Particular reference in this decision is made to the Sixth Circuit Court of Appeals because Respondents are situated in the State of Ohio and this case was heard primarily in Ohio, a state which falls within the jurisdiction of the Sixth Circuit.

F.2d 817, 820 (6th Cir. 1953) ("There is no iron-bound, copper-fastened, double-riveted rule against the admission of evidence after both parties have rested upon their proof and even after the jury has entered upon its deliberations. Considerable latitude in discretion is vested in the trial judge in this respect."); *Zenith Radio Corp. v. Hazeltine Research, Inc.*, 401 U.S. 321, 331-32, *reh'g denied*, 401 U.S. 1015 (1971); *Precision Pine & Timber, Inc. v. United States*, 596 F.3d 817, 833 (Fed. Cir. 2010) ("*Precision Pine*"); *United States v. Peay*, 972 F.2d 71, 73 (4th Cir. 1992); *Matthew Bender & Co., Inc. v. West Publ'g Co.*, 158 F.3d 674, 679 (2d Cir. 1998) ("A district court's decision to reopen the proof to allow a party to submit additional evidence is subject to its sound discretion."); *Hibiscus Assocs. v. Board of Trustees of the Policemen & Firemen Retirement Sys.*, 50 F.3d 908, 917 (11th Cir. 1995) (**"**A judge has broad discretion to reopen a case to accept additional evidence, and his decision will not be overturned absent an abuse of that discretion."); 12 James Wm. Moore et al., Moore's Federal Practice § 59.13(3)(c) (3d ed. 2002) (stating that pre-judgment motions to reopen are separate from Rule 59 motions but that district courts have discretion to grant such motions).

Further, paralleling the language of Rule 22.28(a), the Sixth Circuit and other federal courts appear to have generally settled upon three factors to be considered by a trial court when exercising its discretion in ruling on a motion to reopen the evidentiary record: 1) the probative value of the evidence proffered; 2) the reason why the evidence was not offered earlier in the proceeding; and 3) the likelihood of undue prejudice to the opposing party. *See, e.g.*, *Hurd*, 1993 U.S. App. LEXIS 25718, at *7 (citing *Blankenship*, 775 F.2d at 741; *Dairyland Power Coop. v. United States*, 103 Fed. Cl. 640, 642 (Fed. Cl. 2012) ("*Dairyland*") (citing *Precision Pine*, 596 F.3d at 833-34); *Rivera-Flores v. Puerto Rico Tel. Co*., 64 F.3d 742, 746 (1st Cir. 1995) ("*Rivera-Flores*") ("While the particular criteria that guide a trial court's decision to reopen are necessarily flexible and case-specific, it is generally understood that a trial court abuses its discretion if its refusal to reopen works an 'injustice' in the particular circumstances."); *Garcia v. Woman's Hosp.*, 97 F.3d 810, 814 (5th Cir. 1996); *United States v. Larson*, 596 F.2d 759, 778 (8th Cir. 1979).

With respect to the first of these factors, "a trial court considers whether 'the evidence sought to be introduced is especially important and probative.'" *Dairyland*, 103 Fed. Cl. at 642 (quoting *Rivera-Flores*, 64 F.3d at 746). "The evidence proffered should be relevant, admissible, technically adequate, and helpful to the [factfinder] in ascertaining [the facts at issue]." *United States v. Thetford*, 676 F.2d 170, 182 (5th Cir. 1982) ("*Thetford*"), *cert. denied*, 459 U.S. 1148 (1983). Trial courts act within their discretion in refusing to reopen the evidentiary record where the proffered evidence is of little probative value or is cumulative. *Rivera-Flores*, 64 F.3d at 746 (citing *Joseph v. Terminix Int'l Co.*, 17 F.3d 1282, 1285 (10th Cir. 1994); *Thomas v. S.S. Santa Mercedes*, 572 F.2d 1331, 1336 (9th Cir. 1978)); *Kelly v. Commercial Union Ins. Co.*, 709 F.2d 973, 980 (5th Cir. 1983).

As for the second factor, a trial court considers "whether the moving party offered a *bona fide* explanation for failing to introduce the evidence before it finally rested its case." *Rivera-Flores*, 64 F.3d at 747; *see also Thetford*, 676 F.2d at 182. Courts have accepted a moving party's "reasonably genuine surprise" at losing the opportunity to present the evidence as one

such explanation. *See, e.g.*, *Davignon v. Hodgson*, 524 F.3d 91, 114 (allowing the record to be reopened, in part, because the moving parties had a *bona fide* expectation that they could introduce evidence related to damages at a later stage of the proceeding) (citing *Rivera-Flores*, 64 F.3d at 747). However, "[i]nadvertence is not a compelling explanation" for failing to offer available evidence in the first instance. *Love v. Scribner*, 691 F. Supp. 2d 1215, 1235 (S.D. Cal. 2009); s*ee also Garcia v. Woman's Hosp. of Tex.*, 97 F.3d 810, 814 (5th Cir. 1996) ("Should a district court conclude that a litigant is engaging in any form of chicanery, it properly denies the motion. The same result obtains where the litigant was negligent in failing to introduce the evidence.").

The last factor requires the trial court to consider whether reopening the evidentiary record would cause "undue prejudice to the nonmoving party." *Rivera-Flores*, 64 F.3d at 746; *see also Precision Pine* 596 F.3d at 834. As the Sixth Circuit explained:

> One of the critical factors in evaluating prejudice is the timing of the motion to reopen. If it comes at a stage in the proceedings where the opposing party will have an opportunity to respond and attempt to rebut the evidence introduced after reopening, it is not nearly as likely to be prejudicial as when reopening is granted after all parties have rested . . . .

Blankenship, 775 F.2d at 741; s*ee also Ramsey v. United Mine Workers*, 481 F.2d 742, 753 (6th Cir. 1973) ("[R]eopening proof on the motion of one party long after trial has been completed can put the opposite party at a distinct disadvantage."). A reopening of the record "should not imbue the [new] evidence with distorted importance, prejudice the opposing party's case, or preclude an adversary from having an adequate opportunity to meet the additional evidence offered." *Thetford*, 676 F.2d at 182 (citations omitted). In particular, the non-moving party is prejudiced if it is denied the opportunity to cross-examine the proponent of the new evidence. *See, e.g.*, *Greater Dallas Home Care Alliance v. United States*, 1998 U.S. Dist. LEXIS 9656, at *4-5 (N.D. Tex. June 22, 1998) (refusing to reopen the record, in part, because doing so would require another hearing to allow the non-moving party the opportunity to cross-examine the author of the subject evidence and call witnesses in opposition); *cf. Harker v. United States*, 357 F.3d 846, 849 (8th Cir. 2004) (noting, in upholding a reopening of the record, that the non-movant was given the opportunity to cross-examine the proponent witness). The Sixth Circuit has held that prejudice to the opposing party is the "most important consideration" among the three factors. *Blankenship*, 775 F.2d at 741.

Here, Respondents' Motion seeks to supplement the record with a report dated November 14, 2012 ("Report"), which purports to document the closure activities performed by GT Environmental, Inc. ("GT Environmental"), at the Warren, Ohio facility that Respondent Carbon Injection Systems ("Respondent CIS") previously operated and that is the subject of this proceeding. Respondents explain that they retained GT Environmental to prepare a closure plan for the facility in compliance with applicable Ohio law, notwithstanding their position in this proceeding that the materials at issue are not regulated hazardous wastes, and that the closure plan had not yet been approved by the Ohio Environmental Protection Agency ("Ohio EPA") at

the time of the hearing. Respondents claim, however, that closure activities have since been completed, as described in the Report. Respondents contend that the Report thus "evidences that any potential hazardous waste management unit [at the facility] was properly closed pursuant to Ohio law" and that it is relevant to the relief sought by Complainant in that Complainant is seeking both a monetary penalty and an order requiring that "the former CIS facility be taken through RCRA closure."

Complainant counters Respondents' request in its Response first by citing Rule 22.28(a) and various cases where motions to reopen were filed either after issuance of initial decisions or before any hearing was held in the case, neither of which is the circumstance here. *See* Complainant's Response at 1-2 (citing 40 C.F.R. § 22.28(a) (emphasis added); *City of Detroit et al.*, TSCA Appeal No. 89-5, 1991 EPA App. LEXIS 8 (CJO, July 9, 1991) (motion to supplement the record filed after issuance of Final Decision by Chief Judicial Officer); *Martex Farms, S.E.*, EPA Docket No. FIFRA-02-2005-5301, 2005 EPA ALJ LEXIS 67 (ALJ, Oct. 21, 2005) (Order on Respondent's Motion Requesting Recommendation of Interlocutory Review and/or Reconsideration) (motion filed prior to hearing, noting that Rule 22.28 is applicable to a motion to reopen the hearing after issuance of an initial decision); *Environmental Protection Serv., Inc.*, EPA Docket No. TSCA-03-2001-0331, 2003 EPA ALJ LEXIS 44 (ALJ, June 11, 2003) (Order Denying Respondent's Request to Certify Prehearing Order for Interlocutory Appeal) (same); *Strong Steel Products, LLC*, EPA Docket No. CAA-5-2003-0009, 2005 EPA ALJ LEXIS 8 (ALJ, Feb. 15, 2005) (Order on Respondent's Motion to Reconsider Motion to Dismiss) (same).

Citing Rule 22.22(a) of the Rules of Practice, which provides the standard for the admissibility of evidence at hearing, Complainant next argues that the Report is "irrelevant, immaterial, and of little probative value in this matter" and, as such, should not be admitted. Complainant's Response at 3 (citing 40 C.F.R. § 22.22(a)). In support thereof, Complainant refers the undersigned to Complainant's Exhibit 197 and states that the fact that Respondent CIS proceeded to close its former facility and submit written certification of such is irrelevant because it did not first obtain the requisite approval from Ohio EPA. Complainant's Response at 4 (citing CX 197).

Alternatively, "[i]f the hearing is reopened and the Report is admitted," Complainant requests that it too be allowed to "supplement the record with evidence that proves that the CIS/MSC facility was not properly closed pursuant to applicable laws and regulations." Complainant's Response at 4. Specifically, it requests that it be permitted to add to the record two exhibits designated as Complainant's Exhibits 202 and 203 and to take the testimony of two additional witness, Erik Hagen and Mitch Matthews, with respect to the closure issue.

While Respondents appear to have offered a bone fide reason for not offering the Report earlier, in light of the decision rendered below on liability, the undersigned finds that the Report is of little or no probative value. Further, the admission of the Report at this stage would require the hearing to be reopened further in order to take additional testimony to avoid undue prejudice

to Complainant, which would additionally and unnecessarily delay the issuance of this Initial Decision. Therefore, the parties' motions to supplement the record are hereby **DENIED**.

III. STATUTORY AND REGULATORY BACKGROUND

A. SUBTITLE C OF RCRA AND THE IMPLEMENTING REGULATIONS

Congress enacted RCRA in 1976 as an amendment to the existing Solid Waste Disposal Act of 1965 in response to findings that increased industrial, commercial, and agricultural operations in this country had generated "a rising tide of scrap, discarded, and waste materials," which presented communities with "serious financial, management, intergovernmental, and technical problems in the disposal of solid wastes" that were of national scope and concern. 42 U.S.C. § 6901(a). Congress was further motivated by findings that "disposal of solid waste and hazardous waste . . . without careful planning and management can present a danger to human health and the environment;" that "alternatives to existing methods of land disposal must be developed" due to a shortage of suitable disposal sites; and that the recovery of usable materials and energy from solid waste offered a means of reducing the country's dependence on foreign resources and traditional sources of energy, such as petroleum products and natural gas. 42 U.S.C. § 6901(b)-(d).

In view of these findings, Congress designed RCRA to include two foundational programs: one governing "solid waste," the framework for which is set forth in Subtitle D of the statute, and one governing "hazardous waste," the framework for which is set forth in Subtitle C. Codified at 42 U.S.C. §§ 6921-6939f, Subtitle C was crafted "to reduce the generation of hazardous waste and to ensure the proper treatment, storage, and disposal of that waste which is nonetheless generated, 'so as to minimize the present and future threat to human health and the environment.'" *Meghrig v. KFC Western, Inc.*, 516 U.S. 479, 483 (1996) (quoting 42 U.S.C. § 6902(b)). To achieve this goal, RCRA "empowers EPA to regulate hazardous wastes from cradle to grave, in accordance with the rigorous safeguards and waste management procedures of Subtitle C . . . ." *City of Chicago v. Envtl. Defense Fund*, 511 U.S. 328, 331 (1994) ("*City of Chicago*").[3]

1) Definition of "Hazardous Waste"

While Subtitle C of RCRA directs EPA to "promulgate regulations establishing a comprehensive management system . . . .[,] EPA's authority . . . extends only to the regulation of 'hazardous waste.'" *American Mining Congress v. EPA*, 824 F.2d 1177, 1179 (D.C. Cir. 1987) ("*AMC I*"). Section 1004(5) of RCRA defines the term "hazardous waste" as follows:

> The term 'hazardous waste' means a solid waste, or combination of solid wastes, which because of its quantity, concentration, or physical, chemical, or infectious

[3] In contrast, non-hazardous solid wastes "are regulated much more loosely under Subtitle D [which is codified at] 42 U.S.C. §§ 6941-6949." *City of Chicago*, 511 U.S. at 331.

> characteristics may - (A) cause, or significantly contribute to an increase in mortality or an increase in serious irreversible or incapacitating reversible, illness; or (B) pose a substantial present or potential hazardous to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed.

42 U.S.C. § 6903(5).

As this definition indicates, in order for a material to constitute a "hazardous waste," it must first qualify as a "solid waste" under the statute. *See AMC I*, 824 F.2d at 1179 ("Because 'hazardous waste' is defined as a subset of 'solid waste,' . . . the scope of EPA's jurisdiction is limited to those materials that constitute 'solid waste.'"). RCRA defines the term "solid waste," in pertinent part, as "any garbage, refuse, sludge from a waste treatment plant, water supply treatment plant, or air pollution control facility *and other discarded material*, including solid, liquid, semisolid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations, and from community activities . . . ." 42 U.S.C. § 6903(27) (emphasis added).

Consistent with the statute, the regulations promulgated by EPA to implement Subtitle C, found at 40 C.F.R. Parts 260 through 279, also define "hazardous waste" as a subset of "solid waste" and "solid waste" as "any discarded material." *See* 40 C.F.R. §§ 261.3, 261.2(a)(1). While not defined by statute, the term "discarded material" is defined by the regulations as including materials that are "recycled."[4] 40 C.F.R. § 261.2(a)(2)(i). The regulations further prescribe that spent materials, sludges, sludges exhibiting a characteristic of hazardous waste, by-products listed in 40 C.F.R. 261.31 or 261.32, by-products exhibiting a characteristic of hazardous waste, and commercial chemical products listed in 40 C.F.R. 261.33[5] constitute solid wastes if they are recycled, or accumulated, stored, or treated before recycling, by being "burned to recover energy" or "used to produce a fuel or are otherwise contained in fuels (in which cases the fuel itself remains a solid waste)."[6] 40 C.F.R. § 261.2(c), Table 1.

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[4] The regulatory definition of "discarded material" also includes materials that are "abandoned," "considered inherently waste-like," and "a military munition identified as a solid waste in [40 C.F.R.] § 266.202." 40 C.F.R. § 261.2(a)(1)(2)(i). Complainant has not alleged that the materials at issue in this proceeding fall within any of these categories of "discarded material."

[5] Section 261.33 provides that certain enumerated "materials or items are hazardous wastes if and when they are discarded or intended to be discarded as described in § 261.2(a)(2)(i), . . . or when, in lieu of their original intended use, they are produced for use as (or as a component of) a fuel, distributed for use as a fuel, or burned as a fuel." 40 C.F.R. § 261.33. However, Section 261.2 exempts from regulation as a solid waste any commercial chemical products listed in 40 C.F.R. § 261.33 that "are themselves fuels." 40 C.F.R. § 261.2(c)(2)(ii).

[6] The regulations also provide that certain enumerated materials constitute solid wastes if they are recycled by being applied to or placed on the land in a manner that constitutes disposal, reclaimed, or accumulated speculatively. 40 C.F.R. § 261.2(c)(1), (3), (4). Complainant has not alleged that the materials at issue in this proceeding were recycled by any of these methods.

The regulations exclude from this definition of "discarded material" any materials shown to be recycled by being "used or reused as ingredients in an industrial process to make a product, provided the materials are not being reclaimed," or "used or reused as effective substitutes for commercial products." 40 C.F.R. § 261.2(e)(1)(i), (ii). However, this exclusion does not apply to materials that are "burned for energy recovery, used to produce a fuel, or contained in fuels," even if the given material is recycled by being used or reused as described in subsection 261.2(e)(1). 40 C.F.R. § 261.2(e)(2).

Once a material qualifies as a "solid waste" under the regulations, it must then qualify as a "hazardous waste" in order to be subject to regulation under Subtitle C. Set forth above, the statutory definition of the term "hazardous waste" is broad, with Congress "delegating to EPA the task of promulgating regulations identifying the characteristics of hazardous waste and listing specific wastes as hazardous." *Natural Res. Def. Council v. EPA*, 25 F.3d 1063, 1065 (D.C. Cir. 1994) (citing 42 U.S.C. § 6921). The regulations enacted by EPA pursuant to this authority provide that a solid waste constitutes a "hazardous waste" when, subject to certain exceptions, it satisfies one of two conditions: (1) the waste material exhibits the hazardous characteristics of ignitability, corrosivity, reactivity, or toxicity as defined by 40 C.F.R. §§ 261.21-261.24; or (2) the waste material is specifically listed as a hazardous waste at 40 C.F.R. §§ 261.31-261.33 following a rulemaking proceeding. 40 C.F.R. §§ 261.3, 261.20(a), 261.30(a).

2) Standards Applicable to Hazardous Waste Treatment, Storage, and Disposal Facilities

Once a material qualifies as a "hazardous waste," it is subject to all of the applicable requirements imposed by Subtitle C and the implementing regulations, including requirements governing the generation, storage, treatment, transportation, and disposal of that material. Of particular relevance here, Section 3005(a) of RCRA, 42 U.S.C. § 6925(a), and the implementing regulations set forth at 40 C.F.R. Part 270, require each person owning or operating a facility for the treatment, storage, or disposal of hazardous waste to obtain a permit for its operation. Prior to applying for such a permit, the applicant is required by the regulations at 40 C.F.R. § 124.31(b) to hold at least one meeting with the public to solicit questions and inform any attendees of proposed hazardous waste management activities to be performed at the facility.

The standards found at 40 C.F.R. Part 264 also apply to owners and operators of hazardous waste treatment, storage, or disposal facilities. Specifically, the regulations at 40 C.F.R. § 264.13 require the owner or operator to develop and follow a written plan for obtaining a detailed chemical and physical analysis of a representative sample of the wastes to be managed at the facility. The plan is also required to describe the procedures to be used to inspect and, if necessary, analyze the movement of hazardous waste received at the facility to ensure that it matches the identify of the waste designated on the accompanying shipping documents. In turn, the regulations at 40 C.F.R. § 264.16 require the personnel of a hazardous waste treatment, storage, or disposal facility to complete a program of classroom instruction or on-the-job training that teaches them to perform their duties in a way that ensures the facility's compliance with the

standards of 40 C.F.R. Part 264. The owner or operator is then required to maintain records related to that training.

Pursuant to the regulations at 40 C.F.R. § 264.37, the owner or operator of a hazardous waste treatment, storage, or disposal facility is obligated to attempt to make certain specified arrangements with local authorities, including police and fire departments and emergency response teams, as deemed appropriate for the type of waste managed by the facility and the potential need for the services of those authorities. Where a facility accepts for treatment, storage, or disposal any hazardous waste from an off-site source without an accompanying manifest, the owner or operator is also required by the regulations at 40 C.F.R. § 264.76 to prepare and submit an unmanifested waste report to the Regional Administrator within 15 days of receiving the waste.

The regulations at 40 C.F.R. §§ 264.110 through 264.120 next require the owner or operator of a hazardous waste treatment, storage, or disposal facility to maintain a written closure plan that identifies the steps necessary to perform partial or final closure of the facility at any stage of its active life. Also in connection with the closure of the facility, the owner or operator is obligated to prepare and maintain a detailed written estimate of the cost of closing the facility in accordance with the applicable provisions of 40 C.F.R. § 264, as well as establish financial assurance for closure of the facility based upon the options enumerated in 40 C.F.R. § 264.143. Additionally, the regulations at 40 C.F.R. § 264.192 require the owner or operator of a hazardous waste treatment, storage, or disposal facility to obtain a written assessment reviewed and certified by a qualified Professional Engineer attesting that the facility's tank system has sufficient structural integrity and is acceptable for the storage and treatment of the hazardous wastes managed at the facility.

Finally, pursuant to the regulations found at 40 C.F.R. Part 268, which set restrictions on the land disposal of certain hazardous wastes, where a hazardous waste treatment facility's waste will be further managed at another treatment, storage, or disposal facility, the facility sending the waste off-site is required to comply with certain notice and certification requirements applicable to generators set forth at 40 C.F.R. § 268.7.

B. OHIO'S AUTHORIZED HAZARDOUS WASTE PROGRAM

Pursuant to Section 3006 of RCRA, 42 U.S.C. § 6926, EPA may authorize states to administer and enforce their own statutes and regulations governing hazardous waste in lieu of Subtitle C and the implementing regulations promulgated thereunder. To obtain such authorization, a state hazardous waste program must 1) be the "equivalent" of the federal Subtitle C program; 2) be "consistent" with the federal Subtitle C program and the authorized programs of other states; and 3) provide for "adequate enforcement." 42 U.S.C. § 6926(b). States are required to follow certain procedures set forth at 40 C.F.R. Part 271 in order to apply for

authorization for their base hazardous waste programs and any revisions thereto.[7] After EPA determines whether to approve or disapprove a state's application for authorization, it is required to notify the public of its determination in the Federal Register, among other means. 40 C.F.R. §§ 271.20(e), 271.21(b)(3) and (4). EPA subsequently codifies its authorization at 40 C.F.R. Part 272. Once EPA's authorization is effective, the authorized provisions of the state program become the operative requirements for those aspects of RCRA in the state.

Effective on June 30, 1989, EPA granted final authorization to the State of Ohio, pursuant to Section 3006(b) of RCRA, to administer and enforce its hazardous waste program in lieu of the federal Subtitle C program. 40 C.F.R. § 272.1800(a); 54 Fed. Reg. 27,170, 27,170 (June 28, 1989). EPA subsequently approved revisions to the State's program effective on June 7, 1991, 56 Fed. Reg. 14,203 (Apr. 8, 1991); August 19, 1991, 56 Fed. Reg. 28,088 (June 19, 1991); September 25, 1995, 60 Fed. Reg. 38,502 (July 27, 1995); December 23, 1996, 61 Fed. Reg. 54,950 (Oct. 23, 1996); January 24, 2003, 68 Fed. Reg. 3,429 (Jan. 24, 2003); January 20, 2006, 71 Fed. Reg. 3,220 (Jan. 20, 2006); October 29, 2007, 72 Fed. Reg. 61,063 (Oct. 29, 2007); and March 19, 2012, 77 Fed. Reg. 15,966 (Mar. 19, 2012). Based upon the final authorization granted to the State of Ohio by EPA, the operative regulations for purposes of this proceeding are those promulgated by the State and codified in the Ohio Administrative Code ("OAC"). The regulations of the State are substantially similar to the parallel provisions of the Code of Federal Regulations discussed above.

Following final authorization of its base program and the revisions thereto, the State of Ohio holds primary responsibility for implementing and enforcing the program. 40 C.F.R. § 272.1800(c). However, EPA retains the authority to prosecute violations of any authorized requirement of the State's program as violations of RCRA pursuant to its enforcement authority found at Section 3008(a) of RCRA, 42 U.S.C. § 6928(a), and as described at 40 C.F.R. § 272.1800(c).

IV. FACTUAL BACKGROUND

The following facts were either incorporated into the parties' Joint Stipulations as to Facts, Exhibits and Testimony, undisputed at the hearing, stated as part of credible testimony at the hearing, or contained in credible documentation admitted into evidence at the hearing.

A. OPERATIONS OF RESPONDENT CARBON INJECTION SYSTEMS

Respondent CIS was organized in August of 2004 as a limited liability company doing business in the State of Ohio by Respondent Scott Forster ("Respondent Forster") and Respondent Eric Lofquist ("Respondent Lofquist"). Jt. Stips. I, Schedule A, ¶ 1; Compl.¶ 5;

[7] Revisions to a state's authorized program "may be necessary when the controlling Federal or State statutory or regulatory authority is modified or supplemented. The State shall keep EPA fully informed of any proposed modifications to its basic statutory or regulatory authority, its forms, procedures, or priorities." 40 C.F.R. § 271.21(a).

Ans. ¶ 5; CX 48; Tr. 1898, 1971, 2228. Since that time, Respondent Forster has served as its President, and Respondent Lofquist has served as its Vice President. Jt. Stips. I, Schedule A, ¶¶ 2, 3; CX 2 at EPA29-30; CX 5 at EPA6047. At the height of its operations, the company employed approximately eight individuals, including Respondent Forster and Respondent Lofquist. Tr. 1350. From the time of its formation until 2008, Respondent Forster owned 95 percent of the company, and Respondent Lofquist owned five percent of the company. CX 2 at EPA30, 101; Tr. 1362-63, 1902, 1907. Thereafter, Respondent Forster and Respondent Lofquist split ownership of Respondent CIS equally. Tr. 1907.

On January 1, 2005, Respondent CIS and WCI Steel, Inc. ("WCI Steel"), entered into a "Product Supply and Operation Agreement" ("Agreement"), which memorialized the terms of their agreement that Respondent CIS construct, own, maintain, and operate an "Oil Injection System" for the purpose of supplying "Fuel Oil" as a "fuel alternative to coke and or natural gas" to the blast furnace located at WCI Steel's facility in Warren, Ohio ("WCI Steel Facility").[8] Jt. Stips. I, Schedule A, ¶ 6; CX 24; Tr. 1976-77. Pursuant to the Agreement, Respondent CIS installed the Oil Injection System at Gate #4 Blast Furnace Main Avenue, Warren Township, Ohio ("CIS Facility"), on property currently owned by RG Steel LLC, formerly known as Severstal Warren, Inc., Warren Consolidated Industries, Inc., and WCI Steel (collectively referred to as "WCI"). Jt. Stips. I, Schedule A, ¶¶ 5, 7. Constructed in late 2004, the CIS Facility consisted, in pertinent part, of ten 20,000 gallon vertical above-ground storage tanks individually connected by piping to an eleventh vertical above-ground tank known as the "day tank." Jt. Stips. I, Schedule A, ¶¶ 8, 21; CX 24; Tr. 2191-92. The CIS Facility also contained a laboratory with limited capabilities. Tr. 1350, 1977, 2195.

Shortly after entering into the Product Supply and Operation Agreement, Respondent CIS notified Ohio EPA of its status as a used oil processor and marketer pursuant to OAC § 3745-279-51. Jt. Stips. I, Schedule A, ¶ 9. Operations at the CIS Facility then began in May of 2005. Jt. Stips. I, Schedule A, ¶ 20; CX 5 at 6048; CX 24. Approximately four employees of Respondent CIS were present at the CIS Facility on a daily basis, including John Dzugan, who served as the plant manager from 2004 through 2008, and Robert Malecki, who first served as a technician beginning in August of 2005. CX 2 at EPA29; Tr. 1350, 2187-88, 2230-31, 2256, 2260. Between the onset of operations in 2005 and the end of operations in 2008, approximately 150 entities supplied materials to Respondent CIS, either as the generator of the material or as a broker or intermediary between Respondent CIS and the generator, and Respondent CIS purchased a total of 55 to 60 million gallons of material. Tr. 2021, 2303, 2306-09; RX 40; CX 5 at EPA6705; CX 24 at EPA13131; CX 26 at EPA15532. Each material that Respondent CIS approved for use in its operations was assigned a unique number by which to identify it.[9] Tr. 1993-94, 2303-04; CX 29 at EPA16815; CX 87 at EPA18469, 18471.

[8] As discussed in greater detail below, a blast furnace consists of a steel stack lined with refractory brick that is designed to convert iron ore into liquid iron, often as a first step in the production of steel. CX 86.

[9] At the hearing, Respondent Lofquist described the process by which Respondent CIS approved a material for use in its operations. Tr. 1991-94. According to both Respondent Lofquist and Kenneth Bentfeld, who, among others,

Once a material arrived at the CIS Facility, it was first analyzed by Respondent CIS's staff in the CIS Facility's laboratory for a limited number of characteristics, including its moisture and BTU content.[10] Tr. 1359, 2195-96. The percentage of carbon contained in the material was not analyzed. Tr. 1359-60, 2198. The material was then unloaded into one of the ten vertical above-ground storage tanks, where it mixed with any other material contained in the particular storage tank, before ultimately being transferred to the day tank. Jt. Stips. I, Schedule A, ¶ 22; CX 24; Tr. 2201. Consisting of a blend of materials from the storage tanks, the contents of the day tank were analyzed on a daily basis, both at the CIS Facility's laboratory and at better-equipped laboratories operated by other entities, to ensure that certain properties of the materials met specifications set forth in the Product Supply and Operation Agreement.[11] Tr. 1360, 2203-04. The percentage of carbon contained in the materials was not analyzed at this stage either. Tr. 1362. From the day tank, the materials were then fed into the blast furnace at the WCI Steel Facility, subject to the control of WCI Steel. Jt. Stips. I, Schedule A, ¶ 24; CX 24; Tr. 2204. The flow of material to the blast furnace from the day tank was metered, and Respondent CIS charged WCI Steel each month based upon the volume of material supplied to it. Jt. Stips. I, Schedule A, ¶ 25; Tr. 2204-05.

WCI Steel ceased purchasing material from Respondent CIS in October of 2008, following the idling of the blast furnace. Jt. Stips. I, Schedule A, ¶ 17; CX 5 at EPA6047-48; Tr. 1912, 2012. Respondent CIS subsequently sold its inventory of materials to other facilities. Jt. Stips. I, Schedule A, ¶ 18.

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was responsible for procuring materials for use by Respondent CIS, the supplier of a material would be notified of Respondent CIS's approval by letter, wherein a number would be assigned to the material for purposes of identification. Tr. 1992-93, 2202-04. Each such number began with the letters "CR," which stood for "carbon replacement." Tr. 1992; CX 29 at EPA16815.

[10] According to Francis Awanya, a chemist employed by Region 5 of EPA who was qualified at the hearing as an expert in determining the flashpoint and carbon content of materials, the term "BTU" is an acronym for the "British thermal unit," which is "a unit that you see used a lot to rate energy or rate different things." Jt. Stips. II at 2; Tr. 1283, 1286-87.

[11] The Product Supply and Operation Agreement contained specifications for the following properties: viscosity at 100 degrees Fahrenheit, specific gravity, pounds per gallon, flash point, pour point, BTUs per gallon, total sulfur, total chlorine, water content, ash content, PCBs, arsenic, lead, cadmium, chromium, tin, and phosphorous. CX 24 at EPA13153. According to Respondent Lofquist, he and an employee of WCI Steel, Pat Cannon, developed the foregoing list based upon their desire "to have a list of parameters that pretty much followed the used oil regulations and something that was practical in nature that a truck could come in, be tested to these standards and be offloaded . . . in a relatively quick period of time." Tr. 1977.

B. RELATIONSHIP OF RESPONDENTS TO OTHER ENTITIES

1) Other Business Ventures of Respondent Forster and Respondent Lofquist

In addition to Respondent CIS, Respondent Forster and Respondent Lofquist have formed a number of other business entities together, including those identified below.

a) General Environmental Management, LLC

Respondent Forster and Respondent Lofquist organized General Environmental Management, LLC ("GEM"), in the spring of 2001. CX 2 at EPA30; Tr. 1893, 1896-97. Respondent Lofquist served as its President, and Respondent Forster served as its Vice President. CX 2 at EPA30; CX 71 at EPA17470; CX 114 at EPA18743. They split ownership of the company equally. CX 2 at EPA101; CX 114 at EPA18742; Tr. 1902.

From approximately July of 2001 until 2008, GEM operated a wastewater treatment facility in Cleveland, Ohio ("GEM Facility"), where it treated hazardous and nonhazardous wastes that it had accepted from generators and sold materials that it recovered during those processes to various customers. Tr. 699-700, 702-03, 1357, 1916-20, 2020; CX 97, 98. The GEM Facility housed a laboratory with "[b]road capabilities," including the ability to analyze the amount of carbon and the BTUs contained in a material. Tr. 1968-70. GEM employed a total of 48 individuals, approximately five of whom, including Respondent Forster and Respondent Lofquist, performed its sales functions at any given time. Tr. 1356, 1358, 1968, 1970-71. Eight to ten individuals were employed in the laboratory. Tr. 1968-69.

In addition to the functions it performed on its own behalf, GEM also provided administrative support to Respondent CIS, such as serving as the sales and marketing arm of Respondent CIS by soliciting materials for Respondent CIS's use in its operations. Tr. 1355-56, 1988-89; CX 2 at EPA31; CX 114 at EPA18743. Kenneth Bentfeld, a sales representative for GEM during its operation, assisted in the performance of this role during the course of Respondent CIS's operations by procuring materials to be processed at the GEM Facility and then used by Respondent CIS, as well as materials shipped directly to the CIS Facility for use in the blast furnace. Tr. 2236, 2302-03. In conjunction with the task of obtaining materials for Respondent CIS, Doreen Ostroske, a trained chemist and employee of GEM responsible for the company's environmental health and safety affairs, along with the individuals employed in GEM's laboratory, analyzed the suitability of materials for use in Respondent CIS's operations. Tr. 577-78, 1970, 1998-99. Ms. Ostroske also conferred with regulatory personnel, as well as Pete Wosotowsky, a civil engineer and employee of GEM who had prior experience in the steel industry. Tr. 1972, 1982, 1999, 2004, 2007-08; RX 114 at CIS02138. Respondent CIS, in turn, purchased some of the materials that GEM recovered during its operations. Tr. 1988, 2302.

On April 20, 2006, an explosion and fire occurred at the GEM Facility, resulting in the closure of the facility temporarily. CX 101-103; Tr. 631-32, 2010-11. Respondent Forster and

Respondent Lofquist ultimately dissolved GEM in January of 2009. Tr. 1908; CX 71 at EPA17470.

b) Magnus International Group, Inc.

Respondent Forster and Respondent Lofquist formed Magnus International Group, Inc. ("Magnus"), in 2008 as a holding company for several of the other business entities that they own. Tr. 1352, 1901, 2301; CX 71 at EPA17474. The company functions as an administrative arm for those entities by providing accounting, human resources, technical, and regulatory support. Tr. 1352-53, 1355. Respondent Forster and Respondent Lofquist split ownership of Magnus equally. Tr. 1902. Formerly of GEM, Mr. Bentfeld currently serves as the vice president of sales and marketing at Magnus. Tr. 2300-02.

c) Recycling and Treatment Technologies of Detroit, LLC

Following the formation of Respondent CIS, Respondent Forster and Respondent Lofquist organized Recycling and Treatment Technologies of Detroit, LLC ("RTT-Detroit"). Tr. 1898. Magnus is the sole member of RTT-Detroit. Tr. 1901. On a more limited scale than GEM, RTT-Detroit operates a wastewater treatment facility in Detroit, Michigan, for the purpose of recycling oils and other organic materials for fuel. Tr. 1898-99; CX 71 at EPA17473. Respondent CIS purchased some of the materials that RTT-Detroit recovered during its operations. CX 71 at EPA17473.

d) Hardy Industrial Technologies, LLC

Following their purchase of a facility in Painesville, Ohio, in June of 2007, Respondent Forster and Respondent Lofquist formed Hardy Industrial Technologies, LLC ("Hardy Industrial") to operate from that facility. Tr. 1899-90. The primary business of Hardy Industrial is to produce industrial waxes by hydrogenating such materials as corn and soybean oils. Tr. 1902-04. Magnus is the sole member of Hardy Industrial. Tr. 1901.

e) Recycling and Treatment Technologies, LLC

Respondent Forster and Respondent Lofquist subsequently formed Recycling and Treatment Technologies, LLC ("RTT-Painesville"), also to operate from the Painesville, Ohio facility. Tr. 1900, 1902. RTT-Painesville operates a waste treatment facility at that location. CX 71 at EPA17475. Respondent CIS purchased some of the materials that RTT-Painesville recovered during its operations. CX 71 at EPA17475.

f) Hardy Animal Nutrition, LLC

After 2009, Respondent Forster and Respondent Lofquist organized Hardy Animal Nutrition, LLC, which produces animal feeds and is also located in Painesville, Ohio. Tr. 1908, 1911.

g) Main Street Commodities, LLC

Upon the continuation of operations at the WCI Steel Facility in 2010 after a change in ownership, Respondent Forster and Respondent Lofquist organized Main Street Commodities, LLC ("MSC"), to resume operations at the CIS Facility. Tr. 1912-13; CX 5 at EPA6047-48. MSC leased the CIS Facility from Respondent CIS from March 1, 2010, to December 31, 2010, at which time it purchased the CIS Facility. Jt. Stips. I, Schedule A, ¶ 19; Tr. 136; CX 71 at EPA17476; CX 72 at EPA18042; CX 81; CX 84; CX 85. MSC ceased operations at the CIS Facility in May of 2012 following the idling of the WCI Steel Facility once again. CX 197 at EPA026790; CX 200; Tr. 372.

2) Innovative Waste Management, Inc., and Georgia Gulf Corporation

Between 2004 and 2008, Innovative Waste Management, Inc. ("IWM"), a corporation located in Summerville, South Carolina, acted as a broker of bulk industrial chemicals by facilitating two types of transactions: 1) the sale of services of various entities engaged in treatment and disposal activities to generators of hazardous and nonhazardous wastes, and 2) the sale of materials by generators to entities capable of using the materials in such a way that they would not be considered wastes under applicable regulatory programs. Tr. 557, 1775-77, 1819-20, 1827, 1831, 1881-85. During the course of IWM's dealings, representatives of the corporation – namely, S. Troy Charpia, then a salesman for IWM, and Ernie Willis, then the operations manager for IWM – developed a business relationship with Respondent Forster in his capacity at GEM and Respondent CIS. Tr. 1776-78, 1827-28, 1832. More specifically, IWM arranged for the disposal of hazardous and nonhazardous wastes at the GEM Facility. Tr. 1887-88. According to IWM, Respondent CIS, in turn, "approached IWM as a buyer of high carbon liquid materials for use in its process." CX 15 at EPA11938; *see also* Tr. 634, 1869-70.

Beginning in February of 2005 and continuing through that year, Mr. Charpia and Mr. Willis, with the assistance of Respondent Forster and Respondent Lofquist, sought the concurrence of the Louisiana Department of Environmental Quality ("LDEQ"), the Ohio EPA, and Region 5 of EPA that the use of materials designated as K022 waste[12] in a blast furnace would not run afoul of RCRA. Tr. 565, 569, 586-88, 615-16, 1780-88, 1790-1800, 1805-07, 1834-48, 1852-57; CX 2 at EPA2743, 2803, 2806-08, 2758-59; CX 13 at EPA10120-22, 10137-

[12] Such materials are listed as hazardous waste by the regulations found at 40 C.F.R. § 261.32, and are described as organic chemicals that consist of "[d]istillation bottom tars from the production of phenol/acetone from cumene." 40 C.F.R. § 261.32(a).

44, 10146-59, 10162-72, 10176-77, 10179-83; Jt. Stips. I, Schedule A, ¶¶ 30, 32, 34, 37, 38. This endeavor was prompted by IWM's proposal to a generator of those materials, whose facility was located in Louisiana and who was identified in documentary evidence in the record as both Georgia Gulf Corporation and Georgia Gulf Chemicals & Vinyls, L.L.C. ("Georgia Gulf"), to sell the materials for use in the blast furnace at the WCI Steel Facility, and Georgia Gulf's request that IWM first obtain approval from the LDEQ. Tr. 563-65; 1781-82, 1836; CX 2 at EPA2807-08; CX 13 at EPA10122. As shown by written communications between representatives of IWM and the LDEQ, the LDEQ was seemingly amenable to the position advanced by IWM that the use of materials designated as K022 waste in a blast furnace was exempt from regulation under RCRA, and the LDEQ authorized a shipment of the materials to GEM for the purpose of testing their suitability as "an appropriate carbon source for steel making," contingent upon the approval of the Ohio EPA because of the proposal to use the materials at the WCI Steel Facility in Ohio. CX 2 at EPA2806-08; CX 13 at EPA10159; *see also* Tr. 570, 579-81, 1791-95, 1840-43, 1873-74.

By written communication dated July 12, 2005, Gregory Orr, an inspector employed by the Ohio EPA who was tasked with inspecting the GEM Facility, advised Respondent Forster, Respondent Lofquist, and Doreen Ostroske of GEM that further investigation of the proposed use of the material in question was necessary. Jt. Stips. I, Schedule A, ¶ 32; CX 2 at EPA2743; Tr. 571-72, 586-88. Subsequent written communications between representatives of IWM and the Ohio EPA reflect that the Ohio EPA ultimately disagreed with IWM's position, opining that the material would be burned in the blast furnace, at least in part, for the purpose of recovering energy, and would thus be subject to regulation. CX 2 at EPA2758-59; CX 13 at EPA10149-57, 10176; Tr. 1797-99, 1847, 1852, 1856-58, 1861. Thereafter, representatives of IWM contacted Region 5 of EPA for guidance.[13] Tr. 615-20, 1852-53; CX 13 at 10142-44, 10179-83. While a representative of Region 5 initially referred the representatives of IWM back to Ohio EPA for resolution of their inquiry, Margaret M. Guerriero, Director of Region 5's Waste, Pesticides and Toxics Division, subsequently authored a letter to Mr. Willis on December 9, 2005, wherein she echoed the opinion of the Ohio EPA. CX 13 at EPA10182-83; CX 47 at EPA17146; Tr. 619-20, 1854-55; Jt. Stips. I, Schedule A, ¶ 38. On that same day, a representative of the Ohio EPA again advised representatives of IWM that the use of materials designated as K022 waste in a blast furnace was not exempt from regulation under RCRA. CX 13 at EPA10176; Tr. 620-22, 1797-98, 1856-57. Mr. Charpia of IWM notified Respondent Forster of the determination of the Ohio EPA by email on December 20, 2005. CX 2 at EPA2758-73; Tr. 1799-1801. While representatives of IWM asked the Ohio EPA to reconsider its determination in February of 2006, CX 2 at EPA2780-90, neither IWM nor Respondent CIS ultimately purchased the materials at issue from Georgia Gulf. Tr. 633, 1801, 1860, 1878, 1995.

[13] During his testimony, Mr. Willis explained that he contacted "Washington EPA" or simply "Washington." Tr. 1852-53, 1861, 1872. However, based upon the documentary evidence in the record, he appears to have communicated only with representatives of Region 5 of EPA located in Chicago, Illinois, rather than any of the offices of EPA located in Washington, D.C. *See* CX 13 at 10142-44, 10182-83.

3) Neville Chemical Company

Located in Pittsburgh, Pennsylvania, Neville Chemical Company ("Neville") manufactures resins from raw petroleum materials. Tr. 1938. By letter dated June 3, 2005, Respondent Forster, acting in his capacity at Respondent CIS, notified Neville that a sample of "recovered oil" that it had submitted to Respondent CIS had been found to be "an acceptable carbon replacement" for Respondent CIS's operations and designated the material as "CR205" for identification purposes. CX 21 at EPA12808; *see also* Tr. 1940-41, 1960. Thereafter, representatives of Neville – namely, Zygmunt Osiecki, the director of environmental affairs for the company – sought the guidance of an attorney, Colleen Donofrio. Tr. 582, 1938, 1941-42; CX 21 at EPA12771-72. As reflected in an email communication between Ms. Donofrio and Mr. Osiecki, Ms. Donofrio advised that the material at issue would not be subject to regulation as a solid waste when used by Respondent CIS based upon the information that Respondent CIS had supplied to Mr. Osiecki about its operations. CX 21 at EPA12771; *see also* Tr. 1942.

Together Mr. Osiecki, Respondent Lofquist, and Ms. Ostroske of GEM subsequently sought the approval of the Ohio EPA regarding the use of the material in question by Respondent CIS. *See, e.g.*, Tr. 583-86, 589-98, 602-03, 614-15, 1945-49, 1960-65, 1996, 1999, 2004, 2007-08; CX 2 at EPA2740, 2801-02; CX 21 at EPA12703-04, 12722-23, 12736, 12738-43, 12753, 12760-67, 12796-806; Jt. Stips. I, Schedule A, ¶¶ 33-35. For example, Respondent Lofquist met with Gregory Orr of the Ohio EPA in mid-July of 2005 to discuss the issue. CX 21 at EPA12767; Tr. 588-91, 2004. Thereafter, Respondent Lofquist corresponded with Mr. Orr by letter dated July 22, 2005, in which he described the function of "high carbonaceous liquids" in a blast furnace. CX 2 at 2734-39; CX 21 at EPA12800-01; Jt. Stips. I, Schedule A, ¶ 34; *see also* Tr. 1960-61. At the request of Mr. Osiecki, Ms. Donofrio then drafted a letter, dated July 28, 2005, to Mr. Orr on behalf of Mr. Osiecki that requested concurrence with Neville's position that such use of its materials was not subject to regulation. CX 2 at EPA2801-02; CX 21 at EPA12703-04, 12739-43; Tr. 584-85, 594, 1945-47, 1961; *see also* Jt. Stips. I, Schedule A, ¶ 35. Respondent Lofquist and Ms. Ostroske reviewed a draft of that letter prior to its submission to Mr. Orr, and Respondent Lofquist was copied on the letter as submitted. Tr. 1962-63; CX 2 at EPA2740-42, 2801-02; CX 21 at EPA12703-04, 12763-66; 12798; Jt. Stips. I, Schedule A, ¶ 35. While some evidence in the record suggests that Mr. Orr may have viewed Neville's position favorably, the Ohio EPA ultimately did not concur, and consequently, none of the material in question was shipped to Respondent CIS. Tr. 633, 1947-50, 1997, 2004-07; CX 21 at EPA12738, 12753, 12767.

4) JLM Chemicals, Inc., and Geptek, Inc., d/b/a GTI

On behalf of Respondent CIS, GEM began in August of 2005 to arrange for the purchase of materials designated as K022 waste that had been generated by JLM Chemicals, Inc. ("JLM"), a corporation located in Blue Island, Illinois, and engaged in the manufacture of certain chemical compounds, through Geptek, Inc., d/b/a GTI, a broker of chemicals headquartered in Morristown, New Jersey, with an office serving the Midwest located in Dyer, Indiana. Tr. 559-

60, 603-06; CX 7 at EPA6720, 6732. By letter dated November 8, 2005, Respondent Forster authorized Respondent CIS's purchase of "phenol oil" from JLM and assigned the number "CR257" to the material. CX 7 at EPA6835; CX 19 at EPA12366. The letter describes Respondent CIS's intent for the material to be used "as a commercial chemical replacement for carbon in a steel making operation." *Id.* JLM delivered a shipment of a material bearing number CR257, identified on the bill of lading as "residue column bottoms," to Respondent CIS on November 21, 2005. CX 19 at EPA12208; Jt. Stips. I, Schedule A, ¶ 27.

5) <u>International Flavors and Fragrances, Inc.</u>

Respondent CIS received 40 shipments of a material identified as "Unitene LE" from International Flavors and Fragrances, Inc. ("IFF"), between August 9, 2006, and February 27, 2009. Jt. Stips. I, Schedule A, ¶ 28. Respondent CIS also received from IFF 149 shipments of a material identified as "Unitene AGR" between November 16, 2006, and February 10, 2009. Jt. Stips. I, Schedule A, ¶ 29.

C. ENFORCEMENT ACTIVITIES OF REGION 5 OF EPA

On December 12, 2005, Region 5 issued an information request letter ("IRL") to WCI Steel regarding the injection of waste and/or used oil into the blast furnace at the WCI Steel Facility, pursuant to Section 3007 of RCRA, 42 U.S.C. § 6927 ("First WCI Steel IRL"). CX 23; Tr. 90, 665. WCI Steel thereafter submitted a response to Region 5 dated January 20, 2006 ("Response to First WCI Steel IRL"), that included documents involving Respondents, such as a letter addressed to Thomas Shepker of WCI Steel that Respondent Forster prepared in response to WCI Steel's request for assistance in responding to the First WCI Steel IRL; the Product Supply and Operation Agreement entered into by WCI Steel and Respondent CIS on January 1, 2005; and bills of lading and Material Data Safety Sheets ("MSDSs") related to materials delivered to Respondent CIS by third parties. CX 24; Tr. 90-92.

During its review of these documents, Region 5 identified JLM as one such third party. Tr. 92. Region 5 subsequently performed an inspection of JLM's premises at 3350 West 131st Street, Blue Island, Illinois 60406, on March 19, 2007. CX 30; Tr. 93. By letter dated July 31, 2007, Region 5 also requested information from JLM concerning its operations at that location pursuant to Section 3007 of RCRA, 42 U.S.C. § 6927 ("JLM IRL"), to which JLM submitted a response dated August 28, 2007 ("Response to JLM IRL"). CX 18, 19; Tr. 93. Through these and other channels, Region 5 determined that JLM generated a material identified as K022 waste during the course of its operations,[14] and that JLM had supplied this material both to GEM and to Respondent CIS. CX 19 at EPA12174; CX 30 at EPA16908, 16913; Tr. 93, 126-27. Thereafter,

[14] As previously noted, this material is listed as a hazardous waste by the regulations found at 40 C.F.R. § 261.32, and is described as an organic chemical that consists of "[d]istillation bottom tars from the production of phenol/acetone from cumene." 40 C.F.R. § 261.32(a). The JLM IRL and Response to JLM IRL also refer to this material as "residual column bottoms." CX 18, 19; Tr. 126-27.

Region 5 issued to JLM a Notice of Violation dated December 14, 2007 ("JLM NOV"), wherein Region 5 alleged, among other charges, that the material was subject to regulation as a hazardous waste and did not qualify for any exemptions under the applicable regulations given that it was ultimately injected into WCI Steel's blast furnace as a fuel.[15] CX 30; Tr. 93.

Region 5 issued a Notice of Violation to Respondent CIS as well ("CIS NOV"). Jt. Stips. I, Schedule A, ¶ 39; CX 30; Tr. 94, 103-04. Dated February 8, 2008, and addressed to Respondent Forster, the CIS NOV noted that the Product Supply and Operation Agreement between WCI Steel and Respondent CIS clearly states that the "Fuel Oil" supplied by Respondent CIS to WCI Steel's blast furnace is "a fuel alternative to coke and or natural gas." CX 30. The CIS NOV further advised that the material supplied by JLM to Respondent CIS constituted a hazardous waste when injected into a blast furnace, as reflected in a number of documents attached to the CIS NOV. CX 30. Accordingly, the CIS NOV alleged, Respondent CIS had "stored, treated, or disposed of hazardous waste at its Warren, Ohio, operation without a hazardous waste permit," in violation of RCRA and the applicable regulations. CX 30.

Concurrent with the CIS NOV, Region 5 also issued to Respondent CIS a letter requesting information concerning, among other subjects, the waste management practices at the CIS Facility, and its relationship to a number of entities, including WCI Steel, JLM, and GEM, pursuant to Section 3007 of RCRA, 42 U.S.C. § 6927 ("First CIS IRL"). Jt. Stips. I, Schedule A, ¶ 39; CX 1; Tr. 94. Respondent CIS submitted responses to the CIS IRL on March 27, 2008 ("March Response to First CIS IRL"), and April 28, 2008 ("April Response to First CIS IRL"). Jt. Stips. I, Schedule A, ¶ 40; CX 2, 3; Tr. 94. Respondent CIS also submitted a letter signed by Respondent Forster in response to the CIS NOV on April 28, 2008. Jt. Stips. I, Schedule A, ¶ 40; CX 31; Tr. 94, 104-06. Therein, Respondent Forster, on behalf of Respondent CIS, denied Region 5's allegations of wrongdoing and maintained that the materials shipped by JLM to Respondent CIS in November of 2005 "[do] not constitute a hazardous waste when used as a source of carbon in a blast furnace" in that they "are an effective substitute for a commercial product, or an ingredient in an industrial process to make a product, and they are not burned for energy recovery or used as a fuel when injected into a blast furnace." CX 31.

As part of its ongoing investigation into this claim, Region 5 again requested information from WCI Steel pursuant to Section 3007 of RCRA, 42 U.S.C. § 6927, by letter dated May 20, 2008 ("Second WCI Steel IRL"). CX 25; Tr. 94-95, 666-67. WCI Steel submitted a response on June 26, 2008 ("Response to Second WCI Steel IRL"), together with a supplement to that response under a separate cover ("Supplemental Response to Second WCI Steel IRL"). CX 26, 27. Region 5 subsequently conducted an inspection of the CIS Facility and WCI Steel Facility in August of 2008. Jt. Stips. I, Schedule A, ¶ 41; CX 28, 29; Tr. 95, 100-02, 635, 653-54. Region 5 also requested information from entities that it had identified as either directly supplying

[15] The enforcement activities related to JLM ultimately resulted in the issuance of a Default Order and Initial Decision against JLM on March 24, 2011. CX 54; Tr. 99-100.

materials to Respondent CIS or brokering those transactions - namely, Geptek; IWM; IFF[16]; and Neville - pursuant to Section 3007 of RCRA, 42 U.S.C. § 6927, to which Region 5 received responses on varying dates. CX 6-15, 20-22, 74; Tr. 96. Finally, by letter dated April 28, 2010, Region 5 again requested information from Respondent CIS pursuant to Section 3007 of RCRA, 42 U.S.C. § 6927 ("Second CIS IRL"), to which Respondent CIS submitted a response on June 15, 2010 ("Response to Second CIS IRL"). Jt. Stips. I, Schedule A ¶¶ 44, 45; CX 4, 5.

Thereafter, on August 31, 2010, Region 5 issued a Notice of Intent to File Administrative Complaint against Respondent CIS ("CIS NOI"), to which Respondent CIS submitted a letter in response on September 21, 2010. Jt. Stips. I, Schedule A, ¶¶ 46, 47; CX 35, 39; Tr. 98-99. Region 5 subsequently issued Notices of Intent to File Administrative Complaint against Respondent Forster ("Forster NOI") and Respondent Lofquist ("Lofquist NOI") on October 26, 2010, and November 9, 2010, respectively.[17] Jt. Stips. I, Schedule A, ¶¶ 48, 49; CX 36, 37; Tr. 98. Pursuant to Section 3008(a)(2) of RCRA, 42 U.S.C. § 6928(a)(2), Region 5 also notified Ohio EPA by letter of its intent to commence a formal enforcement action against Respondents concurrent with each of the Notices of Intent to File Administrative Complaint issued to Respondents. Jt. Stips. I, Schedule A, ¶ 50 ; CX 36, 37; Tr. 98-99.

Region 5 and Respondents subsequently entered into three consecutive agreements by which they agreed that the period beginning on November 19, 2010, and ending on May 17, 2011, would not be included in computing the running of any statute of limitations applicable to an action brought by Region 5 against Respondents for the claims described therein. CX 32-34; Tr. 99. Thereafter, on May 14, 2011, Complainant commenced this proceeding by filing the Complaint, wherein Respondents were charged in ten counts with violating certain provisions of RCRA and the Ohio Administrative Code based upon Respondent CIS's receipt of materials from JLM and IFF. Tr. 112.

V. BURDEN OF PROOF

Pursuant to Section 22.24(a) of the Rules of Practice:

> The complainant has the burdens of presentation and persuasion that the violation occurred as set forth in the complaint and that the relief sought is appropriate. Following complainant's establishment of a prima facie case, respondent shall have the burden of presenting any defense to the allegations set forth in the complaint and any response or evidence with respect to the appropriate relief.

[16] EPA ultimately issued a Notice of Violation to IFF in connection with its relationship to Respondent CIS on September 12, 2011, to which IFF responded on September 29, 2011. CX 59, 60; Tr. 100.

[17] By letter dated January 7, 2011, EPA notified Respondents that it had increased the proposed penalty set forth in the Notices of Intent to File Administrative Complaint issued to Respondents from $1,465,200 to $1,915,148. CX 38.

> The respondent has the burdens of presentation and persuasion for any affirmative defenses.

40 C.F.R. § 22.24(a).

Where the question presented is whether a given material constitutes a "solid waste" under RCRA, or, in the case of the State of Ohio's hazardous waste program, whether the material constitutes a "waste" under the parallel provision of the Ohio Administrative Code, once the complainant satisfies its initial burden of demonstrating that the material qualifies as such, the respondent bears the burden of producing evidence that the material is exempt or excluded from regulation. 40 C.F.R. § 261.2(f); OAC § 3745-51-02(F). In particular:

> Respondents in actions to enforce regulations adopted under Chapter 3734 of the Revised Code who raise a claim that a certain material is not a waste, or is conditionally exempt from regulation, must demonstrate that there is a known market or disposition for the material, and that they meet the terms of the exclusion or exemption. In doing so, they must provide appropriate documentation (such as contracts showing that a second person uses the material as an ingredient in a production process) to demonstrate that the material is not a waste, or is exempt from regulation. In addition, owners or operators of facilities claiming that they actually are recycling materials must show that they have the necessary equipment to do so.

OAC § 3745-51-02(F).

In carrying their respective burdens of proof, the parties are subject to a preponderance of the evidence standard. 40 C.F.R. § 22.24(b). To prevail under this standard, a party must demonstrate that the facts the party seeks to establish are more likely than not to be true. *See, e.g., Smith Farm Enterprises, LLC*, 15 E.A.D. ___, CWA Appeal No. 08-02, 2011 EPA App. LEXIS 10, at *14 (EAB, Mar. 16, 2011) ("A factual determination meets the preponderance of the evidence standard if the fact finder concludes that it is more likely true than not.") (citing *Julie's Limousine & Coachworks, Inc.*, 11 E.A.D. 498, 507 n.20 (EAB 2002), *aff'd*, No. Civ-02-907, 2004 WL 1278523 (D. Minn. June 7, 2004), *aff'd*, 406 F.3d 981 (8th Cir. 2005); and *Bullen Cos., Inc.*, 9 E.A.D. 620, 632 (EAB 2001)).

VI. LIABILITY

The Second Amended Complaint alleges that Respondents stored and treated hazardous waste at the CIS Facility on 190 occasions corresponding to Respondent CIS's receipt of materials from JLM and IFF between November 21, 2005, and February 27, 2009. Premised on this allegation, the Second Amended Complaint charges Respondents with ten counts of violating provisions of RCRA and the Ohio Administrative Code that govern facilities engaged in the treatment, storage, or disposal of hazardous waste.

As discussed above, EPA's authority to regulate "hazardous waste" under Subtitle C of RCRA extends only to those materials that first qualify as "solid waste," as that phrase is defined by 40 C.F.R. § 261.2. Where the State of Ohio's authorized hazardous waste program governs, as it does in the present proceeding, EPA's authority to regulate a material as "hazardous waste" similarly rests upon the question of whether the material constitutes a "waste" under the parallel provision of the Ohio Administrative Code promulgated at OAC § 3745-51-02. *See* OAC § 3745-51-03 ("A 'waste,' as defined in rule 3745-51-02 of the Administrative Code, is a hazardous waste if . . . ."). Thus, a critical jurisdictional question in adjudicating Respondents' liability for the ten counts alleged in the Second Amended Complaint is whether the materials supplied to Respondent CIS by JLM and IFF satisfy the definition of "waste" set forth at OAC § 3745-51-02. Complainant bears the initial burden of production and ultimate burden of persuasion on this threshold issue. Respondents, in turn, bear the burden of establishing the applicability of any exclusions.

A. DID THE MATERIALS SUPPLIED BY JLM AND IFF TO RESPONDENT CIS CONSTIUTE "WASTE" UNDER THE OHIO ADMINISTRATIVE CODE?

1) Regulatory Definition of "Waste"

The Ohio Administrative Code defines the term "waste" as "any discarded material that is not excluded by paragraph (A) of rule 3745-51-04 of the Administrative Code or that is not excluded by variance granted under rules 745-50-23 and 3745-50-24 of the Administrative Code." OAC § 3745-51-02(A)(1). In turn, the phrase "discarded material" is defined by the regulations as follows:

> A "discarded material" is any material which is:
>
> (a) Abandoned, as explained in paragraph (B) of this rule; or
> (b) *Recycled*, as explained in paragraph (C) of this rule; or
> (c) Considered inherently waste-like, as explained in paragraph (D) of this rule; or
> (d) A military munition identified as a waste in rule 3745-266-202 of the Administrative Code.

OAC § 3745-51-02(A)(2) (emphasis added).

The regulations then explain the circumstances under which a material is considered a "waste" by virtue of having been recycled, or accumulated, stored, or treated before recycling:

> (C) Materials are wastes if they are recycled or accumulated, stored, or treated before recycling, as specified in (C)(1) to (C)(4) of this rule.
>
> * * *

(2) Burning for energy recovery.

(a) Materials noted with an asterisk in column 2 of the table in this rule are wastes when they are:

(i) Burned to recover energy; or
(ii) Used to produce a fuel, or are otherwise contained in fuels (in which cases the fuel itself remains a waste).

(b) However, commercial chemical products listed in rule 3745-51-33 of the Administrative Code are not wastes if they are themselves fuels.

OAC § 3745-51-02(C). The table referenced by this provision identifies six categories of materials that qualify as wastes in the manner described above: "spent materials," "sludges (listed in rule 3745-51-31 or 3745-51-32 of the Administrative Code)," "sludges exhibiting a characteristic of hazardous waste," "by-products (listed in rule 3745-51-31 or 3745-51-32 of the Administrative Code)," "commercial chemical products listed in rule 3745-51-33 of the Administrative Code," and "scrap metal other than excluded scrap metal." OAC § 3745-51-02.

The regulations also create the following exemption ("recycling exemption"):

(E) Materials that are not waste when recycled.

(1) Materials are not wastes when they can be shown to be recycled by being:

(a) Used or reused as ingredients in an industrial process to make a product, provided the materials are not being reclaimed; or
(b) Used or reused as effective substitutes for commercial products; or
(c) Returned to the original process from which they are generated, without first being reclaimed or land disposed . . . .

(2) The following materials are wastes, even if the recycling involves use, reuse, or return to the original process [as described in paragraphs (E)(1)(a), (E)(1)(b), and (E)(1)(c) of this rule].

* * *

(b) Materials burned for energy recovery, used to produce a fuel, or contained in fuels . . . .

OAC § 3745-51-02(E).

2) Were the Materials "Burned for Energy Recovery" at the WCI Steel Facility?

Complainant advances the argument in this proceeding that the materials supplied by JLM and IFF to Respondent CIS constituted "wastes" because they were "recycled" within the meaning of OAC § 3745-51-02(C) by being "burned for energy recovery" in the blast furnace at the WCI Steel Facility. Before addressing this allegation, a discussion of the general operation of a blast furnace would be instructive. Complainant and Respondents essentially agree upon the manner in which a blast furnace generally operates, and the following description is drawn from uncontroverted testimonial and documentary evidence presented by the parties at the hearing.[18]

a) General Operation of a Blast Furnace

In plain terms, a blast furnace is a countercurrent chemical reactor, the primary function of which is to convert iron ore (Fe_2O_3, for purposes of this proceeding) to a form of iron (Fe) variously known as "liquid iron," "hot metal," or "pig iron" by removing the oxygen atoms (a process otherwise known as "reducing" the iron ore) through a series of chemical reactions. Tr. 1068, 1072, 1074, 1147, 1155, 1190, 2376; CX 86 at EPA18464-65. To begin this process, two main ingredients[19] - 1) coke[20] and 2) iron ore, in the form of raw ore, pellets, or sinter[21] - are fed

[18] On this subject, Complainant presented the testimony of Richard J. Fruehan, Ph.D., a professor of metallurgy and materials science at Carnegie Mellon University, the founder and co-director of the Center for Iron and Steelmaking Research also at Carnegie Mellon University, and an associate editor of the peer-reviewed journal Metallurgical and Materials Transactions B, among many other notable credentials. CX 93 at EPA18489-91; Tr. 1044, 1046-48. Professor Fruehan was qualified as an expert on the comprehensive topics of metallurgy, steelmaking, and the production of iron in a blast furnace and, more specifically, the mechanics of a blast furnace, the physics and chemistry behind the reactions occurring in a blast furnace, and injectants at the tuyere level of a blast furnace. Jt. Stips. II at 1; Tr. 1064-66. Respondents, in turn, presented the testimony of Frederick C. Rorick, Jr., and Joseph J. Poveromo, Ph.D. An operator of blast furnaces for the former Bethlehem Steel Corporation for more than 37 years, a lecturer at an intensive course on iron making held by McMaster University in Ontario, Canada, for the 23 years preceding the hearing, and an independent consultant to blast furnaces worldwide since 2002, Mr. Rorick was qualified as an expert in the field of iron making and, more specifically, the design and operation of blast furnaces, including "both equipment and technical aspects and blast furnace process analysis and optimization," and the use of various types of injectants and their effect on operations. Jt. Stips. II at 3; RX 45 at CIS00540-41; Tr. 2353-54, 2356-57, 2361. The undersigned credits as clear, credible, and persuasive Mr. Rorick's explanation of the operation of blast furnaces in particular. Finally, a member of the research department at the former Bethlehem Steel Corporation for 19 years, a lecturer at the intensive courses on iron making and coke making held by McMaster University, and an independent consultant in iron making, steelmaking, and raw materials since 1993, Dr. Poveromo was qualified as an expert in the field of iron making and, more specifically, "the effect on blast furnace performance and economics (i.e., production, hot metal cost, and hot metal quality) of various materials, including the components of the burden, coal mix changes and coke properties, various additives, and injectants (including natural gas, oil, tar and coal)," and "the related areas of blast furnace design and practice, and alternative iron making and direct reduction, including process assessment, economic analysis and the impact of raw material properties on process economics." Jt. Stips. II at 2-3; RX 52 at CIS00582, 00585, 00588, 00589; Tr. 2520, 2524-25, 2538.

[19] A third ingredient, limestone, serves as "the blast furnace flux" during the conversion process. CX 86 at EPA18464-65. Because the precise function of the limestone and the reactions that it undergoes are not relevant for purposes of this proceeding, a discussion of it has been omitted.

by a conveyor belt into the top of the blast furnace. Tr. 1073; CX 86 at EPA18464-65. Referred to as the "burden," these materials are distributed in alternating layers through the upper two-thirds of the furnace to form a packed bed of materials and then heated by hot gases ascending through the packed bed from the bottom of the furnace. Tr. 1073-74, 1079, 1083-84, 1188-89, 2374-75; RX 47 at CIS00567, 571. As the iron ore (Fe_2O_3) reaches the appropriate temperatures within the furnace, it is reduced to iron oxide (FeO) and then to iron (Fe) by either the gases or the coke through the following reactions:

1) $3\ Fe_2O_3 + CO = CO_2 + Fe_3O_4$ This reaction begins at approximately 850° F.

2) $Fe_3O_4 + CO = CO_2 + 3\ FeO$ This reaction begins at approximately 1100° F.

3) $FeO + CO = CO_2 + Fe$ This reaction begins at approximately 1300° F.
or
$FeO + C = CO + Fe$

CX 86 at EPA18465; RX 47 at CIS00572, 575; Tr. 1079-80, 1082, 2379-80. As the iron ore undergoes these reactions, it softens, melts, and eventually trickles to the bottom of the furnace as liquid iron. CX 86 at EPA18465; RX 47 at CIS00571; Tr. 2379-82, 2469-70. The region of the blast furnace where the iron ore softens and melts is known as the "cohesive zone," which, depending on the precise operation of the furnace, typically appears in the shape of the Greek letter Omega in the center of the furnace. RX 47 at CIS00567; Tr. 2375, 2380, 2469-70. Below the cohesive zone is the "active coke zone," the "dead man zone," and finally the "hearth" at the bottom of the furnace, where the liquid iron collects. RX 47 at CIS000567; Tr. 2375-76.

The above-described reduction of iron ore is triggered by a "hot blast," or large volumes of air[22] preheated to between 1,500 and 2,400 degrees Fahrenheit and directed into the bottom of

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[20] Coke is produced from a mixture of coals that have been ground into a powder and then cooked in an oven for 18 to 24 hours. CX 86 at EPA18465. After removal from the oven, the cooked coal, or coke, "is cooled and screened into pieces ranging from one inch to four inches." *Id.* It consists of 90 to 93 percent carbon. *Id.*

[21] When raw iron ore has an iron content ranging from 50 to 70 percent, it can be sized into 0.5 to 1.5 inch pieces and "charged directly into a blast furnace without any further processing." CX 86 at EPA18464. Iron ore that contains a lower percentage of iron "must be processed or beneficiated to increase its iron content." *Id.* The techniques used to increase the iron content of this ore result in the production of marble-sized pellets that have an iron content ranging from 60 to 65 percent. *Id.* at EPA18464-65. Sinter, on the other hand, "is produced from fine raw ore, small coke, sand-sized limestone, and numerous other steel plant waste materials that contain some iron." *Id.* at EPA18465. These materials are proportioned based upon the desired chemistry of the sinter, mixed together, and then ignited by a gas-fired furnace in order to fuse the materials into pieces ranging from 0.5 to 2 inches in size. *Id.*

[22] Air consists of approximately 21 percent oxygen (O_2), 79 percent nitrogen (N_2), and trace amounts of other gases. Tr. 2388.

the furnace through nozzles known as "tuyeres" that are equally spaced around the circumference of the furnace at its base. CX 86 at EPA18467; Tr. 1080, 2378. The coke fed into the top of the furnace that has descended to the level of the tuyeres is ignited by the hot blast in a cavity adjacent to the tuyeres known as the "raceway," where the coke reacts as follows:

1) $C + O_2 = CO_2 + heat$

Because the foregoing reaction occurs in the presence of excess carbon at a high temperature, the carbon dioxide subsequently converts to carbon monoxide (CO):

2) $CO_2 + C = 2\ CO$

CX 86 at EPA18465; RX 47 at CIS00576; RX 98 at CIS01646; Tr. 1085-86, 1089 (referring to RX 98 at CIS01646), 1151, 1153-54, 1189, 2384, 2493. As the heat and carbon monoxide produced by these reactions ascend through the furnace, the carbon monoxide serves as a "reducing gas" by driving the reduction of the iron ore, as depicted by the reactions on the preceding page. CX 86 at EPA18465. The consumption of the coke and melting of the iron ore creates voids within the furnace, at which time more burden may be fed into the top of the furnace in order for the process to repeat itself. Tr. 2376-77; RX 47 at CIS 00571. The final product of the process, liquid iron, does not consist solely of elemental iron. Tr. 2383. Rather, it contains small quantities of other substances, including approximately four to five percent carbon, which the liquid iron absorbs as it descends from the cohesive zone through the dead man zone to the hearth of the furnace and which lowers its melting point. Tr. 1068, 1071, 1094-95, 1168, 2383-84, 2406-07, 2437-38, 2463-68, 2504. The liquid iron is then removed from the furnace through a process known as "casting." Tr. 2416-18.

Notably, at the tuyere level of most blast furnaces, hydrocarbon-rich materials such as oil, natural gas, and powdered coal are also injected into the furnace along with the hot blast,[23]

[23] A hydrocarbon is an organic molecule consisting of carbon and hydrogen atoms. Tr. 2397. Oil, natural gas, and powdered coal appear to be the most common hydrocarbon-rich materials injected into a blast furnace, but other materials containing hydrocarbons have been found to be suitable for injection. Tr. 1080-81 ("Many different kinds of injectants are used. The most common . . . used around the world is coal because coal is very abundant, fairly inexpensive compared with the other injectant materials. People use oil. . . . That was one of the earliest injectants. . . . [F]or several decades now people have also injected natural gas as an injectant. There's been experimental work on injecting plastics because plastics are hydrocarbons so we can inject plastic. Anything that contains carbon and hydrogen in a concentrated form can be used as an injectant."); Tr. 2395-96 ("Essentially the only requirement for injection of a hydrocarbon is it has to be transportable in a pipe. . . .[I]f it's transportable, then it's capable of being injected and it's capable of working in the furnace."). In the case of the blast furnace at the WCI Steel Facility, the Product Supply and Operation Agreement between Respondent CIS and WCI Steel required Respondent CIS to supply the blast furnace at the WCI Steel Facility with "Fuel Oil," a phrase defined by the Product Supply and Operation Agreement as "[r]ecycled oil" bearing certain characteristics specified therein or Number 6 fuel oil "from time to time as authorized by WCI [Steel]." CX 24 at EPA13139, 13153. Bob Delost, WCI Steel's Coordinator of Blast Furnace Operations, informed Michael Beedle of EPA during his inspection of the WCI Steel Facility in August of 2008 that the oil was "co-injected with natural gas" and that the proportion of materials injected into WCI

where they are ignited and generate carbon monoxide, which, as discussed above, acts as a reducing gas as it rises through the furnace.[24] Tr. 1075-76, 1080-84, 2389-98. Aside from serving as a source of reducing gases to the blast furnace, the precise function of these injected hydrocarbon-rich materials, referred to as "injectants," was rigorously contested by the parties. In particular, the parties dispute whether the materials obtained by Respondent CIS and injected into the blast furnace at the WCI Steel Facility were also "burned for energy recovery" within the meaning of RCRA and the Ohio Administrative Code, thus subjecting those materials to regulation as "waste" based upon the manner in which they were recycled.

b) "Burning for Energy Recovery" under RCRA

As discussed above, the Ohio Administrative Code regulates as "waste" certain types of materials that have been recycled, or accumulated, stored, or treated before recycling, by way of "burning for energy recovery." OAC § 3745-51-02(C). The phrase "burning for energy recovery" is not defined by the Ohio Administrative Code or by the parallel provisions of RCRA and the Code of Federal Regulations. The phrase also has not been construed by any judicial or administrative tribunal, such as the Environmental Appeals Board ("Board" or "EAB"). Not surprisingly, the parties disagree on the precise meaning of the phrase and its applicability to injectants supplied to a blast furnace. In particular, Respondents contend that the phrase should be construed narrowly to subject to regulation only those materials burned for the purpose of obtaining useful heat energy or burned such that substantial, useful heat energy is generated. Respondents' Initial Post-Hearing Brief ("Rs' Br.") at 9-15. Respondents further contend that injectants do not supply any significant or purposeful heat energy when combusted in a blast furnace but, rather, supply only ingredients necessary to the industrial process of manufacturing liquid iron in that they serve as a source of carbon and reducing gases. Rs' Br. at 16-25. Complainant counters that EPA's jurisdiction under the regulation extends not only to materials burned to recover heat energy but also to materials burned to recover chemical energy, and that the burning of injectants in a blast furnace produces both of these types of energy. Complainant's Initial Post-Hearing Brief ("C's Br.") at 47-59.

As recognized by the parties in their post-hearing reply briefs, the Board established a framework for interpreting an administrative regulation in *Howmet Corporation*, 13 E.A.D. 272 (EAB 2007) ("*Howmet*"), which considered the meaning of the term "spent material" as defined by the regulations at 40 C.F.R. § 261.1.[25] The Board first reviewed RCRA's approach to

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Steel's blast furnace during a given period depended upon their relative costs. CX 28 at EPA16782; *see also* Tr. 1086-87.

[24] The combustion of injectants also releases hydrogen, which acts as a reducing gas as well. Tr. 1136, 2393, 2399. For the sake of simplicity, the undersigned has generally limited the discussion of reducing gases to carbon monoxide.

[25] The respondent in *Howmet* used potassium hydroxide ("KOH") as a cleaning agent at its facilities, and when the KOH became too contaminated for this use without reclaiming or reprocessing it, the respondent shipped the material either to a permitted hazardous waste treatment, storage, or disposal ("TSD") facility or to a fertilizer

recyclable materials in general, and then the regulatory coverage of such materials when used as ingredients in fertilizers and the regulatory definition of "spent material" more specifically. *Howmet*, 13 E.A.D. at 283-93. The Board subsequently turned to the meaning of the term "spent material" as it applied to the materials at issue. *Id.* at 293. In doing so, the Board articulated the following approach:

> As we have explained in previous cases, "[w]hen construing an administrative regulation, the normal tenets of statutory construction are generally applied." *In re Bil-Dry Corp.*, 9 E.A.D. 575, 595 (EAB 2001) (citing *Black & Decker Corp. v. Comm'r*, 986 F.2d 60, 65 (4th Cir. 1993)). "The plain meaning of words is ordinarily the guide to the definition of a regulatory term." *Id.* (citing *T.S. v. Bd. of Educ.*, 10 F.3d 87, 89 (2d Cir. 1993)). "Additionally, the regulation must, of course, be 'interpreted so as to harmonize with and further and not to conflict with the objective of the statute it implements.'" *Id.* (quoting *Sec. of Labor v. W. Fuels-Utah, Inc.*, 900 F.2d 318, 320 (D.C. Cir. 1990)). Moreover, in interpreting a regulation, we examine not just the provision at issue, but the entire regulation. *In re U.S. Army, Fort Wainwright Cent. Heating & Power Plant*, 11 E.A.D. 126, 141 (EAB 2003) ("The meaning – or ambiguity – of certain words or phrases may only become evident when placed in context.") (quoting *Food & Drug Admin. V. Brown & Williamson Tobacco Corp.*, 529 U.S. 120, 132 (2000)). *See generally In re Harpoon P'ship*, 12 E.A.D. 182, 195-96 (EAB 2005), *appeal dismissed*, *Harpoon P'ship v. EPA*, No. 05-2806 (7th Cir., Aug. 24, 2005). *Cf. United States Nat'l Bank of Or. V. Indep. Ins. Agents of Am.*, 508 U.S. 439, 455 (1993) ("In expounding a statute, we must not be guided by a single sentence or member of a sentence, but look to the provisions of the whole law . . . .") (citations omitted). Moreover, just as legislative history can be helpful in interpreting a statute, regulatory history, such as preamble statements, assists us in interpreting regulations. *See In re Morton L. Friedman & Schmitt Const. Co.*, 11 E.A.D. 302, 328 (EAB 2004), *aff'd*, *Friedman v. United States Environmental Protection Agency*, No. 2:04-CV-00517-WBS-DAD (E.D. Cal. Feb 25, 2005). Last, we give greater deference to a position when it is supported by Agency rulings, statements, and opinions that have been consistent over time. *See In re Lazarus, Inc.*, 7 E.A.D. 318, 352-53 (EAB 1997).

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manufacturer for use as an ingredient in its fertilizer. *Howmet*, 13 E.A.D. at 277. The material at issue unquestionably exhibited the hazardous characteristic of corrosivity, and the respondent followed the regulations governing hazardous waste for the used KOH shipped to the TSD facility. *Id.* It failed to do so for the used KOH shipped to the fertilizer manufacturer, however, allegedly because the respondent did not believe that the used KOH constituted a solid waste when shipped for the purpose of being used as an ingredient in fertilizer. *Id.* The Administrative Law Judge ruled against the respondent in the underlying decision, holding that the used KOH shipped to the fertilizer manufacturer was a "spent material" subject to the regulations governing hazardous waste. *Id.* at 278. The respondent subsequently appealed the decision to the Board and argued that the used KOH in question was not a "spent material" contrary to the findings of the Administrative Law Judge. *Id.* at 279-80. Thus, the appeal hinged on the issue of whether the used KOH in question was indeed "spent." *Id.* at 276.

Howmet, 13 E.A.D. at 282.

Like the Board in *Howmet*, the undersigned finds that a review of RCRA's approach to recyclable materials and the regulatory coverage of materials "burned for energy recovery" would be instructive. The undersigned will then consider the meaning of the phrase in the context of the materials at issue.

(1) RCRA's approach to recyclable materials and the regulatory coverage of "burning for energy recovery"

As discussed in Section III.A. of this Initial Decision, Congress enacted RCRA in 1976 as an amendment to the existing Solid Waste Disposal Act of 1965 in response to a number of concerns, including findings that increased industrial, commercial, and agricultural operations in this country had generated "a rising tide of scrap, discarded, and waste materials" and that "disposal of solid waste and hazardous waste . . . without careful planning and management can present a danger to human health and the environment." 42 U.S.C. § 6901(a)-(b). Based upon these and other findings, Congress declared "it to be the national policy of the United States that, wherever feasible, the generation of hazardous waste is to be reduced or eliminated . . . . Waste that is nevertheless generated should be treated, stored, or disposed of so as to minimize the present and future threat to human health and the environment." 42 U.S.C. § 6902(b).

While Congress encouraged recycling in the opening sections of RCRA as a means of conserving resources and minimizing the generation and disposal of hazardous waste, 42 U.S.C. §§ 6901(c)-(d), 6902(a), its concerns regarding the management of hazardous waste undoubtedly extended to materials being recycled, as shown by the following passage from the legislative history of the Hazardous Waste and Solid Waste Amendments of 1984:

> This section of the Bill amends Section 3001 of RCRA to require the Administrator to issue regulations regarding use, reuse, recycling, and reclamation of hazardous wastes. . . .The Committee affirms that RCRA already provides regulatory authority over these activities (which authority the Agency has exercised to a limited degree) and in this provision is amending to clarify that materials being used, recycled, or reclaimed can indeed be solid and hazardous wastes and that these various recycling activities may constitute hazardous waste treatment, storage, or disposal. . . .The Committee is particularly concerned with possible harm caused by hazardous waste use and reuse involving direct introduction of hazardous wastes to the air or direct application of hazardous wastes to the land.

H.R. Rep. No. 98-198(I), at 46 (1984), *as reprinted in* 1984 U.S.C.C.A.N. 5576, 5605.

The Board recognized the conflict created by the potential benefits and detriments of recycling in *Howmet*:

> [S]ince its inception, the RCRA program has carried within it a certain tension between, on the one hand, prophylactic regulation of recyclables in order to protect the public and the environment from the serious consequences of mismanagement of such materials, and, on the other hand, not inhibiting through such regulation the beneficial recycling and legitimate reuse of such material.

Howmet, 13 E.A.D. at 284. As the Board further noted, "[t]he Agency has generally resolved this tension through a series of categorical inclusions and exclusions." *Id.* at 285. However, "[i]n the delta between the categorical inclusions and exclusions, the Agency determined to approach the question of regulatory applicability on a case-by-case basis: 'in most cases one must know both what the material is and how it is being recycled before determining whether it is a waste.'" *Id.* at 285 (quoting 50 Fed. Reg. 614-01, 617 (January 4, 1985)). Finally, as a means of illustrating RCRA's orientation to recyclable materials, the Board reviewed a series of cases brought before the United States Court of Appeals for the District of Columbia Circuit ("D.C. Circuit") challenging EPA's jurisdiction to regulate the reuse of materials under certain scenarios and observed that the D.C. Circuit's approach to determining the regulatory status of a recyclable material rested upon the following question: has it become "part of the waste disposal problem?" *Howmet*, 13 E.A.D. at 285-86 (citing *AMC I*, 824 F.2d at 1186; *American Petroleum Institute v. EPA*, 906 F.2d 729, 741 (D.C. Cir. 1990); *Association of Battery Recyclers, Inc. v. EPA*, 208 F.3d 1047, 1054-55 (D.C. Cir. 2000)).

Recognizing the conflicting objectives of RCRA both to encourage the conservation and recovery of resources and to regulate materials being recycled, the Agency proposed in 1983 to amend the regulations implementing RCRA to clarify their coverage of recyclable materials. Hazardous Waste Management System: General, 48 Fed. Reg. 14,472 (proposed Apr. 4, 1983) (to be codified at 40 C.F.R. Parts 260, 261, 264, 265, and 266) ("Proposed Solid Waste Rule").[26] In particular, the Agency proposed a revision of the regulatory definition of "solid waste" such that certain categories of materials would be subject to regulation as solid wastes if recycled in specified ways. *Id.* at 14,476. The Proposed Solid Waste Rule also carved out exceptions for those recycling activities deemed not to involve waste management and exemptions for those recycling activities deemed to involve waste management but found to pose a significantly reduced risk of waste mismanagement. *Id.* at 14,477.

[26] The Proposed Solid Waste Rule echoes the concerns expressed by Congress regarding recycling activity, noting that wastes destined for recycling may pose the same potential for harm as those destined for treatment and disposal. 48 Fed. Reg. at 14,474. To illustrate this concern, the Agency explained that "the risk associated with transporting or storing wastes is unlikely to vary whether the waste ultimately is recycled, treated, or disposed of," and that the burning of wastes for energy recovery may present the same types of hazards posed by incinerating them. *Id.* The Agency also identified a number of facilities engaged in the recycling of hazardous wastes where mismanagement of the materials had resulted in costly cleanups, specifically observing that "[f]acilities that recycle hazardous wastes have caused serious health and environmental problems . . . by burning the wastes as fuels or burning waste-derived fuels." *Id.*

In the preamble to the proposed regulations, the Agency indicated that one form of recycling it had found to be within its jurisdiction and to warrant regulation was the "burning [of] waste or waste-derived fuels for energy recovery, or using wastes to produce a fuel." 48 Fed. Reg. at 14,476. As the Agency explained:

> The Agency has concluded that the statute gives EPA the authority to regulate burning of hazardous waste to recover energy, and that we should exercise this authority. In most cases, such burning is environmentally identical to burning the same material in an incinerator and could pose a parallel or greater risk of environmental dispersal of hazardous waste constituents and products of incomplete combustion. Furthermore, by allowing burning to go uncontrolled, the Agency's existing regulations [which regulated incinerators but not other types of combustion devices, such as boilers] create a loophole in the RCRA regulatory structure, as more and more wastes that can be burned are channeled to boilers or heat-recovery units to avoid disposal or incineration costs. . . . Furthermore, a number of facilities blend hazardous wastes into fuels and then sell these fuels to unsuspecting residential and other municipal users who burn them under conditions which may harm humans and the environment.

48 Fed. Reg. at 14,481-82. Thus, the Agency sought to regulate the burning of hazardous waste to recover energy in an effort to guard against the "risk of environmental dispersal of hazardous waste constituents and products of incomplete combustion," especially for "unsuspecting residential and other municipal users" of the materials. The Agency anticipated that it would curb the scope of its jurisdiction, however, as described in the nineteenth footnote to the preamble:

> In interpreting this provision, the Agency does not consider materials to be burned as fuels when *both material values and energy* are recovered from burning a single material, and material recovery is an important part of the recovery operation. For example, furnaces burning secondary materials to recover economically significant amounts of contained chemicals, and that also recover energy from the same materials, *are not considered to be burning the materials as fuels*.

Id. at 14,485 n.19 (emphasis added).

Finally, the Agency explained that it intended the proposed regulation only to establish jurisdiction over certain categories of materials burned for energy recovery, rather than to set standards governing facilities engaged in this form of recycling. 48 Fed. Reg. at 14,482. Once ongoing studies of the environmental consequences of burning hazardous wastes in boilers had been completed, the Agency explained, it would establish a comprehensive scheme "to substantively regulate burning for energy recovery in those areas that appear to present a potential for substantial hazard to human health and the environment." *Id.* The Agency

observed that "[t]he identity of the combustion unit in which secondary materials are burned is highly relevant in EPA's developing regulatory regime for burning of hazardous secondary materials." *Id.* at 14,482. The Proposed Solid Waste Rule thus sought to distinguish between three types of those devices: "incinerators," "boilers," and "industrial furnaces." *Id.* at 14,482-83. It defined "incinerators" and "boilers" based upon their physical character, "[t]he key distinction . . . [being] that boilers achieve heat transfer within the combustion chamber itself" while "heat transfer does not ordinarily occur in the combustion chamber of an incinerator." *Id.* at 14,483. It then described "industrial furnaces" as "combustion devices designed as incinerators or boilers that are used as integral components of manufacturing processes to recover materials or energy, not to destroy wastes." *Id.* Designating certain devices as industrial furnaces, including blast furnaces, the Proposed Solid Waste Rule found that such devices "are normally considered to be engaged in recycling activities while burning secondary materials, so will not be regulated as incinerators." *Id.*

On January 4, 1985, the Agency adopted its revision of the regulatory definition of "solid waste" largely as proposed. Hazardous Waste Management System: Definition of Solid Waste, 50 Fed. Reg. 614 (Jan. 4, 1985) (to be codified at 40 C.F.R. Parts 260, 261, 264, 265, and 266) ("Final Solid Waste Rule"). The preamble to the Final Solid Waste Rule emphasized that the provisions regulating certain materials as solid wastes when they are recycled by being burned for energy recovery are "among the most important in the regulation." 50 Fed. Reg. at 629. It further noted that "recent statements of Congressional intent strongly support and [sic] expansive reading of authority over waste-fuels" and "voice special concern over recycling practices involving 'direct introduction of hazardous wastes to the air. . . .'" 50 Fed. Reg. at 629-30 (quoting H.R. Rep. No. 98-198, 98th Cong., 1st Sess. 46). The preamble then expounded upon the Agency's understanding of three related activities - burning for energy recovery, burning for material recovery, and burning for destruction - and the applicability of the regulations to those activities. 50 Fed. Reg. at 629-31.

Specifically, in order to distinguish burning for energy recovery from burning for destruction, the preamble first pointed to a view articulated by the Agency in a Statement of Enforcement Policy issued on January 18, 1983, and subsequently printed in the Federal Register. 50 Fed. Reg. at 630 (citing Enforcement Guidance, 48 Fed. Reg. 11,157 (Mar. 16, 1983) ("Enforcement Policy Statement," "Policy Statement," or "Statement")). Addressing the circumstances under which the burning of hazardous waste in boilers is considered to be legitimate recycling,[27] the Statement advised that "[a] determination of what constitutes sham burning depends ultimately on weighing a number of factors presented by the circumstances of a particular case," but that "[t]he energy value of the hazardous wastes being blended or burned . . . is likely to be of primary significance in most cases." 48 Fed. Reg. at 11,157-58. In particular, the Statement explained, "EPA ordinarily views the practice of direct burning of hazardous

[27] At the time the Agency issued the Enforcement Policy Statement, the regulations contained an exemption from regulation for certain hazardous wastes being beneficially used, reused, recycled, or reclaimed (activities referred to collectively by the Statement as "recycled"). 48 Fed. Reg. at 11,157. This exemption was confined, however, only to "legitimate" or "beneficial" recycling practices. *Id.*

wastes with little or no heat value . . . as not being legitimate recycling." *Id.* Describing its intent to "leave[] the principles of the Statement in force," the Agency explained in the preamble to the Final Solid Waste Rule that the Statement counsels that "as a general matter[,] . . . burning of low energy hazardous wastes as alleged fuels is not considered to be burning for legitimate energy recovery" and that "boilers and industrial furnaces burning low energy wastes could be considered to be incinerating them," and thus subject to regulations applying to incinerators. 50 Fed. Reg. at 630.

The preamble then turned to the issue of "determining how to regulate wastes if they are burned to recover materials." 50 Fed. Reg. at 630. The Agency expressed its view that the regulations governing certain categories of materials burned for energy recovery apply whenever such materials are burned in boilers because "[b]oilers, by definition, recover energy" and any simultaneous recovery of materials is "ancillary to the purpose of the boiler." *Id.* With regard to industrial furnaces, however, the Agency explained that the regulatory status of materials burned in those devices was not nearly as straightforward:

> Burning for material recovery in industrial furnaces . . . raises different kinds of issues. . . .[I]ndustrial furnaces are used as integral components of manufacturing processes to recover materials. Thus, regulation under RCRA of actual burning in industrial furnaces could, in some circumstances, represent an intrusion into a normal production process, particularly if the material being recovered is the same material the furnace ordinarily produces. On the other hand, when an industrial furnace is used for material recovery and the secondary material being burned is: (a) Not ordinarily associated with the furnace (for example, organic still bottoms), (b) different in composition from materials ordinarily burned in the unit (as when the secondary material contains Appendix VIII hazardous constituents different from, or in concentrations in excess of those in materials ordinarily burned in the furnace), or (c) burned for a purpose ancillary to the chief function of the furnace, we think that RCRA jurisdiction over the burning exists. (Jurisdiction obviously exists, for example, if that purpose is destruction.)
>
> When industrial furnaces burn for energy recovery, regulation of the burning would not constitute an impermissible intrusion into the production process because burning for energy recovery is an activity that is not central to the usual function of the industrial furnace. . . .We therefore are asserting RCRA jurisdiction when an industrial furnace burns hazardous secondary materials – *i.e.*, hazardous wastes – for energy recovery.
>
> The regulations would also apply when an industrial furnace burns the same secondary material for both energy and material recovery. Examples are blast furnaces that burn organic wastes to recover both energy and carbon values, or cement kilns that burn chlorinated wastes as a source of energy and chlorine. . . . These activities are not so integrally tied to the production nature of the furnace as

> to raise questions about the Agency's jurisdiction. . . . In taking this view, we thus reconsider and withdraw footnote 19 of the preamble to the proposed rule where we said we could count materials burned in industrial furnaces for both energy and material recovery as being burned for material recovery. For the reasons given above, we think that was a mistaken idea.

50 Fed. Reg. at 630-31.

To illustrate the operation of these provisions, the preamble to the Final Solid Waste Rule also offered a number of examples:

> The following examples indicate which secondary materials are wastes when burned for energy recovery.
>
> - Facility A burns an unlisted ignitable by-product in its boilers.
>
> A is considered to be burning a hazardous waste since all secondary materials burned for energy recovery are defined as solid wastes. (Ignitable wastes will have high Btu value, and so the waste will be burned for legitimate energy recovery.)
>
> - Facility B burns the same by-product in an industrial furnace to recover energy.
>
> B is considered to be burning a hazardous waste for the same reason as A was in the first example.
>
> - Facility C burns an unlisted EP toxic by-product in its boiler to recovery both materials and energy.
>
> C is considered to be burning a hazardous waste for energy recovery, since secondary materials burned for a dual recycling purpose in boilers are considered for jurisdictional purposes to be burning for energy recovery. This answer assumes sufficient energy and material values are recovered so that the waste is not being burned for destruction.
>
> - Facility D burns the same by-product in an industrial furnace to recover both energy and materials.
>
> D is considered to be burning a hazardous waste, even though the waste is an unlisted by-product, and even though there is some material recovery. Unlisted by-products burned for energy recovery in any type of combustion unit are defined as solid wastes. If D were burning exclusively for material recovery – for example if D operated a smelting furnace burning to recover metal – the material would not be a solid waste since it would be an unlisted by-product being reclaimed.

50 Fed. Reg. at 631.

Shortly after issuing the Final Solid Waste Rule, the Agency revisited the subject of "burning for energy recovery" when it proposed regulations governing nonindustrial boilers and furnaces engaged in the combustion of hazardous wastes and used oil, among other standards.

Hazardous Waste Management System: Standards for the Management of Specific Wastes and Specific Types of Facilities, 50 Fed. Reg. 1684 (proposed on Jan. 11, 1985) (to be codified as 40 C.F.R. Part 266) ("Proposed BIF Rule"). The preamble to the Proposed BIF Rule largely reiterated the discussion of the subject found in the preamble to the Final Solid Waste Rule. 50 Fed. Reg. at 1690. However, in referring to the burning of recyclable materials in an industrial (as compared to a nonindustrial) furnace solely for material recovery, the preamble to the Proposed BIF Rule also explained the Agency's intent to propose regulations governing industrial boilers and industrial furnaces engaged in the burning of hazardous waste (described as "Phase II" controls) regardless of the purpose of the activity:

> Burning solely for material recovery in industrial furnaces . . . raises different kinds of issues, principally the question of whether the purpose of burning affects either the Agency's jurisdiction or the Agency's regulatory strategy. The Agency will address this issue further as part of the Definition of Solid Waste rulemaking and the Phase II boiler and industrial furnace rulemaking. We note, however, that if the secondary material being burned is a hazardous waste, the purpose for which it is burned is not a factor in determining whether and how to regulate its burning. The issue is whether the burning needs to be regulated to protect human health and the environment, not whether the purpose of burning is destruction, energy recovery, or material recovery. We thus intend to develop regulations for industrial furnaces burning hazardous wastes – regardless of purpose – as part of the Phase II regulations for boilers and industrial furnaces . . . .

50 Fed. Reg. at 1690. However, "[f]or the time being, burning hazardous waste in industrial boilers and furnaces for legitimate energy recovery would continue to be exempt from regulation pending further study by the Agency of what type of regulation is needed to protect human health and the environment." 50 Fed. Reg. at 1685.

In the course of finalizing the regulations governing nonindustrial boilers and furnaces engaged in the burning of hazardous waste and used oil, the Agency again discussed its jurisdiction over materials burned exclusively for material recovery:

> We explained in the January 11, 1985 preamble that since boilers, by definition, have as their primary purpose the recovery of energy, if materials are also recovered, this recovery is ancillary to the purpose of the unit, and so does not alter the regulatory status of the activity. . . .We also explained that the regulations apply when an industrial furnace burns the same material for both energy and material recovery (e.g., when blast furnaces burn organic wastes to recover both energy and carbon values).
>
> Today's regulations, however, do not apply to hazardous wastes burned in industrial furnaces solely for material recovery. . . .[A]s discussed in the January 4, 1985 preamble to the definition of solid waste and the preamble to the proposed

> rule in this proceeding, there are certain situations where control of burning for material recovery in industrial furnaces could lead to an impermissible intrusion into the production process and so be beyond EPA's authority under RCRA. . . . . These situations are limited, and involve circumstances where the secondary material being burned is indigenous to the process in which the industrial furnace is used, for example, because the secondary material contains the same types and concentrations of constituents (particularly hazardous constituents listed in Appendix VIII of Part 261) as the raw materials normally burned in the industrial furnace.

Hazardous Waste Management System: Burning of Waste Fuel and Used Oil Fuel in Boilers and Industrial Furnaces, 50 Fed. Reg. 49,164, 49,167 (Nov. 29, 1985) (to be codified as 40 C.F.R. Parts 261, 264, 265, 266, and 271) ("Final BIF Rule"). The Agency then responded to questions it had received from the public about the concept of "energy recovery":

> [T]hese rules apply to hazardous wastes (and fuels that are produced from or otherwise contain hazardous waste as a result of processing, blending, or other treatment), that are burned for energy recovery in a boiler or industrial furnace that is not operating under RCRA standards for hazardous waste incinerators. Such fuel is termed "hazardous waste fuel."
>
> Certain commenters questioned whether these rules (and by extension RCRA section 3004(q)) would apply when energy recovery from burning hazardous wastes is merely incidental or when energy recovery is not the principal purpose of burning. Today's rules apply where energy recovery is significant or purposeful. The Agency stated as long ago as 1983 in a Statement of Enforcement Policy (48 FR 11159 (March 16, 1983)) that ordinarily burning low energy (less than 5,000 Btu lb.) hazardous waste is not considered to involve energy recovery, in spite of incidental energy release. See also 50 FR at 630 (January 4, 1985), and 50 FR 1690 (January 11, 1985) reiterating this principle. Thus, if boilers or industrial furnaces burn hazardous wastes containing organic constituents these rules would not invariably apply.
>
> These rules do apply, however, if hazardous wastes . . . are burned in industrial furnaces or boilers both to recover energy (i.e., to provide substantial, useful heat energy) and for some other recycling purpose, even if energy recovery is not the predominant purpose of burning. . . .[T]he Agency is moving away from tests based on purpose because the purpose of burning normally is unrelated to its environmental effect. Indeed, the argument that these rules . . . should apply only where energy recovery is the principal purpose of burning would resurrect the discredited "primary purpose" test formerly used by EPA to distinguish recycling from incineration. As both the Agency and the Congress have stated, this standard was largely irrelevant for evaluating environmental effects of burning,

> and proved exceedingly difficult to administer. . . .Consequently, these rules apply where hazardous wastes are burned in boilers or industrial furnaces and provide substantial, useful heat energy.

50 Fed. Reg. at 49,167.

In sum, the regulatory history of the phrase "burning for energy recovery" reflects the Agency's view that a material "burned" in an industrial furnace ostensibly for the purpose of material recovery is not subject to regulation as a "solid waste" unless "substantial, useful heat energy" is also recovered. The Agency's rationale for this exception to the definition of "solid waste" appears to have been an effort to avoid impermissibly intruding on a furnace's production process by restricting the burning of material "indigenous" to the process, which "contains the same types and concentrations of constituents" as the raw materials normally burned in the furnace. Under such circumstances, the use and reuse of the material in question is not increasing the accepted level of direct introduction of hazardous materials to the air or land, such that the material has become "part of the waste disposal problem."

(2) Meaning of the Phrase "Burning for Energy Recovery"

Having reviewed RCRA's approach to recyclable materials and the regulatory coverage of "burning for energy recovery," the undersigned now turns to interpreting the regulatory phrase in the context of the materials at issue. As a preliminary matter, the parties are advised that Complainant's reading of the regulatory language is not entitled to full deference because it is not a final position or decision of the Agency but merely a litigation position advanced by enforcement counsel, which does not receive the same degree of weight.[28] *See, e.g.*, *Lazarus, Inc.*, 7 E.A.D. 318, 351 n.55 (EAB 1997); *Mobil Oil Corp.*, 5 E.A.D. 490, 509 n.30 (EAB 1994); *Harpoon P'ship*, EPA Docket No. TSCA-05-2002-0004, 2004 EPA ALJ LEXIS 111, at *89-90 (ALJ, May 27, 2004); *Julie's Limousine & Coachworks, Inc.*, EPA Docket No. CAA-04-2003-1508, 2003 EPA ALJ LEXIS 37, at *23 n.15 (ALJ, May 2, 2003) (Order on Complainant's Motion for Partial Accelerated Decision); *Ferry County Noxious Weed Control District*, EPA Docket No. FIFRA-10-2002-0048, 2003 EPA ALJ LEXIS 3, at *16-17 (ALJ, Jan. 22, 2003) (Order on Motion for Accelerated Decision); *General Motors Corp., General Motors Technical Center*, EPA Docket No. RUST-002-93, 1995 EPA ALJ LEXIS 36, at *7 (ALJ, Jan. 18, 1995) (citing *Martin v. Occupational Safety and Health Review Comm'n*, 499 U.S. 144, 156 (1991); *Motor Vehicle Mfrs. Ass'n v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 50 (1983)).

Applying the general rules of construction described by the Board in *Howmet* to the phrase "burning for energy recovery," the undersigned first considers the plain meaning of the regulatory wording. The Merriam-Webster's Dictionary attributes a number of meanings to the term "burn" when used as an intransitive verb, including "to consume fuel and give off heat,

[28] Respondents argue in their post-hearing brief that Complainant's interpretation is not entitled to deference on various grounds, *see* Rs' Br. at 28-32, and Complainant argues to the contrary in its post-hearing reply brief, *see* Complainant's Post-Hearing Reply Brief ("C's Reply Br.") at 28-32.

light, and gases;" "to undergo combustion;" and "to undergo alteration or destruction by the action of fire or heat." Merriam-Webster's Collegiate Dictionary 153 (10th ed. 1997). The same dictionary likewise attributes a number of meanings to the term "recover" when used as an intransitive verb, including "to save from loss and restore to usefulness **:** RECLAIM." Merriam-Webster's Collegiate Dictionary 977 (10th ed. 1997). The parties do not seem to dispute that these conventional meanings apply here. *See* C's Reply Br. at 16-18; Respondents' Joint Sur-Reply Brief ("Rs' Reply Br.") at 7. For example, in construing the term "burning" in their initial post-hearing briefs, both Complainant and Respondents point to the testimony of Professor Fruehan regarding the non-scientific nature of the term and the manner in which it is commonly used and understood. C's Br. at 47 n.19 (citing Tr. 1152-53); Rs' Br. at 12-13 (citing Tr. 1152-53). Specifically, when questioned about the meaning of the term, Professor Fruehan testified as follows:

> Q: What can you tell us "burning" means? What is meant by the word "burning"?
>
> A: Burning is not a scientific term. Okay? I'm a scientist, I deal with scientific terms so when you talk about burning, you're talking about what laypeople think about it as opposed to what it really is, okay?
>
> Q: Okay. Is burning the same thing as combustion?
>
> A: It's related, yes.
>
> Q: How is it related?
>
> A: It's, the burning is the conversion of an element from its elemental state to an oxidized state or one oxidized state to a more oxidized state.

Tr. 1152-53. Given the parties' concurrence on this issue, the undersigned finds that a reliance on the plain meanings of the terms "burn" and "recover" is appropriate to define those terms as they are used in the regulations at OAC § 3745-51-02(C), (E)(2).

The undersigned now turns to the crux of the parties' disagreement: the meaning of the regulatory phrase "energy recovery." Arguing that the materials in question were "burned to recover energy" by virtue of producing heat *as well as* chemical energy upon combustion in the WCI Steel's blast furnace, Complainant contends, in essence, that the term "energy" as used in the regulations encompasses *any and all forms* of energy (*e.g.*, thermal, chemical, electrical, mechanical, radiant, elastic) recovered through the burning of a material. C's Br. at 47-49; C's Reply Br. at 17-18. Conversely, Respondents argue that the Agency contemplated the recovery of only one form of energy – heat energy – in promulgating the regulations defining "solid waste" to include materials burned for energy recovery and that the regulatory phrase should be construed accordingly in this proceeding. Rs' Br. at 9-15; Rs' Reply Br. at 7-10.

As argued by Respondents, the position advanced by Complainant appears to stretch beyond the plain meaning of the term "energy." Professor Fruehan himself observed that the term is commonly used and understood to denote heat energy. Tr. 1098 ("[W]e always think of energy as heat."); Tr. 1117 ("We normally think about energy as heat energy."). The Merriam-Webster's Dictionary also defines the term, among other meanings, as "usable power (as heat or electricity)." Merriam-Webster's Collegiate Dictionary 383 (10th ed. 1997). This definition seemingly does not include the concept of chemical energy. At the hearing, Professor Fruehan endeavored to explain this concept in the context of a blast furnace, first testifying that the combustion of injectants in the blast furnace produces carbon monoxide (CO), which acts as a reducing gas by removing the oxygen atoms from the iron ore fed into the furnace. Tr. 1082-84. He further explained that carbon monoxide contains energy in the configuration of its carbon and oxygen atoms, and because less energy is required to bond the carbon and oxygen atoms in carbon dioxide (CO_2), energy is released through the conversion of carbon monoxide to carbon dioxide. Tr. 1083-84, 1092, 1097-1101, 1123, 1133. Describing this form of energy as "chemical energy" and the measure of the chemical energy of a substance as its "enthalpy," Professor Fruehan testified that the conversion of carbon monoxide to carbon dioxide within the blast furnace releases chemical energy that is then harnessed to break the bonds of the iron and oxygen atoms in iron ore and strip the iron ore of its oxygen atoms, thereby converting the ore to liquid iron. Tr. 1083-84, 1092, 1097-1101. Referring to this explanation, Respondents contend:

> Professor Fruehan's scientific explanation of "chemical energy" in terms of the "enthalpy" of the materials, expressed in terms of "joules" and "moles," which he accomplished using a flip chart at the hearing, if anything made clear that such concepts are well beyond the common understanding of the word "energy," either alone or in conjunction with the word "burning."

Rs' Reply Br. at 7. The undersigned is inclined to agree. Given his considerable experience in the field, Professor Fruehan's description of the reduction of iron ore was certainly credible. Moreover, while Mr. Rorick never employed the phrase "chemical energy," his testimony and the written materials that he prepared as an aid to his testimony were consistent with the testimony of Professor Fruehan on the subject. *See, e.g.*, Tr. 2484-85 ("Any chemical reaction when elements change state, there is a change in energy. So if you're asking me is there any . . . energy exchange in these various reactions in the furnace, of course there is. . . . If you change . . . Fe_2O_3 to Fe_3O_4, there's an energy change in that molecule because the molecule has changed state."); RX 47 at CIS00574-76. Nevertheless, the energy stored in the molecular structure of a substance, as described by Professor Fruehan, does not seem to influence temperature. Thus, the concept of chemical energy – and correspondingly, Complainant's interpretation of the term "energy" as used in the regulations at OAC § 3745-51-02(C), (E)(2) – ostensibly does not comport with the plain meaning of the term.

Once the plain meaning of the regulatory text has been considered, the Board in *Howmet* instructs that the provision at issue be read in the context of the objective of the statute it

implements and the regulations as a whole. The Board also advises that regulatory history, such as the preambles to the rulemakings promulgating the regulations, may be instructive.

In this regard, Complainant points to "the overall thrust" of the regulations as "demonstrat[ing] an intention to regulate as solid waste materials that are burned or incinerated." C's Reply Br. at 19. Conversely, Complainant contends, Respondents construe the phrase "burning for energy recovery" to require the combustion of a material to generate "substantial and purposeful heat energy," despite the absence of the terms "substantial," "purposeful," and "heat" in any of the regulatory language defining solid waste. *Id.* According to Complainant, Respondents' interpretation also "attempts to discredit the idea that the energy can take the form of chemical energy as well as heat energy." *Id.*

Respondents first dispute Complainant's claim that they are attempting to discredit the aforementioned idea, arguing instead that it simply "is not what U.S. EPA meant by the word energy when it first promulgated, and later explained, what it meant by the phrase 'burning for energy recovery.'" Rs' Reply Br. at 8. Respondents then urge the undersigned to consider the regulatory history of the revised definition of solid waste and the standards governing the burning of hazardous waste in nonindustrial boilers and furnaces, arguing that this history "reveals that U.S. EPA intended to address the concern over potentially harmful emissions by addressing burning wastes, particularly low BTU wastes, in incinerators and boilers, but that burning high BTU materials in industrial furnaces was much less of a regulatory concern and, moreover, presented jurisdictional issues that justified a balancing approach." Rs' Reply Br. at 8 (citing 48 Fed. Reg. at 11,158-59 (Mar. 16, 1983)). Respondents note that the Agency balanced its interests in addressing the hazards associated with the burning of materials in incinerators and boilers and in avoiding any impermissible intrusion into production processes by requiring any burning resulting in the recovery of materials to produce "substantial useful heat energy" as well in order for the activity to be regulated. Rs' Reply Br. at 9 (quoting 50 Fed. Reg. at 49,167). Respondents contend, "The meaning that Complainant now urges would completely eliminate this requirement and would blur the distinction between regulated burning activity and the normal use of materials (all of which, according to Professor Fruehan, have some 'enthalpy') in the production process that is beyond U.S. EPA's jurisdiction." *Id.*

As observed by Complainant, the regulations as a whole lack any language qualifying the term "energy" in the manner advocated by Respondents. Additionally, the Agency articulated in the preamble to the Final Solid Waste Rule the importance of the provisions regulating certain categories of materials as solid wastes when the materials are recycled by being burned for energy recovery and its understanding that Congress supported an expansive reading of the Agency's authority to regulate such materials. 50 Fed. Reg. at 629-30.

Nevertheless, the rulemakings discussed above yield compelling guidance that supports Respondents' reading of the regulatory language. For example, while the Agency undoubtedly recognized an urgency to address the hazards associated with the burning of recyclable materials, it also articulated its understanding that its authority to regulate that activity was not without

limitations. In particular, it was mindful of the danger that its regulation of certain activities could intrude upon the normal production processes of industrial furnaces like the blast furnace operated at WCI Steel Facility. *See, e.g.*, Final Solid Waste Rule, 50 Fed. Reg. at 630 ("[R]egulation under RCRA of actual burning in industrial furnaces could, in some circumstances, represent an intrusion into normal production processes."); Final BIF Rule, 50 Fed. Reg. at 49,167 ("[T]here are certain situations where control of burning for material recovery in industrial furnaces could lead to an impermissible intrusion into the production process and so be beyond EPA's authority under RCRA."). As first reflected in the preamble to the Final Solid Waste Rule, the Agency addressed this concern by restricting the scope of its jurisdiction over solid wastes to those materials burned in industrial furnaces to recover energy, or to recover both energy and materials, but opting not to extend its jurisdiction to materials burned in industrial furnaces to recover materials exclusively. 50 Fed. Reg. at 630-31.

The Agency also explained its view in the preamble to the Final Solid Waste Rule that "burning of low energy hazardous wastes as alleged fuels is not considered to be burning for legitimate energy recovery." 50 Fed. Reg. at 630. Rather, the Agency explained, such an activity would be considered incineration. *Id.* This view was drawn from the Enforcement Policy Statement issued by the Agency on January 18, 1983, and subsequently printed in the Federal Register on March 16 of that year. As previously discussed, the Statement advised that "[a] determination of what constitutes sham burning depends ultimately on weighing a number of factors presented by the circumstances of a particular case," but that "[t]he energy value of the hazardous wastes being blended or burned . . . is likely to be of primary significance in most cases." 48 Fed. Reg. at 11,157-58. In particular, the Statement explained, "EPA ordinarily views the practice of direct burning of hazardous wastes with little or no *heat value* . . . as not being legitimate recycling." *Id.* (emphasis added). Significantly, the Agency described its intent in the preamble to the Final Solid Waste Rule to "leave[] the principles of the Statement in force." 50 Fed. Reg. at 630. Thus, reading the language of the preamble and the Enforcement Policy Statement together, the Agency plainly associated the practice of recycling a material by recovering energy from it with the "heat value" of the material.

Subsequent rulemakings do not signal any intent by the Agency to depart from this notion. To the contrary, the Agency elaborated upon it in the preamble to the Final BIF Rule, such as the portion of the preamble where the Agency responded to questions it had received from the public about the concept of "energy recovery":

> Certain commenters questioned whether these rules (and by extension RCRA section 3004(q)) would apply when energy recovery from burning hazardous wastes is merely incidental or when energy recovery is not the principal purpose of burning. Today's rules apply where energy recovery is significant or purposeful. The Agency stated as long ago as 1983 in a Statement of Enforcement Policy (48 FR 11159 (March 16, 1983)) that ordinarily burning low energy (less than 5,000 Btu lb.) hazardous waste is not considered to involve energy recovery, in spite of incidental energy release. See also 50 FR at 630

> (January 4, 1985), and 50 FR 1690 (January 11, 1985) reiterating this principle. Thus, if boilers or industrial furnaces burn hazardous wastes containing organic constituents these rules would not invariably apply.
>
> These rules do apply, however, if hazardous wastes . . . are burned in industrial furnaces or boilers *both* to recover energy (i.e., to provide substantial, useful heat energy) and for some other recycling purpose, even if energy recovery is not the predominant purpose of burning. . . .Consequently, these rules apply where hazardous wastes are burned in boilers or industrial furnaces *and provide substantial, useful heat energy*.

50 Fed. Reg. at 49,167 (emphasis added). This passage is particularly telling. Not only did the Agency speak of the recovery of energy from a material solely in terms of "heat energy," but it also qualified the concept further by explaining that the incidental release of energy from a material "is not considered to involve energy recovery." Rather, the release of "substantial, useful heat energy" is required.

The Agency continued to focus on the recovery of "substantial, useful heat energy" in its response to a request by certain entities to exclude Cadence product 312 ("Cadence product"), a material patented for use as an injectant in a blast furnace by Cadence Chemical Resources, Inc. ("Cadence"), from regulation as a "hazardous waste fuel." In the course of its discussion, the Agency rejected the argument that the generation of heat energy from burning the material in a blast furnace was "incidental and unavoidable" and, therefore, that the material was not burned for energy recovery. 50 Fed. Reg. at 49,171. The Agency found that, to the contrary:

> [T]he product in fact releases *substantial, useful heat energy* to a blast furnace and, thus, is burned partially for energy recovery within all reasonable understanding of the term. Although we agree that energy recovery is not the sole purpose for burning Cadence product in a blast furnace, the fact that substantial, useful energy is recovered subjects Cadence product to regulation as hazardous waste fuel.

50 Fed. Reg. at 49,171-72 (emphasis added). The Agency further observed that "injectants with no or minimal heating value are not considered to be burned for energy recovery." 50 Fed. Reg. at 49,173. Finally, while the Agency explained that the hydrocarbons contained in injectants "act as ingredients to furnace reactions by being converted to the reducing gases carbon monoxide and hydrogen" upon combustion, it never referred to the chemical energy contained in those gases and used during the reduction process as a basis for finding that injectants are burned for energy recovery. 50 Fed. Reg. at 49,172. Rather, the Agency seemed to view the release of hydrocarbons in the form of reducing gases as the recovery of materials. Thus, the foregoing sections of the preamble to the Final BIF Rule favor the interpretation of the term "energy" advanced by Respondents. Complainant seems to acknowledge this point in its post-hearing

reply brief, observing that the analysis contained in the preamble to the Final BIF Rule "appears to have rested on 'heat energy.'" C's Reply Br. at 30.

Given the regulatory history discussed above and the principles set forth in the Enforcement Policy Statement, the Agency appears to have contemplated the recovery of only heat energy at the time it revised the definition of "solid waste" to include materials recycled by being burned to recover energy. Likewise, at the time it further explained its view of this activity in subsequent rulemakings, the Agency appears to have required the release of "substantial, useful heat energy" from the combustion of a given material, even if the recovery of such energy was not the predominant purpose of the combustion, in order for the activity to be considered "energy recovery." Thus, the undersigned may reasonably conclude that the Agency intended to require the release of substantial and useful heat energy upon combustion of the material in order to subject it to regulation as a solid waste by virtue of having been recycled by being "burned for energy recovery." Such a finding does not discount Professor Fruehan's explanation of the concept of chemical energy and the conclusion that the reducing gases generated by the combustion of injectants in a blast furnace serve as a source of such energy. Rather, as argued by Respondents, the foregoing discussion simply demonstrates that the form of energy described by Professor Fruehan "is not what U.S. EPA meant by the single word 'energy' when it first promulgated, and later explained, what it meant by the phrase 'burning for energy recovery."

Finally, as observed by Respondents, another division of Region 5 seems to have construed the phrase "burning for energy recovery" as requiring the generation of heat energy as recently as 2005. *See* Rs' Br. at 14. Specifically, in a letter addressed to Ernie Willis of IWM and dated December 9, 2005, Margaret M. Guerriero, Director of Region 5's Waste, Pesticides and Toxics Division, responded to a request that Ohio EPA and the Agency determine whether the use of K022 as a coke supplement in a blast furnace required it to be handled as a hazardous waste. CX 47, EPA17146. Citing the regulations at OAC § 3745-51-02(C)(2)(a) and (E)(2)(b), Ms. Guerriero explained:

> [E]ven if recycling of the solid waste involves use or reuse, but it is burned for energy recovery, used to produce a fuel, or contained in fuels, it remains a solid waste. The common use of the term "fuel" is any material used to produce heat or power by burning. A blast furnace receives some of its heat energy from the combustion of the coke that is charged into the furnace, as well as the combustion of material injected in the tuyeres. Combustion of the coke provides heat needed to melt the iron-bearing material in the furnace, and any substitute for coke is an alternate heat source of fuel. Therefore, the use of K022 in the blast furnace as a substitute for coke makes it a fuel.

CX 47, EPA17146. The letter's focus on whether K022 served as a "heat source" or provided "heat energy" to a blast furnace reflects a consistent interpretation within the Agency of the phrase "energy recovery" as requiring the generation of heat energy. While not dispositive for purposes of this proceeding, this consideration certainly lends support to Respondents' position.

See Howmet, 13 E.A.D. at 298 (explaining that the Board is not bound by a position on a regulation taken by a program office of the Agency but that it is appropriate to give greater deference to such a position when the agency's rulings, legal interpretations, and opinions are consistent over long periods of time) (citing *Lazarus, Inc.*, 7 E.A.D. 318, 352-53 (EAB 1997) ("The degree of deference accorded to an [informal Agency] interpretation 'will depend upon the thoroughness evident in its consideration, the validity of its reasoning, its consistency with earlier and later pronouncements, and all those factors which give it power to persuade, if lacking power to control.'") (quoting *Skidmore v. Swift*, 323 U.S. 134, 140 (1944)); *Landfill Serv. Corp.*, 3 E.A.D. 346, 350 (EAB 1990) (explaining that interpretations by EPA's program offices are neither binding on the Board nor dispositive).

As informed by the plain meaning of the terms "energy," "burn," and "recover," the Agency's view of the phrase "burning for energy recovery" as reflected in the rulemakings and Enforcement Policy Statement discussed above, and the subsequent advisory opinion issued by another division of Region 5, the undersigned is compelled to find that a fair reading by the regulated community of the phrase "burning for energy recovery" as used in the applicable regulations is the burning of a material such that substantial, useful heat energy is obtained from the combustion. Complainant's arguments to the contrary simply are not as persuasive as the considerations enumerated above. While Complainant is correct that the regulatory text lacks any language qualifying the term "energy," a reading of the term to encompass any and all forms of energy disregards its everyday meaning. Such an outcome would be incongruous with the Board's direction in *Howmet* that "[t]he plain meaning of words is ordinarily the guide to the definition of a regulatory term" and with the parties' reliance upon the plain meanings of "burn" and "recover" to define those terms. The interpretation advocated by Complainant also is inconsistent with the Agency's understanding and expression of the intended meaning of the phrase "energy recovery," as shown by the regulatory history of the revised definition of "solid waste" and the standards governing the burning of hazardous waste in nonindustrial boilers and furnaces, as well as the principles described in the Enforcement Policy Statement.

Complainant disagrees, countering that its position on the issue simply "is advancing what may be seen as a more current understanding of blast furnace operations, which recognizes that the reducing gases produced by combustion of injectants provide chemical energy in addition to the heat energy from combustion." C's Reply Br. at 30. As discussed in greater detail below, the undersigned agrees with Complainant that the evidentiary record reflects a more current understanding of the operation of a blast furnace than described by the rulemakings in question. However, this consideration does not compel an interpretation of the regulations in a manner that disregards the plain meaning of a regulatory term or alters the Agency's intentions at the time it promulgated and later explained the scope of the regulations. Moreover, as Respondents contend, Complainant's position could conceivably bring within the scope of regulation "any manufacturing operation that involves a chemical reaction." Rs' Reply Br. at 6. Such an expansive reading of the phrase "burning for energy recovery" lacks sufficient support based upon the record of this proceeding. Thus, Complainant's arguments are hereby rejected, and consistent with the foregoing discussion, the undersigned finds that in order for a material to

be considered a "solid waste" under RCRA or a "waste" under the Ohio Administrative Code by virtue of having been recycled through "burning for energy recovery," the combustion of the material shall result in the recovery of substantial and useful heat energy.

c) The Burning of Injectants at the WCI Steel Facility

Having interpreted the phrase "burning for energy recovery" as the recovery of substantial and useful heat energy from the combustion of a material, the undersigned now turns to the question of whether substantial and useful heat energy was obtained from the materials supplied by JLM and IFF to Respondent CIS and subsequently injected into the blast furnace at the WCI Steel Facility, such that the materials constitute a "waste" as defined by OAC § 3745-51-02(C)(2) insofar as the manner in which they were recycled. Given that an element of Complainant's *prima facie* case is to establish that these materials constituted a "waste" as defined by the Ohio Administrative Code, and that the regulations at OAC § 3745-51-02(C)(2) provide that certain categories of materials are considered "waste" when they are recycled, or accumulated, stored, or treated before recycling, by being burned for energy recovery, Complainant bears the initial burden of production and ultimate burden of persuasion on the issue. Respondents, in turn, bear the burden of establishing the applicability of any exclusions or exemptions.[29] As noted above, the regulations set forth a recycling exemption for materials shown to be recycled by certain means, such as by being "[u]sed or reused as ingredients in an industrial process to make a product, provided the materials are not being reclaimed." OAC § 3745-51-02(E)(1). However, this exemption is unavailable where the materials are also "burned for energy recovery, used to produce a fuel, or contained in fuels." OAC § 3745-51-02(E)(2)(b). Thus, the question of whether the materials supplied by JLM and IFF to Respondent CIS were "burned for energy recovery" is dispositive for regulatory purposes.[30]

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[29] Complainant argues in its Reply Brief that "Respondents have the burden of proving that the JLM and IFF material *was not* burned for energy recovery and *was* an ingredient in an industrial process to make a product when it was burned in [WCI Steel's] iron making blast furnace as a coke substitute" in order to avail themselves of the recycling exemption set forth at OAC § 3745-51-02(E)(1)(a). C's Reply Br. at 3. Complainant proceeds to claim that Respondents "have not met this burden, and thus the JLM and IFF material is regulated as a waste under OAC § 3745-51-02(C)(2)." C's Reply Br. at 3. To clarify the allocation of the burden of proof in this proceeding, Respondents bear the burden of establishing the applicability of an exclusion or exemption only *after* Complainant has met its burden of demonstrating that the injectants supplied by Respondent CIS did, in fact, supply substantial and useful heat energy to the blast furnace at the WCI Steel Facility upon combustion. Thus, the initial burden lies with Complainant.

[30] While the question of whether the JLM and IFF materials were "burned for energy recovery" is dispositive, the undersigned notes that the evidentiary record supports a finding that injectants such as the materials at issue are "used or reused as ingredients in an industrial process to make a product," and are not being reclaimed, an activity that the Agency distinguished in the preamble to the Final Solid Waste Rule as the recovery of a component of a material as an end product. 50 Fed. Reg. at 637-38. Thus, these types of materials would fall within the recycling exemption set forth at OAC § 3745-51-02(E)(1)(a) but for a finding that the materials are also "burned for energy recovery, used to produce a fuel, or contained in fuels." On this subject, Respondents first rely on the testimony of Dr. Poveromo and Professor Fruehan to argue that injectants are used as ingredients in the industrial process to produce iron, and ultimately steel, on account of serving as a source of reducing gases for the blast furnace, which are necessary for the reduction of the iron ore to liquid iron. Rs' Br. at 19-20 (citing Tr. 1112, 2537-42, 2554, 2557-

58; CX 13 at 10113-15). Respondents then point to evidence presented at the hearing by Mr. Rorick to argue that injectants are also used as ingredients because some of the carbon contained in the injectants does not react in the raceway of the blast furnace but, rather, is propelled to other parts of the furnace, where it dissolves in the liquid iron descending to the hearth. Rs' Br. at 16-17 (citing Tr. 2406-08, 2421-23, 2426-29, 2432-36, 2498-99; RX 117, 119). As for the effect of this carbon on the liquid iron, Respondents observe that Professor Fruehan and Mr. Rorick agreed that "carbon necessarily and inevitably is a component of the hot liquid metal produced by a blast furnace" and that "the carbon content lowers the melting point of the iron[,] which permits it to flow when the blast furnace is tapped." Rs' Br. at 18 (citing Tr. 1094, 1168, 2504).

To counter Respondents' position on this issue, Complainant argues simply that Respondents are unable to sustain their burden of demonstrating that the JLM and IFF materials qualify for the recycling exemption because the exemption does not apply to materials burned for energy recovery, which, Complainant maintains, occurred in this case. C's Br. at 59; C's Reply Br. at 31-32. Complainant also challenges Respondents' contention that the materials were used for their carbon values due to a lack of evidence that Respondents knew the precise amount of carbon that the materials contained. Cs' Br. at 59-60 (citing CX 31 at EPA16970, CX 39 at EPA16994).

Apart from these arguments, Complainant does not appear to dispute that injectants generally are "used or reused as ingredients in an industrial process to make a product" due to the carbon and hydrogen values supplied by the injectants to a blast furnace in the form of reducing gases, which are critical to the reduction process. *See* C's Br. at 49-50. Professor Fruehan certainly spoke of the carbon and hydrogen values provided by injectants and the role those materials play in the reduction of iron ore to liquid iron within the furnace, albeit with an emphasis on the chemical energy they supply. *See, e.g.*, Tr. 1075 (explaining that injectants serve as a means of supplying carbon and hydrogen to a blast furnace); Tr. 1092 (explaining that injectants are a source of "chemical energy that's conveyed in the carbon monoxide," which is required for the reactions within the furnace to occur); Tr. 1097-98 (explaining that the carbon monoxide generated by the injectants is both a source of energy and a reactant); Tr. 1108 ("By injecting a hydrocarbon, they are supplying energy . . . in the carbon and the hydrogen."); Tr. 1112 ("[Injectants are] hydrocarbon carriers used for reduction, that's the chemical reaction. But they're also supplying energy. They're a reactant and they're an energy source . . . ."). The evidence in the record on this subject is also consistent with the discussion set forth in the preamble to the Final BIF Rule, where the Agency explained that the material values resulting from the combustion of injectants "act as ingredients to furnace reactions by being converted to the reducing gases carbon monoxide and hydrogen during endothermic reactions." Final BIF Rule, 50 Fed. Reg. at 49,172. Based upon these considerations, the undersigned could reasonably conclude that injectants are "used or reused as ingredients in an industrial process to make a product" with respect to the carbon and hydrogen supplied by injectants as reducing gases.

With respect to the argument that injectants act as ingredients to the processes of the blast furnace to the extent that unreacted carbon from the injectants exits the raceway of the furnace and is absorbed by the liquid iron as it descends to the hearth, the parties agreed that liquid iron consists of four to five percent carbon and that the carbon lowers the melting point of the liquid iron, but they presented conflicting evidence as to its source. The undersigned considers the evidence presented by Mr. Rorick in support of Respondents' position to be especially compelling, however. When asked whether carbon from oil injectants is incorporated into the liquid iron, Mr. Rorick responded emphatically, "The answer to that is undeniably, absolutely categorically yes, indisputably." Tr. 2408. He explained that a material injected into the furnace is present in the raceway for only three to five thousandths of a second and that, depending upon such factors as the type of injectant, the rate of injection, the manner in which a given blast furnace is being operated, and the type of equipment used by the furnace to convey the injectant to the raceway, between 10 and 70 percent of the carbon contained in the material does not have an opportunity to react with the oxygen in the raceway but, rather, is driven in solid form by the incoming hot blast and injectants into the dead man zone, where it is absorbed by the liquid iron trickling to the hearth. Tr. 2386-87, 2397-2408, 2411-14, 2438-39, 2481, 2485-87, 2496-97. Mr. Rorick stressed that unreacted carbon from an injectant is "preferentially dissolved in the iron" over the particles of coke also present in the dead man zone because of the smaller size of the unreacted carbon:

> [W]e know . . . that fine particles will preferentially go into solution versus large ones. . . . A coke particle starts out about two to three inches in diameter. A char particle [unreacted carbon from a coal injectant] is the size of a grain of table salt. A soot particle [unreacted carbon from an oil injectant] is even smaller than that, so when the iron comes down, it's looking for a carbon. It's got this nice little fine particle right next to the droplet or it can try to stick itself on the outside of this big chunk of coke.

Tr. 2406-07; *see also* Tr. 2466-67 (explaining that smaller particles dissolve more readily in a solution than bigger particles pursuant to principles of basic chemistry and that the smaller particles of unreacted carbon from injectants in the dead man zone will therefore dissolve more readily in the liquid iron as it descends to the hearth than the larger particles of coke also present in that zone).

Mr. Rorick testified that his opinion on the issue was based upon his personal observations and analyses, including studies that he had performed involving the attachment of "tracers" to injectants, which then reappeared in the liquid iron; anecdotal evidence from other blast furnace operators; and research conducted by a number of individuals in the industry. Tr. 2407-08, 2419-23, 2432-37. As Mr. Rorick explained, "[The use of tracers] made a believer out of me because we analyzed it and saw it with our own eyes, verified it with our colleagues at other furnaces. By the way I've talked to other furnaces since then, . . . [and] our experience wasn't unique. It's widespread." Tr. 2421. Mr. Rorick also presented recordings of injections taken from a viewing port used by operators to observe activities in the raceway, which he described as corroborating his testimony that injectants are not entirely combusted in the raceway unless pure oxygen also is injected. RX 117, 119; Tr. 2423, 2426-29, 2480-81. He explained, however:

> You can make it all combust [by simultaneously injecting pure oxygen into the raceway], but in fact . . . the operators specifically exactly do not want that to happen and we take specific measures to ensure that it never does. . . . If we have combustion right here in the raceway, the gases expand and that creates a back-pressure back into the blow pipe [the conduit for the hot blast]. . . . It's like trying to blow out of a soda straw if someone's blowing into the other end of it. You just can't blow as much out anymore because the two are fighting each other.

Tr. 2429. Mr. Rorick testified that operators also seek to curb the amount of combustion because of the risk that temperatures at the tuyeres will exceed the standards of that equipment, which could "burn a hole inside of the furnace and under normal operating pressure fire, all kinds of coke and damage and iron and slag will come blowing out of this hole and put everyone at risk who's in the area as well as the facility." Tr. 2429-30.

With respect to the blast furnace at the WCI Steel Facility in particular, Mr. Rorick described his "[g]ood general knowledge" of its operations between the years 2005 and 2008 on account of having visited the facility on approximately 15 occasions over the course of 30 years and having spoken with the operators of the blast furnace "[m]any times." Tr. 2364-65, 2494-95. He testified that he also reviewed data related to the operation of the blast furnace as part of his duties as the "facilitator and manager" of "blast furnace data exchanges," for which operators of blast furnaces in North America and around the world compile and exchange data about their operations in order to "benchmark what's going on in the rest of the industry." Tr. 2364-65. Based upon his familiarity with WCI Steel's blast furnace, Mr. Rorick testified that the injectants used there were even less likely to combust completely in the raceway. Tr. 2487, 2496-97, 2500. He pointed to the conduit for the injectants, referred to as a "lance," as the primary culprit:

> They were using a non-atomizing lance, a straight lance which is the most likely to give you a tight stream coming out of the injection lance and it's the most likely to put more injectant out of the raceway unreacted because the hot blast can only react to the outer surface of the stream. The more dissipated the stream in a mist, the more chance it has to react. The tighter the stream, it can

> only react on the outer surface and work its way in, so the core of that stream is like the water squirting out of your garden hose, it's blasting into the back . . . .

Tr. 2496-97. Mr. Rorick also testified to the inefficiency of the blast furnace at the WCI Steel Facility between the years 2005 and 2008, explaining that "they had the lowest hot blast temperature in North America" and "the highest total consumption of reductants, coke plus injection per ton of hot metal in North America." Tr. 2497-2500. As for the rate of injection there, Mr. Rorick observed that oil injectants were used at a rate of approximately 50 to 60 kilograms, or 100 to 120 pounds, per ton of hot metal, which was the same rate of injection in one of the recordings he produced at the hearing in which the oil injectant was not completely combusted. Tr. 2415, 2480-81, 2498; RX 117. Finally, testifying that a steel plant typically removes carbon from liquid iron during the steelmaking process in accordance with the needs of its customers, Mr. Rorick explained that the WCI Steel Facility in particular produced "high carbon steels," or steel containing one to two percent carbon, from the liquid iron produced by its blast furnace. Tr. 2501-03.

The undersigned found the foregoing evidence to be exceptionally clear and coherent, and Complainant failed to elicit any testimony from Mr. Rorick that contradicted it. The record demonstrates that Mr. Rorick has had an extensive career working as a blast furnace operator and consulting with other operators worldwide, and that he possesses a considerable degree of personal knowledge as to the practical aspects of blast furnace operation, as well as the operation of the blast furnace at the WCI Steel Facility in particular. This hands-on experience is notable. As Mr. Rorick explained, "I've used injectants . . . since the 1960s. I personally have injected at furnaces that I was responsible for everything from coal tar to natural gas to fuel oil, number 6 fuel oil to waste oils to coal and probably a couple other things in there, too." Tr. 2389. He later testified, "I have been actively living injection on a hands-on basis for 45 years in running the blast furnace and someone else without the same experience would not have access to the same kind of knowledge that I've gained in actually doing that." Tr. 2439. He reasonably concluded, "[A]s opposed to what theoretically might be or what by mathematical calculation should be, I can tell you what is. What I've seen with my own eyes, with my own tests, with my own examination." Tr. 2438.

These considerations lend substantial weight to Mr. Rorick's testimony concerning the percentage of carbon from injectants that exits the raceway unreacted and is incorporated into the liquid iron produced by the blast furnace, the process by which the carbon is absorbed, the factors that affect the likelihood that an injectant is entirely combusted in the raceway, and the features of the blast furnace at the WCI Steel Facility that increased the probability that carbon from the oil injectants used there would not fully combust and would thus be incorporated into the liquid iron. Accordingly, the undersigned found Mr. Rorick's opinion on the issue at hand to be especially well-supported and deserving of credibility.

On the other hand, the evidence presented by Complainant on this topic was not as compelling. Professor Fruehan disagreed with Mr. Rorick on the extent to which carbon from an injectant is incorporated into the liquid iron, first testifying:

> [A] small amount of the carbon in the injectants, probably one or two percent of the carbon in the injectant, enters into the iron itself. Most of the carbon that's in the iron comes in as the iron starts to melt, it percolates down through the coke bed and it absorbs carbon as it does that; but up higher in the blast furnace, it's possible to get one or two percent carbon in the metal, that represents about one or two percent of the injectants so it could be said that some of the carbon goes into the product . . . .

Tr. 1070. Later distinguishing between oil and coal injectants, he testified that oil injected into a blast furnace is "almost completely combusted . . . to carbon monoxide and hydrogen" and that "very little remains as soot," while coal is less likely to combust completely in the blast furnace and that any unreacted carbon from coal injectants is "carried up in the process" and "eventually reacts up higher in the furnace." Tr. 1092-93. He acknowledged that

"one or two percent of the carbon in the oil ends up as carbon in the [hot] metal," but he attributed the majority of the carbon found in liquid iron to the coke in the blast furnace:

> Based on work that's been done in Japan, they actually froze and dissected a blast furnace and they got some vague idea. The majority of the carbon comes from the coke bed itself. Some of the carbon, some, could, can come from the carbon monoxide coming up into the furnace. That's limited to one to two percent of the carbon in the iron and most of that carbon monoxide, by the way, comes from the coke so it is still coming from the coke.

Tr. 1095-96. He further testified that the percentage of the total amount of carbon found in liquid iron that derives from an oil injectant depends upon "how much oil is being injected versus how much coke is being used." Tr. 1096. Based upon an amount of 50 kilograms of oil injectant per ton of hot metal, he opined that the percentage of the carbon in the liquid iron deriving from the injectant would be "very, very small, one or two percent." Tr. 1096. He also stressed that this carbon is subsequently removed during the steelmaking process. Tr. 1070-71, 1094, 1096, 1148. He concluded, "Any carbon that enters the [hot] metal from the injectants will be small, a small amount may enter the metal but it's less than two percent of the total carbon that comes in with the injectants . . . ." Tr. 1148.

Undoubtedly, Professor Fruehan is extremely knowledgeable about topics related to the production of liquid iron in a blast furnace, as demonstrated by his testimony, his curriculum vitae, and other documentary evidence presented at the hearing. However, his testimony regarding the source of the carbon found in liquid iron simply was not as clear or as thorough as the evidence presented by Mr. Rorick on this subject, and he did not appear to possess the same degree of practical experience in the operation of a blast furnace that the undersigned found to be so noteworthy about Mr. Rorick. For example, Professor Fruehan did not identify any basis for his opinion that the majority of the carbon found in liquid iron is attributable to the coke in the blast furnace other than a "vague idea" developed from "work that's been done in Japan," whereas Mr. Rorick explained that he formed his opinion on the subject based on studies that he had performed firsthand as a blast furnace operator, among several other considerations. Additionally, while Mr. Rorick described in detail a number of factors that affect the likelihood that an injectant is entirely combusted in the raceway, Professor Fruehan pointed to the rate of injection and "[t]he efficiency of the injection system and the combustion system" as such factors before admitting, "I don't know all of the factors." Tr. 1096, 1158-59. He also was uncertain about the terminology related to this subject:

> Q: Is there a term for that unreacted solid carbon from the injectants that leave, that leaves the raceway?
>
> A: Soot?
>
> Q: Soot?
>
> A: Yeah.
>
> Q: Char?
>
> A: Soot or char. Char is usually, yeah, it could be called char, yes.
>
> Q: Is there a difference between soot and char?
>
> A: Soot and char…. I'm not sure. I think char is usually the product of incomplete combustion. Soot can be the product of incomplete combustion or condensation, but I'm not sure but basically they're, they're very similar.

Tr. 1183. Finally, Professor Fruehan acknowledged that he has never visited the WCI Steel Facility. Tr. 1160.

(1) Arguments of the parties

The parties presented a myriad of arguments related to the question of whether injectants such as the JLM and IFF materials supply heat energy to a blast furnace, as summarized below.

(A) Complainant's initial post-hearing brief

Apart from arguing that the combustion of injectants in a blast furnace produces chemical energy in the form of reducing gases and that this consideration alone demonstrates that the injectants supplied by Respondent CIS to the WCI Steel Facility were "burned for energy recovery," Complainant also maintains that the combustion of injectants generates heat energy. C's Br. at 47. Complainant first relies upon the testimony of both Professor Fruehan and Dr.

Based upon these considerations, the undersigned found the evidence that he presented to be less persuasive. The undersigned is thus inclined to accept Mr. Rorick's opinion on the source of the carbon found in liquid iron over that of Professor Fruehan.

In accordance with the foregoing discussion, the preponderance of the evidence in this proceeding supports a finding that between 10 and 70 percent of the carbon found in injectants exits the raceway of the blast furnace unreacted and is subsequently absorbed by the liquid iron descending to the hearth, and that complete combustion of injectants at WCI Steel's blast furnace was especially unlikely given the design of the lance used there, the inefficient manner in which the blast furnace was operated, and the rate of injection. This use of injectants appears to fall squarely within the recycling exemption. As argued persuasively by Respondents in their post-hearing brief, any claim that carbon is not an ingredient given that liquid iron is used to produce steel and carbon is typically removed during the steelmaking process is misguided:

> The recycling [exemption] refers to materials used or reused as ingredients in an "industrial process," not ingredients in a final product. A substance is an ingredient in an industrial process if it is an ingredient in an intermediary product that is produced as a feedstock for use in the overall production process. In any event, not all iron is used to make steel, and not all steel has no carbon content. Indeed, Mr. Rorick, who has personal knowledge regarding the former WCI steel plant, testified that the steel produced there was a particularly high carbon content steel.

Rs' Br. at 18 (citing Tr. 2503).

As for the use of the JLM and IFF materials in particular, the evidentiary record supports a finding that these materials behaved no differently in the blast furnace at the WCI Steel Facility than other oil injectants used there. *See, e.g.*, Tr. 1108-09, 2558-59, 2563-68; RX 131-134. While Complainant disputes that the materials were used for their carbon values due to a lack of evidence that Respondents knew the precise amount of carbon that they contained, such an argument seemingly contradicts Complainant's position that the materials reacted in the blast furnace like any other injectant and, thus, supplied chemical energy to the blast furnace by way of the reducing gases that they generated upon combustion. *See* C's Br. at 56 (arguing that because the blend of oil and materials from IFF "was used as an injectant" at WCI Steel's blast furnace, it, "just like any injectant, . . . provided the reducing gases (CO and H_2) necessary to remove the oxygen from iron (Fe_2O_3) and FeO," which "lowered the amount of energy required for the reduction reactions"). Accordingly, the undersigned finds that its argument lacks merit, and the JLM and IFF materials could reasonably be found to have acted as ingredients in an industrial process to make a product, such that they would qualify for the recycling exemption set forth at OAC § 3745-51-02(E)(1)(a) provided that they were not also "burned for energy recovery, used to produce a fuel, or contained in fuels."

Poveromo as support for this position, claiming that these witnesses agreed that "some sensible heat energy is produced" from the combustion of injectants in a blast furnace. *Id.* (citing Tr. 1082-84, 1091-92, 1133, 1148-49, 1155-56, 1177-83, 1191, 2570-71, 2573). Complainant contends that this conclusion is consistent with the Agency's view of the role of injectants in a blast furnace as described in the preamble to the Final BIF Rule. C's Br. at 49 (citing 50 Fed. Reg. at 49,172). As Complainant observes:

> The preamble explains that fuel injectants "first behave as *bona fide* fuels by combusting to (ideally) carbon dioxide and water." After the injectants are combusted, they act as ingredients to the furnace reactions only, by providing reducing gases (CO and H_2), which fuel the reducing reactions. The excess reducing gases, which were not used to reduce iron ore, are collected with the blast furnace "off gas." These off gases are combusted outside the furnace to supply energy to preheat air that is injected into the furnace through the tuyeres. In total, fuel injectants provide approximately 22% of the heat input to the blast furnace. Therefore . . ., injectants serve a dual purpose of providing substantial energy and reductants.

C's Br. at 49-50 (internal citations omitted).

Complainant contends that a finding that injectants serve as a source of heat energy to a blast furnace would also be consistent with the determination of Margaret M. Guerriero of Region 5 that K022, the material generated by JLM and supplied to Respondent CIS, constitutes a fuel. C's Br. at 52 (referring to CX 47 at EPA17146). As previously discussed, Ms. Guerriero explained in a letter dated December 9, 2005, and addressed to Ernie Willis of IWM:

> [E]ven if recycling of the solid waste involves use or reuse, but it is burned for energy recovery, used to produce a fuel, or contained in fuels, it remains a solid waste. The common use of the term "fuel" is any material used to produce heat or power by burning. A blast furnace receives some of its heat energy from the combustion of the coke that is charged into the furnace, as well as the combustion of material injected in the tuyeres. Combustion of the coke provides heat needed to melt the iron-bearing material in the furnace, and any substitute for coke is an alternate heat source of fuel. Therefore, the use of K022 in the blast furnace as a substitute for coke makes it a fuel.

CX 47, EPA17146.

According to Complainant, this view is also consistent with the determination rendered by the Agency in the preamble to the Final BIF Rule that Cadence product is burned for energy recovery in a blast furnace given its heat value of 10,500 to 14,000 BTU/lb. C's Br. at 52 (citing 50 Fed. Reg. at 49,173-74). Noting that this figure is far less than the heating value that WCI Steel required of the materials supplied by Respondent CIS pursuant to their Product Supply and

Operation Agreement, Complainant maintains that those materials consequently qualify as fuels. C's Br. at 53 (citing CX 24 at EPA13153). Complainant also refers to an alternative basis articulated by the Agency for its authority to regulate Cadence product, as described in the preamble to the Final BIF Rule:

> EPA does not believe that the question of jurisdiction over the Cadence product (or other similar waste-derived materials) need turn narrowly on the question of whether it is burned partially for energy recovery . . . These still bottoms are not similar to raw materials customarily used in the iron-making process (i.e., toxic chlorinated solvents are not a typical feed or energy source to the iron-making process). The recycling practice, as well as prior transportation and storage, has the potential to cause substantial harm to human health and the environment if conducted improperly.

C's Br. at 52-53 (quoting 50 Fed. Reg. at 49,173-74). Complainant contends that the materials supplied to Respondent CIS by JLM and IFF also "are not similar to the raw materials customarily used in the iron-making process." C's Br. at 53. Regardless of their characteristics, Complainant argues, those materials, "like K022 and Cadence [product], serve as a supplement for coke in a blast furnace. Therefore, if Respondents agree that coke provides energy, the material at issue also provides energy. Any supplement for coke is an alternate heat source or fuel, which is burned for energy recovery." *Id.*

As additional support for its position that the materials at issue here constitute fuels and, thus, supply heat energy to a blast furnace, Complainant relies upon the regulations at 40 C.F.R. § 266.103, entitled "Interim status standards for burners," for the notion "that hazardous waste with a heating value of 5,000 BTU/lb or more is considered burned as a fuel – and not considered burned as an ingredient." C's Br. at 53 (citing 40 C.F.R. § 266.103(a)(5)(ii)(B)). While Complainant acknowledges that this threshold does not appear in any of the regulations governing whether a recyclable material satisfies the definition of "solid waste," Complainant contends that it may serve as guidance on the issue. C's Br. at 54. In particular, observing that the materials supplied by IFF generally had a heat value of at least 17,000 BTU/lb, and that the Product Supply and Operation Agreement between Respondent CIS and WCI Steel required the supply of injectants with even greater heat values, Complainant argues that the injectants constituted fuels. C's Br. at 54 (citing CX 9 at EPA7243; CX 24 at EPA13153). Complainant also cites a number of occasions where Respondents "agree that their used oil and hazardous waste blend is a 'fuel,' at least when it suits them." C's Br. at 54-56. For example, Complainant notes, "Respondents . . . refer to their oil blend as a fuel throughout their relationship with [WCI Steel]," such as in the Product Supply and Operation Agreement. C's Br. at 55 (citing CX 24).

Complainant concludes:

> Under the foregoing analysis, CIS's oil fuel, blended with hazardous waste from IFF, was burned in WCI Steel's furnace for energy recovery within the meaning

> of OAC § 3745-51-02(C)(2)(a) and consistent with this description of blast furnace operations. At the WCI Steel blast furnace, CIS' blended hazardous waste fuel was injected into the blast furnace through an "Oil Injection System," which was owned and operated by Respondents. The blended hazardous waste fuel of Respondent CIS served as an injectant in the tuyere zone, and therefore a coke supplement, as described above. Because it was used as an injectant, the blended fuel essentially served two functions. First, just like any injectant, the blended fuel was combusted upon entering the column and provided heat energy, which replaces heat energy of the displaced coke. Heat is required to fuel the reactions that reduce iron ore. Second, the blended fuel provided the reducing gases (CO and H_2) necessary to remove the oxygen from iron ore (Fe_2O_3) and FeO. By supplying reducing gases, the blended hazardous waste fuel also lowered the amount of energy required for the reduction reactions. Therefore, Respondent CIS' blended hazardous waste fuel, including the IFF hazardous waste, was burned to recovery energy both through combustion and through the provision of reductants.

C's Br. at 56.

(B) Respondents' initial post-hearing brief

Addressing the question of whether injectants supply significant and useful heat energy to a blast furnace, Respondents rely upon the testimony of Dr. Poveromo to support their position that the role of injectants in a blast furnace is not to provide heat energy but to generate reducing gases as a supplement to those produced by the combustion of coke. In particular, Respondents argue that the thermal energy necessary to drive chemical reactions in the blast furnace derives from two sources only: the hot blast entering the blast furnace through the tuyeres and the combustion of coke in the raceway created by the hot blast. Rs' Br. at 20 (citing Tr. 2542). Because injectants enter the blast furnace at the level of the tuyeres and are not preheated, Respondents contend, "any heat that theoretically would be generated from their partial combustion in the raceway is more than offset by the amount of heat energy required to bring them up to raceway temperatures." Rs' Br. at 20 (citing Tr. 2541). Respondents argue that the heat required to raise the temperature of the injectants is supplied by the increased combustion of coke, which itself is achieved by the addition of oxygen to the hot blast. Rs' Br. at 20-21 (citing Tr. 1097, 2544-45, 2547). As support for this claim, Respondents refer to "heat balance calculations [provided by Dr. Poveromo] for the raceway of a blast furnace that were developed from actual research undertaken by U.S. Steel, taking into account the reactions of injectants in the raceway and then calculating how much additional heat energy is needed to bring the injectants up to raceway temperature." Rs' Br. at 21 (citing Tr. 2552-53). Based upon these considerations, Respondents observe, Dr. Poveromo opined that injectants supplement the "'chemical role'" of coke by generating reducing gases but do not produce thermal energy "'[o]n a net basis.'" Rs' Br. at 21 (quoting Tr. 2554-55). Thus, Respondents maintain, injectants do not supply any substantial or useful heat energy to a blast furnace. Rs' Br. at 21.

Claiming that "Professor Fruehan actually agreed with Dr. Poveromo without directly admitting as much," Respondents point to the testimony of Professor Fruehan that "'these injectants are going in at room temperature and the heat that's given off by their initial oxidation is not enough to get them back up to the flame temperature.'" Rs' Br. at 22 (quoting Tr. 1159). Respondents then challenge Professor Fruehan's opinion and the considerations upon which it was based as flawed for purposes of determining the quantity of thermal energy supplied by a particular material entering the blast furnace, arguing that he formulated his opinion that injectants supply energy to a blast furnace without differentiating between the thermal energy and chemical energy of a material. *See* Rs' Br. 22-25. Respondents also challenge Professor Fruehan's suggestion that "the heat value of the top gas that exits the blast furnace should be considered as providing heat energy" on the grounds that the generation of top gases "is inevitable and not purposeful, and in any event is not affected by the use of injectants." Rs' Br. at 24 (citing Tr. 2443-47, 2578). Moreover, Respondents contend, "although Mr. Rorick and Professor Fruehan both described a range of possible uses for top gas, Complainant offered no evidence as to how top gases generated at the former WCI blast furnace were utilized, if at all." Rs' Br. at 25.

Finally, Respondents object to the other arguments raised by Complainant as "immaterial," "too circular to shed any light on the issue," and "without merit." Rs' Br. at 25. In particular, Respondents contend that Complainant's arguments with respect to the December 9, 2005 letter from Ms. Guerriero to Ernie Willis of IWM "can be summed up in four words: 'because we say so.'" Rs' Br. at 26. Respondents also challenge Complainant's reliance upon the use of the term "fuel" by Respondents and others in the industry to refer to injectants. First, Respondents observe that "Complainant's view of the import of the use or mis-use of the word fuel in a variety of contexts found no support in even its own expert's opinions: 'whether we call it a fuel, whether we call it an injectant, whether we call it a reductant and to my mind it doesn't matter what we call it.'" Rs' Br. at 26 (citing Tr. 1110, 1148). Respondents also point to the testimony of Mr. Rorick and Dr. Poveromo explaining that, while members of industry traditionally used the term "fuel" to refer to injectants, they now recognize that such terminology is a mischaracterization and that the proper description of an injectant is as a reductant. Rs' Br. at 26 (citing Tr. 2532-37). Respondents emphasize, "The outdated concept of the blast furnace as a combustion process, which resulted in the common use of words like 'fuel' and 'burning' when describing the process, no longer is considered accurate or appropriate." Rs' Br. at 27 (citing Tr. 2366-68, 2532-37).

(C) Complainant's reply post-hearing brief

Complainant maintains in its reply brief that the materials supplied to Respondent CIS by JLM and IFF were "burned to recover energy" within the meaning of the regulations by virtue of generating chemical energy upon combustion in the blast furnace at the WCI Steel Facility. However, Complainant also argues that if the undersigned construes the phrase to require the production of "substantial and purposeful heat energy" as advocated by Respondents, the

materials at issue would still be considered a "solid waste" when used as an injectant in a blast furnace given the testimony of Professor Fruehan and Dr. Poveromo that "some sensible heat energy is produced" upon combustion. C's Reply Br. at 19 (citing Tr. 1082-84, 1091-92, 1133, 1148-49, 1155-56, 1177-83, 1191, 2570-71, 2573). Complainant refers to the following testimony of Dr. Poveromo in particular as support for its position:

> Q: You talked about the hot air blast coming in at the tuyere level?
>
> A: Yes.
>
> Q: How is the hot air blast initially heated?
>
> A: In the stoves.
>
> Q: And where does the heat in the stoves come from?
>
> A: It's basically a combustion process, so a stove burner at the bottom of the stove heats up the stove.
>
> Q: What's fueling the stove?
>
> A: It could be the blast furnace top gas, it could be natural gas? It can be coke oven gas depending on the individual configuration.
>
> Q: So the top gas can be used to fuel the –
>
> A: Of course in any steel plant the blast furnace top gas is considered a valuable plant fuel to be used wherever it can be most effectively used, the stoves, rolling mills, the coke oven gas under firing, so forth.

C's Reply Br. at 19-20 (quoting Tr. 2570-71). Based upon this testimony, Complainant contends:

> [T]he capture and use of the top gases is purposeful and provides substantial heat energy used in the operation of the blast furnace and elsewhere in the plant. If the heat energy was not substantial, then it would not warrant capture and reuse, and would instead be released. Accordingly, injectants, like Respondents' materials, are "burned for energy recovery" even under their own interpretation.

C's Reply Br. at 20.

Complainant also points to the Agency's explanation in the preamble to the Final BIF Rule of the operation of a blast furnace, followed by its determination that Cadence product is

subject to regulation as a hazardous waste fuel given that "burning Cadence [product] in an industrial furnace as an injectant replacing some of the coke that would otherwise be used provided heat energy and reducing gases used in iron making." C's Reply Br. at 23-25 (citing 50 Fed. Reg. at 49,171-73). Complainant particularly emphasizes the portion of the Agency's discussion concerning the use of top gases for heating purposes outside of the blast furnace:

> The heat energy released from subsequent (i.e., outside the combustion zone) reactions of fuel injectant hydrocarbons is in fact substantial, intentional, and useful contrary to Cadence's claim that it is incidental and unavoidable. As discussed above, *furnace top gas is used as fuel in stoves to heat the hot blast, in a boiler plant, or in other heating applications within the steel plant. The excess reducing gas contained in the top gas that was not used to reduce the iron ore gives the top gas substantial heating value. The excess reducing gas is contributed by the coke and fuel injectants, roughly in proportion to the amount of hydrocarbons each provides to the furnace. [The] furnace top gas is a substantial fuel source* in that only about one-third of the fuel gas is used to heat the hot blast while two-thirds is available for other uses.

C's Reply Br. at 24 (quoting 50 Fed. Reg. at 49172-73) (emphasis added by Complainant). Complainant contends that "EPA's understanding of blast furnace operations expressed in 1985, and its conclusion that Cadence was a solid waste burned for energy recovery despite, perhaps, its use as an ingredient in an industrial process to make a product, is wholly consistent with [Complainant's] application of the regulations in this case." C's Reply Br. at 25. Complainant also contends that the views of the Agency as articulated in the preamble to the Final BIF Rule are "still relevant," as confirmed by Professor Fruehan. C's Reply Br. at 25-26 (citing Tr. 1128-30). To the extent that the evidentiary record reflects that injectants provide both heat and chemical energy to a blast furnace, Complainant argues, it "is not *inconsistent* with the Cadence discussion. Rather, it reflects a more current understanding that the energy used to convert iron ore to iron comes in the form of heat energy and chemical energy." C's Reply Br. at 26.

(D) Respondents' reply post-hearing brief

In their reply brief, Respondents object to Complainant's position that injectants supply heat energy to a blast furnace as "too simplistic." Rs' Reply Br. at 11. Specifically, Respondents contend:

> Essentially, Complainant argues that because coke supplies the heat energy needed for the chemical reactions in a blast furnace to occur, and because injectants replace coke, then injectants must therefore supply heat energy too. The flaw in this approach, and in Professor Fruehan's entire testimony, is that it fails to distinguish between the three roles that coke performs in the blast furnace and it fails to recognize that injectants are not, in fact, a substitute for *any* amount of coke that is performing two of those roles. Injectants only replace a relatively

> small portion of the coke that provides reductants. Injectants do not replace any of the coke that provides heat, and they do not replace any of the coke that provides structure. Injectants are utilized only for their material value, and not for their thermal energy value.

Rs' Reply Br. at 11-12 (citing Tr. 2538-39). Respondents argue that the testimony of Dr. Poveromo is "absolutely clear" in this regard and that Complainant "completely mischaracterizes" his testimony by claiming that he agreed that the combustion of injectants provides "sensible heat energy" to the blast furnace. Rs' Reply Br. at 12-13 (citing Tr. 2554-55). To the contrary, Respondents contend, Dr. Poveromo explained that the heat energy necessary to drive reactions within the blast furnace and to raise the temperature of the additional reducing gases generated by the combustion of injectants derives only from the combustion of coke. Rs' Reply Br. at 13-14 (citing Tr. 2572-77). Respondents further argue that in contrast to the "generic 'industry standard' heat balances for blast furnaces" referenced by Professor Fruehan and the Agency in discussing Cadence product in the preamble to the Final BIF Rule, "Dr. Poveromo's examination of the heat balance of the raceway . . . demonstrates that injectants, in fact, supply no heat to fuel the blast furnace." Rs' Reply Br. at 14.

In response to Complainant's position that the top gases discharged from the blast furnace are used as a fuel and that injectants thus provide substantial and useful heat energy, Respondents cite the testimony of Mr. Rorick and Dr. Poveromo and contend that "the generation of top gases is not purposeful, and in any event is not affected in any way, including volume or composition, by the use of injectants." Rs' Reply Br. at 14-15 (citing Tr. 2447-48, 2443-47, 2578). Respondents also argue that Complainant failed either to present any evidence that the WCI Steel Facility engaged in this practice or to rebut the evidence presented by Mr. Rorick or Dr. Poveromo on the subject. Rs' Reply Br. at 14-15. In fact, Respondents contend, Complainant claims in its post-hearing reply brief that emissions from the WCI Steel Facility were not captured. Rs' Reply Br. at 14 (citing C's Reply Br. at 78). Thus, Respondents maintain:

> The points raised in Complainant's Reply Brief are without merit. They are insufficient to rebut the overwhelming evidence that demonstrates that, despite what U.S. EPA mistakenly understood in 1985, injectants used in a blast furnace are not burned for the purpose of obtaining useful heat energy or for providing substantial useful heat energy. Accordingly, they are not burned for energy recovery and are not subject to RCRA regulation.

Rs' Reply Br. at 15.

Even if injectants did supply some amount of heat energy to the blast furnace, Respondents argue, their use would not be subject to the Agency's jurisdiction based upon the following criteria set forth in the preamble to the Final Solid Waste Rule:

> [W]hen an industrial furnace is used for material recovery and the secondary material being burned is (a) Not ordinarily associated with the furnace (for example, organic still bottoms), (b) different in composition from materials ordinarily burned in the unit (as when the secondary material contains Appendix VIII hazardous constituents different from, or in concentrations in excess of those in materials ordinarily burned in the furnace, or (c) burned for a purpose ancillary to the chief function of the furnace, we think that RCRA jurisdiction over the burning exists.

Rs' Reply Br. at 15 (quoting 50 Fed. Reg. at 630-31). Arguing that injectants do not satisfy any of these criteria for establishing jurisdiction over a material, Respondents contend that both Professor Fruehan and Mr. Rorick agreed that the injection of hydrocarbon-rich materials at the tuyere level of blast furnaces has been a common practice for over half a century. Rs' Reply Br. at 16 (citing Tr. 1080-81, 2389). Further, Respondents argue, "[t]he oil products that are the subject of this case (unlike Cadence product) contained no hazardous constituents different from, or in concentrations in excess of those in materials ordinarily burned in a blast furnace including phenol and chlorine." Rs' Reply Br. at 16 (citing Tr. 2448-56, 2558-68; March 29, 2012 Declaration of Joseph Poveromo at 10; April 2, 2012 Declaration of Frederick Rorick at 7-8). Finally, Respondents contend, injectants are combusted in a blast furnace to generate reducing gases, a required ingredient for the reduction of iron ore that is hardly ancillary to the chief function of the furnace. Rs' Reply Br. at 16. Respondents thus conclude, "Because injectants here (a) are ordinarily associated with blast furnace operations, (b) are not different in composition from materials ordinarily used, and (c) are not burned for a purpose ancillary to the chief function of the blast furnace, RCRA jurisdiction over their use does not exist." Rs' Reply Br. at 16.

(2) Discussion

As reflected in their post-hearing briefs, the parties dispute a number of issues related to the question of whether the injectants supplied by Respondent CIS to the WCI Steel Facility served as a source of substantial and useful heat energy to the blast furnace upon combustion. The issues raised by their arguments may be distilled as follows: (A) whether injectants supply substantial and useful heat energy to a blast furnace upon initial combustion in the raceway of the furnace in a manner similar to coke; (B) whether injectants supply substantial and useful heat energy to a blast furnace on account of generating reducing gases and the manner in which excess reducing gases are used; and (C) whether injectants are subject to regulation under RCRA as a matter of policy based upon the principle articulated in the rulemakings discussed above that the Agency possesses the authority to regulate materials dissimilar to those customarily used in the iron-making process. The undersigned considers each of these issues in turn.

(A) Do injectants supply substantial and useful heat energy to a blast furnace upon initial combustion in the raceway?

As discussed in the section of this Initial Decision regarding the general operation of a blast furnace, uncontroverted evidence in the record establishes that coke is ignited in the raceway of the blast furnace by the hot blast entering the furnace through the tuyeres, where it reacts to produce carbon monoxide and additional heat, which then ascend through the furnace to drive the reduction of the iron ore. CX 86 at EPA18465; RX 98 at CIS01646; Tr. at 1085-86, 1089 (referring to RX 98 at CIS01646), 1153-54, 1189, 2493, 2538-42. Uncontroverted evidence in the record also establishes that the combustion of injectants in the raceway of a furnace likewise generates reducing gases and that injectants may serve as a more economical source of these gases than coke because coke has become increasingly scarce and expensive in recent years. Tr. 1075-76, 1080-84, 1108, 2389-98, 2544. The question presented here then is the extent to which injectants, in a manner similar to coke, also release heat upon their initial combustion in the raceway and thereby contribute to the energy needs of the blast furnace.

To support its position on this issue, Complainant first relies upon the opinion of Professor Fruehan. Professor Fruehan explained at the hearing that the combustion of injectants in the blast furnace results in the conversion of the injectants' carbon atoms first to carbon dioxide and then to carbon monoxide, a net reaction that releases energy to the furnace in the form of heat. Tr. 1083, 1085-86, 1089 (referring to RX 98 at CIS01646), 1092, 1133, 1148, 1153-54, 1177-81. According to Professor Fruehan, this energy raises the temperature of both the gases entering the furnace as part of the hot blast and the gases generated through the combustion of the coke and injectants to at least 3,500 degrees Fahrenheit, and these hot gases subsequently raise the temperature of the burden as they ascend through the furnace, which is required for the reduction of the iron ore. Tr. 1083-84, 1092, 1097, 1133. Specifically, Professor Fruehan testified:

> Down in the bottom of the furnace where we inject the injectant, it can be carbon containing, it can contain hydrogen, we get off some initial heat by combusting the carbon portion to CO. That heat heats up the gases and according to the Respondents' energy and materials balances with the oxygen enrichment to about 3,500 degrees Fahrenheit. . . .The gases leave the furnace at about 500 degrees Fahrenheit so the difference there of 3,000 degrees Fahrenheit, that energy is being transferred to the burden and being used in the process so that's the first way it provides energy [with the second way being the chemical energy contained in the bonds of the carbon monoxide, which is not under consideration here].

Tr. 1083-84. As support for his opinion, Professor Fruehan stressed that entities such as the American Iron and Steel Institute, the International Iron and Steel Institute, and the U.S. Department of Energy each quantify the amount of energy consumed in a blast furnace in the same manner: by calculating the amount of energy that would be released by all of the carbon and hydrogen contributed to the furnace, either in the form of coke or injectants, should those elements be converted to carbon dioxide and water, respectively. Tr. 1069, 1106-07, 1147-48. He further testified, "It doesn't matter if the carbon comes in with the coke. It doesn't matter if

the carbon comes in with the injectants. . . .Whatever carbon or hydrogen comes in is considered to be energy input into that furnace." Tr. 1070.

Complainant also relies heavily upon the preamble to the Final BIF Rule for support. Therein, the Agency observed that "the net reaction of injected fuels is endothermic (heat absorbing)" in the raceway of the blast furnace,[31] and yet it still considered injectants to be "fuels" based upon the "sensible heat" that they release during their initial combustion to carbon dioxide and water. The Agency articulated this view as part of its response to a request from certain entities to exclude Cadence product from regulation as a "hazardous waste fuel," which the undersigned previously discussed in the context of the meaning of the regulatory phrase "burning for energy recovery." 50 Fed. Reg. at 49,171-74. In responding to that request, the Agency described its understanding of the operation of a blast furnace and of the function of injectants. 50 Fed. Reg. at 49,171-72. Specifically, the Agency explained:

> [C]oke provides both the primary source of heat and the primary source of carbon used to produce the reducing gas carbon monoxide. . . .The two principle [sic] methods of reducing coke rates are to increase hot blast temperatures and to inject fuels through tuyeres (i.e. firing nozzles)[32] into the combustion zone at the base of the furnace. Both approaches generally are employed together because fuel injection enables operators to control flame temperatures in the combustion zone (raised by increasing hot blast temperatures) to optimum levels. In addition, the injection of hydrocarbon fuels replaces the carbon in the displaced coke and ensures that appropriate furnace gas composition conducive to iron ore reduction is maintained. The heat energy of the hydrocarbon fuels also replaces the heat energy of the displaced coke. Given that coke is the primary fuel and the primary source of reducing gas (carbon in the coke is converted to the reducing gas carbon monoxide), when the coke rate is decreased substantially (i.e., by increasing hot blast temperature and using fuel injectants) the heat energy and source of reducing gas supplied by the displaced coke must be provided by some other source. This source is the tuyere-injected fuels like the Cadence product.

50 Fed. Reg. at 49,172. The Agency proceeded to explain that injectants cool temperatures in the raceway of a furnace:

> Combustion zone temperatures are maintained at 3700-3900°F by the combustion of coke in the presence of the 2000°F hot blast (i.e., preheated combustion air).

[31] As explained by Professor Fruehan and Dr. Poveromo at the hearing, an "endothermic" reaction absorbs energy provided by another source in order to proceed, while an "exothermic" reaction releases energy to its environment. Tr. 1175-76, 2542-43.

[32] In a footnote to the preamble, the Agency explains its description of materials injected into a blast furnace through the tuyeres as "fuels," asserting that "tuyere-injected materials with substantial heating value are invariably termed fuels in the technical literature." 50 Fed. Reg. at 49,172 n.19.

> The net reaction of injected fuels is endothermic (heat absorbing) in this zone. Injected liquid fuels first undergo endothermic vaporization, then exothermic combustion to (ideally) carbon dioxide and water where sensible heat energy is released, and finally, endothermic dissociation and reduction in the presence of excess carbon provided by the coke to form the reducing gases carbon monoxide and hydrogen.

50 Fed. Reg. at 49,172. However, the Agency rejected the contention that injectants are not burned for energy recovery on account of the net endothermic reaction that they undergo upon combustion in the furnace. *Id.* Notwithstanding this net consumption of energy by injectants, the Agency maintained, injectants initially "behave as *bona fide* fuels by combusting to (ideally) carbon dioxide and water," and "[t]he amount of sensible heat released during this combustion phase is measured by a fuel injectant's heating value in Btu/lb." *Id.* The Agency proclaimed in a footnote to the preamble that it "always considers a material with a minimum heating value of 5,000-8,000 Btu/lb to be a *bona fide* fuel." 50 Fed. Reg. at 49,173 n.24. The Agency also cited an energy balance for a modern furnace obtained from a standard literature reference, noting that the energy balance reflected that an injectant consisting of fuel oil "provides about 22% of the heat input to the furnace." 50 Fed. Reg. at 49,173. The Agency concluded, "The fact that fuel injectants release substantial heat energy while providing hydrocarbons for reactions enables operators to reduce coke rates." 50 Fed. Reg. at 49,172.

In regard to Cadence product in particular, the Agency reasoned that it is a "fuel injectant" because of its heating value of 10,500 to 14,000 Btu/lb. 50 Fed. Reg. at 49,173. The Agency further explained, "Cadence product, like other liquid fuel injectants, cools flame temperatures in the combustion zone. It also provides hydrocarbons for conversion to the reducing gases carbon monoxide and hydrogen, provides substantial, useful heat energy to the blast furnace, and thus enables operators to reduce the coke rate." *Id.* As another basis for finding that Cadence product is burned for energy recovery in blast furnaces, the Agency observed that Cadence had represented to the Agency, the public, and others that Cadence product is burned by blast furnaces as a fuel. *Id.*

Complainant cites these considerations in the present proceeding to argue that the particular injectants used at the WCI Steel Facility generated substantial and useful heat energy in the blast furnace there, noting first that the Product Supply and Operation Agreement required Respondent CIS to supply WCI Steel with materials for the blast furnace that had a heating value in excess of that of Cadence product and that the IFF materials in particular had a heating value of at least 17,000 Btu/lb. C's Br. at 53-54 (citing CX 24 at EPA13153; CX 9 at EPA7243). Given this heating value, Complainant reasons, these materials "were burned for their energy value" and constitute fuels. C's Br. at 53-54. Documentary evidence in the record certainly suggests that at least WCI Steel viewed the heating value of the injectants supplied by Respondent CIS to the blast furnace as a critical characteristic of those materials. The heating value appears to have driven the pricing formula agreed upon by Respondent CIS and WCI Steel and to have been a cause of concern for WCI Steel during its relationship with Respondent CIS.

CX 26 at EPA15376 (a message to Respondent Forster from Patrick B. Cannon, senior purchasing agent for WCI Steel, observing that the heating value of the materials was "beginning to fall under the 140,000 Btu's per lb" and that "[t]his is the basis for the price formula"); CX 26 at EPA15385 (an email from Pat B. Cannon notifying Respondent Forster that testing of the materials reflected "an unfavorable trend," with his "main concern" being the heating value of the materials). As recounted by Inspector Beedle in the report that he prepared following his inspection of the WCI Steel Facility in August of 2008, Bob Delost, WCI Steel's Coordinator of Blast Furnace Operations, explained to him that "the purpose of the injection [is] to add heat value" and that "there is a baseline BTU value of the fuel [because] otherwise there would be a cooling reaction and they would be 'totally screwed.'" CX 28 at EPA16782. Inspector Beedle also recounted that Mr. Cannon informed him on that day that WCI Steel "uses the oil for the BTU value in the blast furnace." CX 28 at EPA16783.

Finally, Complainant cites a number of occasions where Respondents themselves refer to the materials it supplied to WCI Steel as "fuel" or "fuel oil." C's Br. at 54-56 (citing Tr. 91, 95, 270-324). Indeed, the record is replete with examples of Respondents' use of those terms. For instance, as noted above, Respondent CIS agreed in the Product Supply and Operation Agreement to "supply[] Fuel Oil to WCI Blast Furnace as a fuel alternative to coke and or natural gas." CX 24 at EPA13139. In the report he prepared following his inspection of the CIS Facility in August of 2008, Inspector Beedle related that Dan Weiss, Interim Plant Manager, and Bob Malecki, Operations Technician, each told him that the materials supplied by Respondent CIS to WCI Steel were burned as a fuel. CX 29 at EPA16814, 16817. Additionally, the record contains documentary evidence related to Respondent CIS's financial standing that reflects that Respondent CIS claimed alternative fuel mixture tax credits amounting to a total of approximately $10,000,000 in 2007, 2008 and 2009. CX 39 at EPA17011, 17024; CX 72 at EPA18047. Respondent CIS explained the nature of its operations in that documentation, asserting that it "distributes liquid carbon substitutes, petroleum, non-petroleum, and alternate fuels to a blast furnace in Warren Township, Ohio." CX 39 at EPA17023. With respect to the claimed tax credit, Complainant argues:

> To qualify for the alternative fuel mixture tax credit, Respondents must have registered as an alternative fueler and sold or used the alternative fuel mixture. The IRS regulations provide that an alternative fueler means a person that:
>
> > (1) Is an alternative fueler (unmixed fuel); or
> > (2) Produces alternative fuel mixtures for sale or use in its trade or business.
>
> IRS Notice 2006-92. The IRS defines an "alternative fuel mixture" as "a mixture of alternative fuel and taxable fuel that contains at least 0.1 percent (by volume) of taxable fuel." *Id.* Further, the IRS defines use as a fuel (relating to alternative fuel mixtures):

> (1) A mixture is used as a fuel *when it is consumed in the production of energy. Thus, for example, a mixture is used as a fuel when it is consumed in an internal combustion engine to power a vehicle or in a furnace to produce heat.* A mixture that is destroyed in a fire or other casualty loss is not used as a fuel.
> (2) A mixture producer sells a mixture for used as a fuel if the producer has reason to believe that the mixture will be used as a fuel either by the person buying the mixture from the producer or by any later buyer of the mixture.
>
> IRS Notice 2006-92.

C's Br. at 54 (emphasis added). In conclusion, Complainant contends that, "just like any injectant, [the material supplied by Respondent CIS to WCI Steel] was combusted upon entering the column and provided heat energy, which replaces heat energy of the displaced coke." C's Br. at 56.

The points raised by Complainant are persuasive at first glance. Upon further review of the record, however, the undersigned finds its position on whether injectants supply substantial and useful heat energy to a blast furnace upon initial combustion to be undermined by a number of considerations.

First, the evidence presented by Respondents in opposition was equally compelling. To counter the opinion of Professor Fruehan, Respondents proffered the opinion of Dr. Poveromo, whose reasoning in formulating his opinion that injectants do not, in fact, supply a blast furnace with substantial and useful heat energy appeared to be sound. He testified that the chief sources of heat energy to a blast furnace are the hot blast entering the furnace through the tuyeres and the heat generated by the combustion of coke in the raceway of the furnace. Tr. 2542. In regard to coke's role as a source of heat energy, Dr. Poveromo testified that coke is able to serve this function because it is "top charged" into the furnace, meaning that it is heated by the hot reducing gases rising through the furnace as it descends from the top of the furnace to the raceway, such that its temperature is already approximately 2,800 degrees Fahrenheit at the point of combustion and all of the heat energy generated by its combustion is then available to the processes of the furnace. Tr. 2541-42. Conversely, Dr. Poveromo explained, injectants do not act as a supplemental source of heat energy to the furnace because of the relatively low temperature at which they enter the raceway:

> The big problem is because they're injected cold into the blast furnace, that's really the problem. If you had some way to get the injectants into the top of the furnace and somehow preheat them up to raceway temperature, then indeed they could provide an energy role but they're injected cold and so it takes a lot of energy to heat them back up to the raceway temperature and the net reaction of

> heating them up plus the reactions themselves, those net reactions . . . are endothermic reactions that require energy.

Tr. 2544. Thus, he testified, "[injectants] provide no net energy to the system." Tr. 2545.

According to Dr. Poveromo, three techniques are available to operators of blast furnaces to compensate for the net consumption of energy by injectants in the raceway:

> They can reduce the blast moisture to as low as possible. . . .They can raise the blast temperature if they have the capability to do so. They could also enrich with additional oxygen. The additional oxygen would increase the coke burning rate and thereby generate exothermic energy to help substitute for the overall endothermic impact of the injectants. There's about three things they can do and that's what they usually do to help restore the raceway heat balance.

Tr. 2547-48. Dr. Poveromo further explained that injectants would undergo exothermic reactions upon combustion in a traditional combustion environment, thereby functioning as a "fuel":

> [I]f we look at these reactions [the combustion of coke and of various injectants] at so-called room temperature, these are indeed exothermic reactions that would provide energy so if you were essentially burning or combusting these fuels in a combustion or boiler setting, they are in fact fuels. That's why they're generically called fuels in most let's say outside of the blast furnace context situations. Obviously oil is a fuel, natural gas is a fuel and so forth so that's really what happens at room temperature….

Tr. 2548-49. Relying upon calculations performed "by the late Tom Oshnock of U.S. Steel Research" and used in lectures at the intensive iron making course held by McMaster University, he then proceeded to reiterate that when combusted in a blast furnace rather than a traditional setting, injectants instead undergo endothermic reactions because of the quantity of energy beyond that generated by their combustion that is required to raise the temperature of the resultant reducing gases to that of the raceway. Tr. 2552-53. Given these considerations, Dr. Poveromo concluded, injectants are not used in a blast furnace in order to obtain heat energy:

> Q: Given the explanation that you've given us and based on your experience, do you have an opinion regarding whether liquid hydrocarbons are injected into the blast furnace for the purpose of obtaining heat energy?
>
> A: No, no. It's really for a material, a chemical reactant.
>
> Q: When injectants are used in the blast furnace, are they used for their thermal energy?

A: No.

Q: If oil injectants are used in the blast furnace as a substitute or a replacement for coke, what is their purpose?

A: Their purpose is basically to fulfill some of the chemical role of coke [by generating reducing gases]. . . .

Tr. 2553-54.

Complainant did not elicit any contradictory testimony from Dr. Poveromo or present any rebuttal evidence to refute his testimony. *See, e.g.*, Tr. 2571-73, 2576-77. Indeed, the evidentiary basis for Dr. Poveromo's opinion seems to be largely undisputed. In particular, uncontroverted evidence in the record reflects that the materials supplied by Respondent CIS to the blast furnace at the WCI Steel Facility were typically injected at a temperature of approximately 180 degrees Fahrenheit to facilitate the flow of the materials. Tr. 2192, 2201; RX 114 at CIS02148. While such a temperature may not be considered "cold" by ordinary standards, it is a substantially lower temperature than that of the hot blast,[33] and Dr. Poveromo testified that the injection of materials at that temperature would not affect his opinion as set forth above. Tr. 2546. As observed by Respondents, Professor Fruehan ostensibly agreed with Dr. Poveromo that injectants generally enter a blast furnace at a relatively low temperature and that any heat energy generated by the initial combustion of injectants in the raceway of the furnace is insufficient to raise their temperature to that of the raceway. In this regard, Professor Fruehan testified that "injectants are going in at room temperature and the heat that's given off by their initial oxidation is not enough to get them back up to the flame temperature." Tr. 1159. Professor Fruehan also agreed that a means of offsetting that deficiency is the addition of oxygen to the raceway, testifying that "[t]here has to be oxygen enrichment to use these materials to maintain the flame temperature." *Id.*

Despite their agreement on these points, Professor Fruehan and Dr. Poveromo seemed to disagree on the precise role played by the injection of supplemental oxygen at the level of the tuyeres and whether the quantity of energy released by the combustion of the injectants would be sufficient, by itself, to raise the temperature of these materials from the relatively low temperature at which they enter the blast furnace to that of the raceway. The opinions ultimately rendered by Professor Fruehan and Dr. Poveromo on whether injectants supply substantial and useful heat energy to a blast furnace also obviously diverged.

In weighing their opinions, the undersigned notes at the outset that both of these witnesses possess considerable knowledge of the subject matter at issue here, as reflected in the evidentiary record. Further, while they may have ultimately disagreed on the issue at hand,

[33] As noted by Mr. Rorick, the temperature of the hot blast at WCI Steel's blast furnace was 1,400 to 1,500 degrees Fahrenheit. Tr. 2497-98.

Professor Fruehan testified that he has "a lot of respect" for Dr. Poveromo, that they have been "friends for a number of years," that he considers Dr. Poveromo knowledgeable on the subject of iron making, and that he has consulted Dr. Poveromo on occasion about matters related to iron making. Tr. 1143, 1150-51. Based upon these considerations alone, the opinions of Professor Fruehan and Dr. Poveromo merit equal weight.

Further consideration of the record, however, tends to weigh against the opinion of Professor Fruehan. While he concluded that injectants undergo a net exothermic reaction upon initial combustion in the blast furnace, he did not clearly explain the circumstances under which he believes the reaction to be exothermic or his view of the role played by injections of supplemental oxygen at the level of the tuyeres. *See* Tr. 1083 (explaining that the energy released by the combustion of injectants, "with the oxygen enrichment," heats the gases also generated by the combustion to 3,500 degrees Fahrenheit, which subsequently heats the burden); Tr. 1097 (explaining that the energy released by the combustion of injectants, "with the oxygen injection," heats the gases also generated by the combustion to an extremely high temperature, which then heats materials and drives chemical reactions higher in the furnace); Tr. 1159 (explaining that the heat energy released by the combustion of injectants is "not enough" to raise their temperature from room temperature to the flame temperature when only air is injected into the blast furnace because of the quantity of nitrogen present, which absorbs the heat, but when "you have oxygen, you don't have to heat up that nitrogen"); Tr. 1177-78 (explaining that the net reaction of injectants in the raceway is exothermic as long as "there is adequate oxygen injection" because then "there's less nitrogen to heat up with the other gases" and whether an injectant reaches the flame temperature "depends on what else it has to heat up"); Tr. 1180-81 (explaining that the net reaction of injectants in the raceway, without considering the "heating up [of] components," is exothermic). Pieced together, these segments of his testimony seem to state that injections of oxygen at the level of the tuyeres in some way replace the nitrogen entering the raceway as part of the hot blast, which reduces the quantity of energy-absorbing gas in the raceway and enables the heat energy released by the combustion of the injectants to be used solely for raising the temperature of the gases also generated by the combustion, such that their temperature increases from room temperature to 3,500 degrees Fahrenheit without the input of any additional energy. This is not entirely evident, however, and in any case, Complainant has not pointed to any evidence that "adequate oxygen injection" occurred at WCI Steel's blast furnace such that the net reaction of the injectants was indeed exothermic and the heat energy generated by their combustion was sufficient to increase their temperature to that of the raceway.

Professor Fruehan also emphasized during the course of his testimony that entities such as the American Iron and Steel Institute, the International Iron and Steel Institute, and the U.S. Department of Energy each quantify the amount of energy consumed in a blast furnace by calculating the amount of energy that would be released by all of the carbon and hydrogen contributed to the furnace, either in the form of coke or injectants, should those elements be converted to carbon dioxide and water, respectively. Thus, those entities view injectants as a source of energy. As countered by Dr. Poveromo, however, such an approach appears to be too "simplistic" for purposes of this proceeding. Tr. 2556-57 (explaining that overall energy

balances are not relevant to the questions at issue in this proceeding because they fail to "break[] down the individual materials and what their roles are in each process," which is necessary "to precisely be able to say how they're being used and why they're being used"); Tr. 2573-74 (acknowledging that some entities calculate the energy consumed by a blast furnace in this manner but explaining that "[i]t's just not the way one has to differentiate between the role[s] of the various materials in the blast furnace process"). For example, as observed by Respondents, the record is unclear as to whether these entities distinguish between heat and chemical energy in generating their calculations. During the course of explaining the concept of chemical energy, Professor Fruehan testified:

> That is what I mean by chemical energy. That's what AISI, International Iron and Steel Institute, and Department of Energy, that's why they say all of the carbon is converted to CO_2 when I am computing the amount of energy that a blast furnace consumes and they say this is the amount of energy that's available.

Tr. 1100. This testimony muddles the issue. The calculations utilized by those entities also seem to presume that injectants are completely combusted in the raceway of a blast furnace, but such a presumption conflicts with the credible testimony of Mr. Rorick that, in practice, only a fraction of injectants undergo combustion in the raceway of the blast furnace, particularly at WCI Steel's blast furnace during the years in question. Thus, while the entities identified by Professor Fruehan may consider all of the energy theoretically generated by the combustion of injectants as relevant in calculating the quantity of energy consumed by a blast furnace, that measure appears to oversimplify the operation of a blast furnace and be less appropriate for determining whether a substantial and useful quantity of heat energy is, in fact, released by injectants at a given furnace. In view of the foregoing considerations, the undersigned has some misgivings about Professor Fruehan's opinion.

Conversely, in the undersigned's view, the position advanced by Dr. Poveromo – that injectants do not supply substantial and useful heat energy to a blast furnace upon combustion, notwithstanding any energy they release at that time, because the amount of energy released is exceeded by the amount of energy required to raise the temperature of the injectants to that of the raceway, thus resulting in the net consumption of energy by the injectants and necessitating the input of more heat energy by such methods as increasing the temperature of the hot blast or injecting supplemental oxygen in order to combust additional particles of coke – simply is more clear and comports with common sense. Documentary evidence in the record also lends support to his opinion. For example, as part of its August 11, 2009 response to one of EPA's requests for information, Innovative Waste Management supplied correspondence, dated February 9, 2006, between Troy Charpia of IWM and David H. Wakelin, Ph.D., who was identified on the letterhead of the document as an iron making consultant. CX 13 at EPA10113. Included in the correspondence was a description authored by Dr. Wakelin of the activities in the raceway of a blast furnace, wherein Dr. Wakelin explained:

> More cost effective tuyere injectants than steam are now used in modern blast furnace operations. These almost all are hydrocarbon based, the most common being pulverized coal, tar, fuel oil and natural gas. . . .The injected hydrocarbons replace some of the carbon monoxide reducing gas otherwise supplied by coke and add hydrogen also for that purpose. Although hydrocarbons typically have positive heats of combustion, their effect on the raceway temperature is negative, because they replace coke that enters the raceway area already preheated to 2800°F.
>
> * * *
>
> Significant increases in blast furnace productivity have been made possible through the availability of on-site tonnage amounts of oxygen generated by cryogenic air separation. The use of oxygen enrichment of the blast air increases the coke burning rate with less nitrogen present, and hence reduces blast pressure requirements. Having less nitrogen to heat up in the raceway raises the raceway temperature as the percentage of oxygen in the blast increases . . . . [H]ydrocarbon injectants are needed to temper the raceway temperature for high productivity furnace operation using blast oxygen enrichment.

CX 13 at EPA10114-15. Dr. Wakelin further explained that "too high a flame temperature can lead to premature melting of the iron oxide materials before reduction is complete." CX13 at EPA10114. His description suggests that operators of blast furnaces use injectants under certain circumstances for the express purpose of consuming energy within the raceway, rather than supplying it, in order to moderate temperatures. The amount of weight that the undersigned attributes to Dr. Wakelin's description is limited given the nature of the document. However, it certainly corroborates the testimony of Dr. Poveromo, and even Professor Fruehan credited Dr. Wakelin at the hearing as being "knowledgeable" in the field of iron making. Tr. 1173. Interestingly, the Agency appears to have confirmed the function that Dr. Wakelin described, explaining in the preamble to the Final BIF Rule that injectants "cool flame temperatures in the combustion zone" and that they are thus typically used in conjunction with increased blast temperatures as a means of moderating flame temperatures:

> The two principle [sic] methods of reducing coke rates are to increase hot blast temperatures and to inject fuels through tuyeres (i.e., firing nozzles) into the combustion zone at the base of the furnace. Both approaches generally are employed together because fuel injection enables operators to control flame temperatures in the combustion zone (raised by increasing hot blast temperatures) to optimum levels.

50 Fed. Reg. at 49,172; *see also* 50 Fed. Reg. at 49,172 n. 21 ("Fuel oil injection . . . acts as a coolant, allowing the use of higher blast temperatures . . . ."). The use of injectants for such a

purpose seems, at least in the undersigned's view, to weigh against the notion that injectants supply substantial and useful heat energy to the blast furnace upon initial combustion.

Based upon the foregoing discussion, the undersigned is inclined to credit the opinion of Dr. Poveromo over that of Professor Fruehan, which undermines Complainant's position. Turning to the preamble to the Final BIF Rule, upon which Complainant also relies, the undersigned is mindful that in it the Agency rejects arguments similar to those advanced by Respondents in this proceeding, concluding that injectants generally supply substantial and useful heat energy to a blast furnace in spite of the cooling effect they have in the raceway resulting from the endothermic reactions that they undergo. However, certain evidence presented at the hearing casts doubt upon the reliability of the discussion set forth in that document on the subject of energy recovery, which diminishes the persuasive authority of its technical determinations in the case at hand. In particular, while Professor Fruehan initially testified that the Agency's understanding of the operation of a blast furnace and the use of injectants as described in the preamble to the Final BIF Rule is still reasonably accurate, Tr. 1130, 1149, 1174-75, counsel for Respondents later elicited testimony from Professor Fruehan in which he disagreed with the Agency's view that the net reaction of injectants is endothermic in the raceway of the furnace and observed that the Agency had failed to account for certain considerations in its discussion, namely the injection of supplemental oxygen:

> Q: Do you agree with that statement [of the Agency that the net reaction of injectants is endothermic in the raceway of the furnace]?
>
> A: If there is adequate oxygen injection, they can be exothermic.
>
> Q: I'm sorry. If there's adequate –
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> A: They're not talking about the enrichment that's necessary for these reactions.
>
> Q: And what is the effect of enrichment?
>
> A: Enrichment means that there's less nitrogen to heat up with the other gases and so they cannot get to those temperatures.
>
> Q: So are you saying that this statement is true if there is oxygen enrichment?
>
> A: This statement, this is the first time I've read it, okay? I believe you have to go up to up higher where they talk about carbon plus CO_2 going to 2 CO. That's an endothermic reaction and absorbs energy, okay? And the, what I'm saying is the net reaction, carbon plus oxygen goes to CO is exothermic. The reaction itself is exothermic. Whether it will get up to the flame temperature depends on what else it has to heat up. It is heating up all of the gases that have been formed including

> the nitrogen. Over 50 percent of the gas in this area is nitrogen and I've got to get that from 1800 up to 3500 [degrees Fahrenheit]. This absorbs energy.

Tr. 1177-78. Based upon its earlier discussion in the preamble, the Agency may have considered an increase in the temperature of the hot blast in lieu of an injection of supplemental oxygen. However, Professor Fruehan plainly disagreed with the Agency's view that the net reaction of injectants is endothermic. Referring to the three steps of the net reaction of injectants that the Agency described in the preamble to the Final BIF Rule,[34] Professor Fruehan maintained that the net reaction of injectants upon combustion in the blast furnace is exothermic, directly contradicting the determination articulated by the Agency:

> Q: And if you look at all three steps together, is it your testimony that that is an, when looked at as a whole, an exothermic reaction?
>
> A: The reaction itself, just the reaction now, not heating up components and –
>
> Q: The reaction itself.
>
> A: Is exothermic.
>
> Q: If you look at all three steps together?
>
> A: Yes.

Tr. 1180-81. As previously discussed, Professor Fruehan's testimony is somewhat confusing as to the circumstances under which he considers the combustion of injectants in a blast furnace to be exothermic in that he first testified that the net reaction of injectants in the raceway "can be exothermic" as long as "there is adequate oxygen injection," but later testified that the net reaction is exothermic without any such qualification. Nevertheless, his testimony raises some question as to the thoroughness of the Agency's consideration of the topic and the soundness of its technical determinations in the preamble to the Final BIF Rule.[35] Thus, this Tribunal is reluctant to rely upon them in this proceeding.

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[34] Specifically, the Agency explained that injectants react as follows in the raceway of the blast furnace: first, the injectants "undergo endothermic vaporization;" second, they undergo "exothermic combustion to (ideally) carbon dioxide and water where sensible heat is released;" and third, they undergo "endothermic dissociation and reduction in the presence of excess carbon provided by the coke to form the reducing gases carbon monoxide and hydrogen." 50 Fed. Reg. at 49172. According to the Agency, the sum of those reactions is endothermic. *Id.*

[35] The undersigned is troubled by other aspects of the discussion set forth in the preamble to the Final BIF Rule as well. For example, the preamble omits any consideration of the amount of energy necessary to raise the temperature of the injectants to that of the raceway and discusses only the amount of energy consumed by the reaction of the injectants itself. The preamble also states that "coke provides . . . the primary source of heat" to the blast furnace and that "[t]he heat energy of the [injectants] . . . replaces the heat energy of the displaced coke." 50 Fed. Reg. at 49,172. However, the undersigned has strained to understand how the Agency considered any heat energy released by the injectants to replace the heat energy provided by coke given the Agency's discussion of the cooling effect of

In addition to Professor Fruehan's disagreement with the Agency as described above, a number of other considerations also support a finding that the understanding of this subject matter has advanced since the date of that rulemaking in 1985. Complainant seemingly conceded this point when it urged the undersigned to construe the regulatory phrase "energy recovery" as encompassing the recovery of both heat and chemical energy. Specifically, Complainant argued that such an interpretation was not inconsistent with the preamble to the Final BIF Rule but "merely supplement[ed]" the discussion therein by reflecting "a more current understanding of blast furnace operations, which recognizes that the reducing gases produced by combustion of injectants provide chemical energy . . . ." C's Reply Br. at 30. Complainant thus acknowledged that the Agency's understanding of a blast furnace as articulated approximately 30 years ago in 1985 is now outdated, at least in some respects.

The characterization of injectants as "fuels" because of their measured heating value, which the Agency cited in the preamble to the Final BIF Rule as a basis for concluding that injectants supply substantial and useful heat energy to a blast furnace and are thus subject to regulation as "solid wastes," also no longer appears to be a view as widely accepted as it may have been at the time the Final BIF Rule was issued. As previously discussed, the Agency explained in the preamble to the Final BIF Rule that injectants supply substantial and useful heat energy to a blast furnace, notwithstanding the net consumption of energy by injectants in the raceway of the blast furnace, in part because injectants behave as "*bona fide* fuels" by releasing a quantity of "sensible heat" upon combustion to carbon dioxide and water, which "is measured by a fuel injectant's heating value in Btu/lb." 50 Fed. Reg. at 49,172. The Agency also observed in a footnote that "tuyere-injected materials with substantial heating value are invariably termed fuels in the technical literature." 50 Fed. Reg. at 49,172 n.19. Finally, the Agency asserted that it "always considers a material with a minimum heating value of 5,000-8,000 Btu/lb to be a *bona fide* fuel." 50 Fed. Reg. at 49,173 n.24.

The regulations governing whether a recyclable material satisfies the definition of "solid waste" do not contain the particular threshold of 5,000 Btu/lb identified by the Agency in the preamble to the Final BIF Rule or any other definition for the term "fuel." The Merriam-Webster's Dictionary defines the term, among other meanings, as "a material used to produce heat or power by burning." Merriam-Webster's Collegiate Dictionary 470 (10th ed. 1997). This definition is consistent with the regulatory concept of "burning for energy recovery," which, as found above, turns on the question of substantial and useful heat energy is obtained from the combustion of a material. Complainant, however, refers to the Agency's reliance upon the 5,000 Btu/lb threshold in the preamble to the Final BIF Rule as support for its position in the present proceeding, and urges the undersigned to consider as guidance the regulations at 40 C.F.R. § 266.103(a)(5)(ii)(B), which provide that a hazardous waste is "considered to be burned as fuel" when it "has a heating value of 5,000 Btu/lb or more." An advisory opinion issued on May 23,

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injectants and of the concurrent increase in hot blast temperatures, which seemingly would play a role in providing heat energy to the furnace in lieu of the heat energy that the coke would have generated.

1997, by Elizabeth Cotsworth, Acting Director of the Agency's Office of Solid Waste, lends some support to Complainant's position:

> [T]here is currently no regulatory provision that uses a heating value of 5000 Btu/lb to determine whether a secondary material meets the definition of solid waste (e.g., whether the material is a characteristic by-product being burned for energy recovery). However, *there has historically been a strong presumption that the burning of secondary material with a heating value of 5000 Btu or greater constitutes burning for energy recovery* and, in fact, we are considering codifying this in the upcoming definition of solid waste rulemaking.

Regulatory Status of Burning Sulfur-Containing Secondary Materials to Produce Virgin Sulfuric Acid, *available at* http://yosemite.epa.gov/osw/rcra.nsf/0c994248c239947e85256d090071175f/A41832B7A294FCF58525670F006C2C37/$file/14086.pdf (emphasis added). Yet another advisory opinion from Ms. Cotsworth, subsequently issued on December 19, 1997, counsels against such an approach, however:

> Although EPA's regulations state that a heating value of 5000 Btu or more for a hazardous waste is a test for determining the applicability of standards for boilers and industrial furnaces (see 40 CFR 266.103(a)(5)(ii)(B)), *it was not EPA's intent to state that 5000 Btu should be a "bright line" test for determining whether a secondary material meets the definition of solid waste. Our view continues to be that such determination should be made on a case-by-case basis.*

CX 13 at EPA10132-33; Clarification on Use of Waste Heating Value, *available at* http://yosemite.epa.gov/osw/rcra.nsf/0c994248c239947e85256d090071175f/D39835ADAC4646BC852568E30046815C/$file/14164.pdf (emphasis added). This directive is seemingly at odds with the reasoning articulated in the preamble of the Final BIF Rule that injectants function as "fuels" in a blast furnace, and thus supply substantial and useful heat energy and are subject to regulation as "solid waste," by virtue of their heating values alone.

Further, Dr. Poveromo testified that injectants may be considered "fuels" in a traditional "combustion or boiler setting" because of the exothermic reactions that they undergo but that they do not function as such in a blast furnace. Tr. 2548-49. Related to this topic, Mr. Rorick explained that blast furnaces were historically considered to operate "much like a combustion boiler" but that "a lot of new understandings were developed" within the industry as a result of dissections of blast furnaces performed "in the 1970s and into the '80s" after the closure of those facilities.[36] Tr. 2366-69. Conceivably, the characterization of injectants as "fuels" originated

[36] More specifically, Mr. Rorick explained that these dissections revealed that the interior of a blast furnace is split into distinct zones where critical steps in the production of the liquid iron occur, a discovery that enabled "massive increases in blast furnace size, productivity and efficiency," "a great expansion of reductant injection technology in both variety of injectants that were used and quantity used per ton of hot metal," and the "develop[ment] [of] instruments and probes to start quantifying what was actually going on inside the process because now we knew

during the period of time predating those dissections when blast furnaces were viewed as synonymous with boilers.

Indeed, Dr. Poveromo testified as to the evolving views within the iron making industry with respect to the use of the term "fuel" to describe injectants given the current understanding of their function in the blast furnace. He explained that the industry utilizes a number of terms and phrases, some of which were coined hundreds of years ago, that are no longer considered to be accurate but that are not updated, unless an "urgent need" arises, "just to keep things simple." Tr. 2531. Among other examples, Dr. Poveromo explained that the use of the term "fuel" to describe injectants stemmed from the particular material first widely used as an injectant but that members of the industry have begun to recognize the fallacy of using the term:

> The term "fuel injection" really came about because the first injectant to be widely used was Number 6 fuel oil and of course the oil industry was very anxious to promote the use of oil in blast furnace technology . . . so the term fuel injection has just stuck really until the present day.
>
> Now, now of course in the past decade people particularly on the European side have said you really should talk more properly about reductant use or injection of reductants rather than fuels and of course we heard I guess a lot of testimony in the past several days about classifying the injectants as raw materials or even classifying carbon and carbon and coke as a raw material but anyhow, this really is the major misnomer as far as this issue.

Tr. 2532-33. Dr. Poveromo acknowledged his own use of the term "fuel" in documentary evidence contained in the record but testified as to his intent to revise materials that he had authored for lectures at the McMaster University in order to remove it. Tr. 2533. When questioned further about this subject, he explained the need to clarify the role of injectants in a blast furnace, especially from an operational standpoint:

> Q: Why is it important that you update the use of that term in particular?
>
> A: Because we really want to clarify that the injectants supply reducing materials to the blast furnace rather than fuel. That's one important reason and also in the general context of calling these materials a [sic] reductants, as well.
>
> Q: Does that have any practical implications when operating a blast furnace?
>
> A: Well, actually it does because in the McMaster blast furnace iron making course when we're giving lectures about how one responds to changes in thermal state of the furnace, the kind of lectures that Mr. Rorick would give or Art Cheng or somebody else talking about practical blast furnace operation, they emphasize

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where to look." Tr. 2367-69.

> that for example if the blast furnace is cooling down and you have to heat it back up again quickly, the one thing you don't want to do is increase the rate of the injectants because the injectants in fact have a cooling effect on the blast furnace. The stress is on either raising the blast temperature which is the thermal input to the furnace if you can raise the blast temperature, reducing the blast moisture which is also reducing the injection of cooling materials, or putting more coke in the blast furnace ultimately so that's a very important practical operating point that really reads directly on the issue of injectants as energy sources or the injectants as sources of raw materials.
>
> Q: Would it be the case that an operator that thinks of the injectants as a fuel when presented with an operational issue where he wants to heat the blast furnace up, might be inclined to want to add more because it's fuel thinking it's going to provide heat?
>
> * * *
>
> A: Oh, yeah, yeah. The blast furnace operator can easily make a mistake if he forgets his training. He could easily do that. That's one more reason why we really have to start correcting this terminology.

Tr. 2533-36.

The undersigned finds Dr. Poveromo's testimony that injectants do not function as a "fuel" to the blast furnace, and that the use of that term to describe these materials is a misnomer, to be compelling. In his description of the activities occurring in the raceway of a blast furnace, Dr. Wakelin alluded to the same notion, explaining that "hydrocarbons typically have positive heats of combustion" but that in a blast furnace, "their effect on the raceway temperature is negative." CX 13 at EPA10114. Dr. Poveromo's testimony is also substantiated by a paper proffered by Respondents at the hearing entitled "Summary Evaluation and Assessment of Carbon and Hydrocarbon Raw Materials of Iron Ore Reduction," which was authored by Rudolf Jeschar and Gerrit Dombrowski of Germany and presented at a conference in 1998 that Professor Fruehan and Mr. Rorick attended ("Jeschar and Dombrowski paper"). RX 96. Among other conclusions, the Jeschar and Dombrowski paper opines that "[t]he carbon and hydrocarbon carriers used for the reduction of iron ore cannot be classified as fuels as they cannot be replaced by another, perhaps chemically inert energy carrier or other non-physical energy source," and that "[t]hese materials should therefore be classed as chemical raw materials as their components are involved in the chemical reactions of the iron ore reduction." RX 96 at CIS01615. Mr. Rorick explained during the course of his testimony that not only did he rely upon the Jeschar and Dombrowski paper in formulating his opinions for this proceeding but that it is also "an essential element of the training courses that [he] run[s] for blast furnace operators around the world" because its characterization of injectants as a reductant rather than a fuel is "a critical distinction for blast furnace operators and specifically in how they react to any abnormal

situations." Tr. 2360. As previously discussed, the undersigned highly regards the practical experience of Mr. Rorick in the operation of blast furnaces, and it compels the undersigned to attribute significant weight to his reliance upon the Jeschar and Dombrowski paper in his training of other operators and his corresponding view of injectants as a reductant rather than a fuel.

The evidence presented by Complainant in opposition fails to persuade that the proper characterization of injectants used in a blast furnace is as a "fuel," thus warranting regulation as a "solid waste" pursuant to the regulations at issue. First, while Professor Fruehan praised the Jeschar and Dombrowski paper as providing "a very nice energy and materials balance," he objected to the conclusions that it articulated. Tr. 1109-1122, 1186. He testified that the term "fuel" is still used by "[s]ome people" to refer to injectants, as confirmed by recent publications that he reviewed prior to the hearing. Tr. 1110-12. He also challenged the conclusion drawn by the Jeschar and Dombrowski paper that injectants cannot be replaced by another "energy carrier," citing examples of other, admittedly impractical, means of producing iron without the use of hydrocarbons. Tr. 1113-16, 1131-32, 1156-58. Finally, observing that the Jeschar and Dombrowski paper had not been peer-reviewed, he questioned the purpose for which it was written, speculating that it "tries to depict carbon not as an energy source because if it was an energy source, it may be subject to some sort of carbon tax," which was pending in Europe at the time of its publication. Tr. 1110, 1119-22; *see also* Tr. 1195-97.

Upon consideration, the undersigned finds this testimony to be insufficient to discredit the Jeschar and Dombrowski paper and the testimony of Dr. Poveromo and Mr. Rorick regarding the suitability of the term "fuel" to describe injectants. Professor Fruehan's testimony that "some people" continue to refer to these materials as "fuel" is not especially persuasive that this characterization is appropriate. Rather, it suggests that the characterization is, in fact, no longer universally accepted in the iron making industry and that the view advanced by Respondents is just as favored. Professor Fruehan's description of other means of producing iron without the use of hydrocarbons also fails to cast sufficient doubt on the conclusion of the Jeschar and Dombrowski paper given that Professor Fruehan acknowledged the impracticability of those methods. As for the lack of peer review of the Jeschar and Dombrowski paper, the process of peer review undoubtedly "aids in the promotion of sound science and engineering." Fed. Judicial Ctr. & Nat'l Research Council of the Nat'l Acads., Reference Manual on Scientific Evidence 938 (3rd ed. 2011). However, "its presence does not ensure accuracy or validity, and its absence does not imply that a reference is scientifically unsound." *Id.*

Complainant also offered documentary evidence related to a specification set by the Product Supply and Operation Agreement for the heating value of materials supplied by Respondent CIS to WCI Steel, such as correspondence to Respondent Forster from Pat Cannon, an employee of WCI Steel, expressing concern that analyses of the materials had reflected that that specification was not being met and noting that the heating value of the materials served as "the basis for the price formula." *See, e.g.*, CX 26 at EPA15376, 15385. Specifically, the Product Supply and Operation Agreement required the materials supplied by Respondent CIS to exhibit a heating value between 135,000 and 150,000 Btu/gallon. CX 24 at EPA13153.

Conversely, the Agreement did not set any specification for the amount of carbon contained in the materials, and the materials were never tested for that parameter, as they were for their heating value. CX 24 at EPA13153; Tr. 1359-62, 1712, 2198. This evidence supports the inference that WCI Steel viewed the heating value of the materials it purchased from Respondent CIS, and not the carbon content, as a key characteristic of those materials, which suggests, in turn, that WCI Steel used the materials in its blast furnace for the purpose of obtaining their heat energy rather than their carbon values.

The undersigned considers such a finding to be problematic, however. First, the parties' do not dispute that a function of injectants, including the injectants used at WCI Steel's blast furnace, is to supply carbon and hydrogen values for the reduction reactions occurring within the furnace. Thus, to argue that WCI Steel did not use the materials, at least in part, for the purpose of obtaining those values would be a fallacy. Additionally, Respondents presented evidence at the hearing that challenges such a finding. Respondent Lofquist explained that he developed the list of parameters found in the Product Supply and Operation Agreement with Mr. Cannon, who was responsible for "purchasing and contracts" at WCI Steel and was the "administrator" of the Agreement, based upon their desire for "something that was practical in nature that a truck could come in, be tested to these standards and be offloaded . . . in a relatively quick period of time." Tr. 1975, 1977, 1987. Consistent with this explanation, he further testified that they chose to list "BTU/gallon" as a parameter rather than a measure for carbon content because of the rapidity of tests for heating value and the correlation between the heating value and carbon content of a material:

> Q: Can you tell us why the specifications that were developed included a specification for BTU per gallon as opposed to carbon?
>
> A: Sure. The BTU test is a very fast test, carbon test takes much longer, and this is more of what's normal in the industry for these types of products rather than the carbon test so it's just, it's more of a convenience and people have a general correlation between BTU and carbon.

Tr. 1977-78. Acknowledging that the amount of carbon contained in a given material was not specifically considered in determining its suitability for injection, Kenneth Bentfeld, who was employed as a sales representative for GEM at the time of the alleged violations but was serving as the vice president of sales and marketing at Magnus by the time of hearing, similarly testified that "carbon content would [have been] implied in the BTU section." Tr. 2325-26.

The testimony of Respondent Lofquist and Mr. Bentfeld regarding a correlation between a material's heating value and carbon content is self-serving, which casts doubt upon its veracity. *See, e.g., Cent. Paint & Body Shop*, 2 E.A.D. 309, 315 (EAB 1987) ("Self-serving declarations are entitled to little weight."). However, testimony was also adduced from Ernie Willis of IWM and Bruce M. Sass, Ph.D., that supports their assertions. Mr. Willis, whose title at IWM during

the alleged period of violation was operations manager, described his responsibilities at that time[37] and then testified as follows:

> Q: Based on your experience working in the field, Mr. Willis, if a company were looking for a material that contained a high percentage of hydrocarbon, would it make sense for that company to test the material for BTUs?
>
> A: If the material showed to be high BTUs, . . . in my opinion it would obviously be high in carbon content.

Tr. 1827-28, 1830-31. Likewise, Dr. Sass, who was qualified at the hearing as an expert in analytical and physical chemistry and the properties of organic and inorganic chemicals, testified that the measure of a material's heating value is indicative of the amount of carbon that the material contains:

> Q: Do you know if CIS tested the Unitene material for BTUs?
>
> A: They did. They performed tests on tanker trucks as they came in to confirm that it was, met the specifications. They measured BTU. I think we understand that they were really after the carbon content, but the BTU is scaled to the carbon again because of the, that structure of the molecule there.

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[37] Specifically, Mr. Willis explained that he was a "certified environmental compliance manager" and "certified hazardous waste manager" who was responsible "[p]rimarily [for] customer service" in that he "did waste profiles into the facilities and made sure the customers were taken care of with their documentation." Tr. 1828. He also testified that he has reviewed federal environmental regulations as part of his duty to ensure that IWM is compliant with the law. *Id.* at 1828-29. When questioned by counsel for Complainant about his credentials, Mr. Willis acknowledged that he lacks education or training in analytical chemistry, engineering, and the testing of a material's energy and carbon content. Tr. 1864-65. However, counsel for Complainant later appeared to recognize Mr. Willis's understanding of regulatory matters:

> Q: What is your current title at Innovative Waste Management?
>
> A: I'm the technical and regulatory director.
>
> Q: Okay. And do you handle matters related to environmental compliance of acquisitions?
>
> A: Yes. If the sales guys or any of our customers have any questions about it, we discuss it, we talk about material, how they generate it and make sure it qualifies.
>
> Q: And why is it important for Innovative Waste Management to have someone with your knowledge in that position at the company?
>
> A: To avoid being in a place like this.

Tr. 1874-75.

> Q: So it's your understanding that they were testing the BTU value of the Unitene not for the energy value but for the carbon percentage?
>
> A: That's right. So if you took a certain compound, like say D-limonene, you know, it has a certain heating value. It also -- but because of the stoichiometry of the molecule, it's 87 percent carbon so you can equate BTU to carbon content.

Jt. Stips. II at 2; Tr. 1712-13. This testimony undoubtedly corroborates the assertions of Respondent Lofquist and Mr. Bentfeld on the subject.

To counter the foregoing evidence, Complainant offered the testimony of Francis Awanya, a longtime chemist at Region 5 of EPA who was qualified as an expert in determining the flashpoint and carbon content of materials. Jt. Stips. II at 2; Tr. 1283. Explaining that he performs analyses of materials for EPA in order to determine certain properties of the materials, including the amount of carbon that they contain, Mr. Awanya testified that the BTU is not a typical unit of measurement for carbon:

> Q: [W]hen you're testing for carbon content of a material, do you ever test for BTU?
>
> A: No, we don't.
>
> Q: Why not?
>
> A: BTU is usually not a unit that specifies what the carbon content is. It gives you, it's, like I say, it's a unit that is used for, to give energy, to describe energy but not carbon content of a material.

Tr. 1283-84, 1286-87; *see also* Tr. 1317. He further testified that he "would not rely on the BTU values as a measure of carbon because there are other actors that could be contributing to the BTU values." Tr. 1320. Rather than measuring the carbon contained in a material in terms of BTUs, Mr. Awanya explained, he measures carbon on a "weight basis, which is milligrams per liter," or on a "percent basis." Tr. 1314. His testimony on this subject was not unequivocal, however. When questioned by counsel for Respondents, Mr. Awanya agreed that an analysis of a material's heating value could at least approximate its carbon content:

> Q: Is it possible to get a good approximation of carbon content from a sample by testing for a BTU value?
>
> A: I have not tested it that way and if I'm looking for specific content versus nonspecific content, I would be looking for a system that would report carbon.
>
> * * *

Q: Do you have an understanding of how a test, a BTU test is conducted?

A: I don't.

Q: So you, do you know whether or not a BTU test could be used as an indicator, at least on a rough basis, of carbon content of a material sample?

A: Well, if you're talking on a rough basis, it's possible.

Tr. 1317-18. Mr. Awanya also testified as to the cost of analyzing a material's carbon content in the Akron, Ohio region, explaining that a laboratory would charge between 42 and 53.40 dollars for a "routine turnaround" of ten days and 160 dollars for results the same day. Tr. 1286, 1316. He testified further that some methods of determining the amount of carbon in a material other than those used at EPA "are very expensive, too." Tr. 1317. This testimony does not directly contradict the explanation of Respondent Lofquist that he and Mr. Cannon of WCI Steel chose heating value as a parameter in their Product Supply and Operation Agreement because of its correlation to the amount of carbon in a material and the relative quickness of testing for heating value. Thus, Respondent Lofquist's explanation appears to be plausible.

To further its position, Complainant also points to a number of examples in the record of Respondents' use of the term "fuel" during the course of their operations, which arguably belies their position in this proceeding that the term is a mischaracterization of these materials. However, Dr. Poveromo dismissed the use of the term by Respondent CIS, WCI Steel, or any individuals affiliated with those entities as inconsequential, testifying that any such use was simply consistent with common practice within the industry and more than likely did not reflect "a whole lot of thought" about its suitability to describe injectants. Tr. 2536-37. This explanation also appears to be plausible given the credible testimony of Dr. Poveromo regarding the evolving view of injectants within the industry. Thus, while Respondents' documented references to injectants as "fuels" certainly weigh against them to some degree, the undersigned does not find this consideration alone to be dispositive of the issue of whether injectants in general, and the materials supplied by Respondent CIS to WCI Steel specifically, operate as "fuels" in a blast furnace.

Based upon the foregoing discussion, the undersigned first finds that the industry's understanding of the operation of a blast furnace and the function of injectants has sufficiently advanced since the issuance of the Final BIF Rule approximately 30 years ago that looking to the highly technical determinations rendered by the Agency at that time for guidance is less reasonable than relying upon the evidence presented by the parties in this proceeding. Accordingly, the undersigned is not persuaded by the Agency's view as articulated in the preamble to the Final BIF Rule that any material with a certain heating value functions, *ipso facto*, as a "fuel" in a blast furnace by supplying substantial and useful heat energy to the process. To the contrary, the weight of the evidence presented in this proceeding supports a

finding that injectants may release heat energy upon combustion in a blast furnace but that they do not, in fact, function as a "fuel" in the traditional sense because of their net consumption of energy and consequential cooling effect in the raceway. Thus, injectants generally do not appear to be "fuels" as that term is used in the regulations at OAC § 3745-51-02(C)(2)(a)(ii).

Finally, any contention that injectants serve as a source of heat energy to a blast furnace simply by virtue of being used in the furnace as a supplement to coke is not persuasive. As argued by Complainant, "if Respondents agree that coke provides energy, the material at issue also provides energy. Any supplement for coke is an alternate heat source . . . ." C's Br. at 53. This notion is embodied in the December 9, 2005 letter of Margaret M. Guerriero of Region 5, in which she advised Ernie Willis of IWM that the "[c]ombustion of the coke provides heat needed to melt the iron-bearing material in the furnace, and any substitute for coke is an alternate heat source." CX 47 at EPA17146. These assertions appear to be unsubstantiated. Moreover, they conflict with the credible, undisputed testimony of Dr. Poveromo that coke serves three principal roles in a blast furnace. Specifically, Dr. Poveromo explained that coke creates a permeable grid within the column of the blast furnace that provides for the passage of liquids descending to the bottom of the furnace and the passage of gases rising to the top of the furnace; that it serves as a major source of the heat energy necessary for the reactions occurring in the furnace and for the melting of the iron ore; and, finally, that it generates reducing gases. Tr. 2538-39, 2543-44. Applying the logic that injectants used in a blast furnace as a supplement to coke necessarily perform the role of coke in supplying heat energy to the furnace, the injectants would also necessarily perform the role of coke in forming the physical structure that provides for the passage of liquids and gases within the furnace. This conclusion clearly is untenable.

Given the findings articulated above - that the opinion of Dr. Poveromo is deserving of more weight than that of Dr. Fruehan; that the persuasive authority of the technical determinations rendered by the Agency in the preamble to the Final BIF Rule is limited due to advances in the understanding of the operation of a blast furnace; that the weight of the evidence demonstrates that injectants do not serve as a "fuel" in a blast furnace, notwithstanding their measured heating value, because of their net consumption of energy in the raceway; and that the notion that injectants serve as a source of heat energy to a blast furnace simply by virtue of being used in the furnace as a supplement to coke is unsubstantiated and conflicts with credible testimony in the record - the undersigned is compelled to conclude that a preponderance of the evidence fails to establish that materials injected into a blast furnace supply substantial and useful heat energy to the furnace upon initial combustion in the raceway. While some of the evidence presented by Complainant undoubtedly weighs in favor of its position, namely Respondents' documented use of the term "fuels" to describe injectants, the undersigned finds it to be insufficient to sustain Complainant's burden of persuasion on this particular issue. Accordingly, the JLM and IFF materials are found not to be "wastes" as defined by OAC § 3745-51-02(C)(2) on account of any energy released upon initial combustion in the raceway of the blast furnace.

(B) Do injectants supply substantial and useful heat energy by virtue of the excess reducing gases emitted by the blast furnace?

Complainant also contends that injectants serve as a source of heat energy to a blast furnace because any reducing gases produced by the combustion of injectants that are not consumed within the furnace are subsequently emitted and combusted outside of the furnace to heat the air comprising the hot blast. To advance this position, Complainant relies upon the testimony of Professor Fruehan and Dr. Poveromo. C's Br. at 47 (citing Tr. 1082-84, 1091-92, 1133, 1148-49, 1155-56, 1177-83, 1191, 2570-71, 2573); C's Reply Br. at 19-20 (same).[38] Respondents counter that the generation of excess reducing gases is not purposeful, that the use of injectants does not impact the volume or composition of the reducing gases, and that Complainant failed to offer any evidence demonstrating how the excess reducing gases were specifically utilized at the WCI Steel Facility, if at all. Rs' Br. at 24-25 (citing Tr. 2443-47, 2578); Rs' Reply Br. at 14-15 (same).

The record contains ample evidence that steel mills may utilize reducing gases not consumed in the blast furnace by drawing those gases, referred to as "top gases" or "off gases," from the top of the furnace and combusting them elsewhere in the facility in order to obtain energy to heat the air entering the furnace as the hot blast, among other heating applications within the facility. Professor Fruehan, Mr. Rorick, and Dr. Poveromo each testified to this practice at the hearing. Tr. 1074-75, 1125, 1133, 1148-49, 2461-62; 2570-71. For example, Professor Fruehan explained that top gas is "an energy source and usually a good portion of that energy is used to preheat the air before it goes into the furnace, so it's used back in the furnace." Tr. 1125. He further testified on the subject, "[T]he off gas . . . that comes off the process which comes from the burning of the hydrocarbons or the injection of the hydrocarbons is used to preheat the air that goes back into the furnace or for other useful purposes in the steel plant or maybe just to produce electricity." Tr. 1133. In describing the equipment used at blast furnaces to clean top gases exiting the furnace, Mr. Rorick explained generally that the gases may be "useful as a fuel for other people" and that they "can be a valuable commodity depending on your site specific requirements." Tr. 2461-62. The following testimony was elicited from Dr. Poveromo on this topic:

Q: How is the hot air blast initially heated?

A: In the stoves.

[38] Complainant also cites the Agency's description of the role of injectants in a blast furnace, and its determination that Cadence product is subject to regulation by virtue of these excess reducing gases, as set forth in the preamble to the Final BIF Rule. C's Br. at 49-50 (citing 50 Fed. Reg. at 49,172); C's Reply Br. at 23-25 (citing 50 Fed. Reg. at 49,171-73). As discussed in the preceding section of this Initial Decision, however, the undersigned found the determinations rendered by the Agency in the preamble to the Final BIF Rule to lack adequate persuasive authority due to inconsistencies between the Agency's discussion of this topic and evidence presented by the parties in this proceeding, which the undersigned found to reflect advances in the understanding of the operation of a blast furnace since the date of that rulemaking. Thus, the undersigned is not considering them here.

> Q: And where does the heat in the stoves come from?
>
> A: It's basically a combustion process, so a stove burner at the bottom of the stove heats up the stove.
>
> Q: What's fueling the stove?
>
> A: It could be the blast furnace top gas, it could be natural gas? It can be coke oven gas depending on the individual plant configuration.
>
> Q: So the top gas can be used to fuel the –
>
> A: Of course in any steel plant the blast furnace top gas is considered a valuable plant fuel to be used wherever it can be most effectively used, the stoves, rolling mills, the coke oven gas under firing, so forth.

Tr. 2570-71.

In addition, the document entitled "How a Blast Furnace Works," which Complainant obtained from the website from the American Iron and Steel Institute and proffered at the hearing, explains:

> Another product of the ironmaking process, in addition to molten iron and slag, is hot dirty gases. These gases exit the top of the blast furnace and proceed through gas cleaning equipment where particulate matter is removed from the gas and the gas is cooled. This gas has a considerable energy value so it is burned as a fuel in the "hot blast stoves" which are used to preheat the air entering the blast furnace to become "hot blast."

CX 86 at EPA18466.

The foregoing evidence establishes a common practice within the steelmaking industry with respect to excess reducing gases emitted by a blast furnace. As noted by Respondents, however, Complainant has not pointed to any evidence in the record as to the practices of the WCI Steel Facility in particular. The undersigned's review of the record also did not yield any evidence that supports Complainant's position on this subject.[39] To the contrary, some evidence

[39] In any case, the burden of coming forward with the evidence necessary to support their respective positions falls squarely upon the parties. *See Northwestern Nat'l Ins. Co. v. Baltes*, 15 F.3d 660, 662-63 (7th Cir. 1994) ("[J]udges are not archaeologists. They need not excavate masses of papers in search of revealing tidbits—not only because the rules of procedure place the burden on the litigants, but also because their time is scarce."); 40 C.F.R. § 22.26 ("All submissions [of proposed findings of fact, conclusions of law, and proposed orders, and any briefs in support thereof,] . . . shall contain adequate references to the record and authorities relied on."). This obligation is especially critical in cases such as the present one where the record is voluminous (as the parties are aware, the record of this

in the record suggests that the excess reducing gases generated at the WCI Steel Facility were not, in fact, used in connection with heating the air for the hot blast. In a letter dated July 22, 2005, and addressed to Gregory Orr of the Ohio EPA, Respondent Lofquist explained that "[t]he purpose of the high carbonaceous liquids [injectants] is not to supply heat for the hot air blast; fuels are used at steps elsewhere in the process." CX 2 at EPA2734, 2737. As a self-serving statement that is unsubstantiated by other evidence in the record, Respondent Lofquist's assertion is entitled to little weight. *See, e.g., A.Y. McDonald Indus., Inc.*, 2 E.A.D. 402, 426 (EAB 1987) ("[U]ncorroborated self-serving statements . . . are entitled to little weight."). However, as already noted, Complainant does not appear to have produced any evidence to refute it.

Furthermore, as observed by Respondents, Complainant seems to undercut the idea that the WCI Steel Facility utilized all of the gases emitted by its blast furnace by advancing the view that the WCI Steel Facility was an "open system" in order to support its calculation of the proposed penalty in this proceeding. Rs' Reply Br. at 14 (citing C's Reply Br. at 78). Referring to testimony elicited from Mr. Rorick that some gases drawn from the top of a blast furnace are emitted into the environment, Complainant begins:

> Respondents' own witness testified that the blast furnace is not a closed system. Furthermore, the WCI blast furnace was not permitted to burn hazardous waste. Since hazardous wastes were being burned in an unpermitted blast furnace, and since it is an open system, area residents were potentially exposed to hazardous emissions. Respondents also assert that "steel mills typically have air emission control equipment and are permitted." However, Respondents presented no evidence to support this assertion, or its applicability to a blast furnace system – as opposed to any other system at a steel mill, and also presented no evidence regarding control of any emissions from the *WCI blast furnace* in particular.

C's Reply Br. at 78 (internal citations omitted) (emphasis in original).

This excerpt is problematic. First, while Complainant contends that Respondents failed to present any evidence to support their assertion that steel mills typically employ air emission control equipment, the record contains testimonial and documentary evidence to the contrary. When questioned about the use of such equipment at the WCI Steel Facility, Inspector Beedle recounted that it had "a scrubber and a baghouse," which he had determined by "look[ing] up their air permit." Tr. 884. The record is unclear as to whether this equipment was present at the blast furnace, but Mr. Rorick testified to the general use of air pollution control equipment at blast furnaces on multiple occasions at the hearing. Tr. 2405 (explaining that the furnace is a "closed system," meaning that top gases are processed in a "complicated treatment system" rather than being released immediately to the environment); 2443-44 (explaining that top gases typically are not released from the blast furnace to the environment untreated but, rather, are "dry

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proceeding contains tens of thousands of pages of testimonial and documentary evidence) and the contested issues involve subject matter that is highly technical in nature.

cleaned and then wet cleaned at most places"); Tr. 2460-62 (explaining that "every blast furnace in the world has gas cleaning equipment both dry and wet" that cleans the top gases upon leaving the furnace); Tr. 2476-77 (explaining that top gases "go through cleaning equipment" to "remove the moisture and remove the dirt" before some of the gases are ultimately released to the environment). Complainant's own witness, Professor Fruehan, also testified that "[t]hose gases are cleaned," Tr. 1074, and the document entitled "How a Blast Furnace Works," which Complainant proffered at the hearing, explains that excess reducing gases "exit the top of the blast furnace and proceed through gas cleaning equipment where particulate matter is removed from the gas," CX 86 at EPA18466. Thus, the evidentiary record undoubtedly supports a finding that blast furnaces typically treat the excess reducing gases exiting the furnace and that the WCI Steel Facility in particular employed air emission control equipment at least in some capacity. The excerpt is also problematic because Complainant appears to expect the undersigned to infer that the WCI Steel Facility burned excess reducing gases for purposes of heating the air to produce the hot blast based upon the evidence in the record establishing that steel mills generally engage in this practice, but then objects to a similar inference being drawn with respect to the use of air emission control equipment by the WCI Steel Facility, all while arguing that the WCI Steel Facility was an open system that may have exposed area residents to hazardous emissions.

The contradictory position advanced by Complainant, and the lack of direct evidence in the record demonstrating how the WCI Steel Facility utilized gases exiting its blast furnace, if at all, weighs against a finding that the injectants supplied by Respondent CIS to WCI Steel provided substantial and useful heat energy by virtue of excess reducing gases. Accordingly, the undersigned finds that the evidence that excess reducing gases exiting a blast furnace *may* be combusted outside of the furnace for the purpose of heating air for the hot blast simply is insufficient to establish the purpose for which they were used in this case. Thus, Complainant has not met its burden on this issue, and the JLM and IFF materials are found not to be "wastes" as defined by OAC § 3745-51-02(C)(2) on account of the excess reducing gases emitted at WCI Steel's blast furnace.

(C) Are injectants subject to regulation under RCRA as a matter of policy?

As discussed above, a preponderance of the evidence in this proceeding fails to establish that the injectants supplied by Respondent CIS to the blast furnace at the WCI Steel Facility produced substantial and useful heat energy at that facility either upon initial combustion in the raceway of the furnace in a manner similar to coke or by virtue of excess reducing gases. Rather, based upon the uncontroverted evidence in the record that the combustion of the injectants in the raceway supplies carbon and hydrogen values in the form of reducing gases, and the compelling evidence presented by Mr. Rorick that unreacted carbon from the injectants is incorporated into the liquid iron as it descends to the hearth, the injectants appear to have been burned solely for the recovery of materials. Accordingly, the undersigned is compelled to find that the JLM and IFF materials were not "burned for energy recovery," and thus, do not constitute "wastes," such that they are not subject to regulation under OAC § 3745-51-02(C). Nevertheless, as a final

argument in favor of regulating the materials in question, Complainant refers to an alternative basis articulated by the Agency for its authority to regulate Cadence product, as set forth in the preamble to the Final BIF Rule:

> EPA does not believe that the question of jurisdiction over the Cadence product (or other similar waste-derived materials) need turn narrowly on the question of whether it is burned partially for energy recovery . . . These still bottoms are not similar to raw materials customarily used in the iron-making process (i.e., toxic chlorinated solvents are not a typical feed or energy source to the iron-making process). The recycling practice, as well as prior transportation and storage, has the potential to cause substantial harm to human health and the environment if conducted improperly.

C's Br. at 52-53 (quoting 50 Fed. Reg. at 49,173-74). Consistent with this rationale, Complainant argues that the materials provided by JLM and IFF to Respondent CIS are subject to regulation because they "are not similar to the raw materials customarily used in the iron-making process." C's Br. at 53.

Respondents, in turn, argue that the use of injectants is not subject to regulation based upon the following criteria set forth in the preamble to the Final Solid Waste Rule:

> [W]hen an industrial furnace is used for material recovery and the secondary material being burned is (a) Not ordinarily associated with the furnace (for example, organic still bottoms), (b) different in composition from materials ordinarily burned in the unit (as when the secondary material contains Appendix VIII hazardous constituents different from, or in concentrations in excess of those in materials ordinarily burned in the furnace, or (c) burned for a purpose ancillary to the chief function of the furnace, we think that RCRA jurisdiction over the burning exists.

Rs' Reply Br. at 15 (quoting 50 Fed. Reg. at 630-31). With respect to the first factor identified by the Agency, Respondents dispute that injectants are "[n]ot ordinarily associated" with a blast furnace given the agreement of Professor Fruehan and Mr. Rorick that the injection of hydrocarbon-rich materials at the level of a blast furnace's tuyeres has been a common practice for over half a century. Rs' Reply Br. at 16 (citing Tr. 1080-81, 2389). Turning to the second factor, Respondents contend that "[t]he oil products that are the subject of this case (unlike Cadence product) contained no hazardous constituents different from, or in concentrations in excess of those in materials ordinarily burned in a blast furnace including phenol and chlorine." Rs' Reply Br. at 16 (citing Tr. 2448-56, 2558-68; March 29, 2012 Declaration of Joseph Poveromo at 10; April 2, 2012 Declaration of Frederick Rorick at 7-8). As for the third factor, Respondents argue that injectants are combusted in a blast furnace to generate reducing gases, a required ingredient for the reduction of iron ore that is hardly ancillary to the chief function of

the furnace. Rs' Reply Br. at 16. Thus, Respondents conclude, "RCRA jurisdiction over [the use of injectants] does not exist." Rs' Reply Br. at 16.

As observed by the parties, the Agency discussed the scope of its authority to regulate materials burned in industrial furnaces, and Cadence product in particular, in the preambles to the rulemakings for the revised definition of solid waste and the standards governing the burning of hazardous waste in nonindustrial boilers and furnaces. In the preamble to the Final Solid Waste Rule, the Agency explained its view that the regulation of the burning of materials in an industrial furnace for purposes of energy recovery "would not constitute an impermissible intrusion in the production process because burning for energy recovery is an activity that is not central to the usual function of the industrial furnace." 50 Fed. Reg. at 630. Thus, the Agency explained, it was "asserting RCRA jurisdiction when an industrial furnace burns hazardous secondary materials – *i.e.*, hazardous wastes – for energy recovery." *Id.* With respect to its authority to regulate the burning of materials in an industrial furnace for purposes of material recovery, however, the Agency observed that "industrial furnaces are used as integral components of manufacturing processes to recover materials" and, "[t]hus, regulation under RCRA of actual burning in industrial furnaces could, in some circumstances, represent an intrusion into a normal production process, particularly if the material being recovered is the same material the furnace ordinarily produces." *Id.* The Agency then continued:

> On the other hand, when an industrial furnace is used for material recovery and the secondary material being burned is: (a) Not ordinarily associated with the furnace (for example, organic still bottoms), (b) different in composition from materials ordinarily burned in the unit (as when the secondary material contains Appendix VIII hazardous constituents different from, or in concentrations in excess of those in materials ordinarily burned in the furnace), or (c) burned for a purpose ancillary to the chief function of the furnace, we think that RCRA jurisdiction over the burning exists. (Jurisdiction obviously exists, for example, if that purpose is destruction.)

50 Fed. Reg. at 630.

The Agency reiterated this belief in the preamble to the Final BIF Rule, explaining that the regulations being promulgated "do not apply to hazardous wastes burned in industrial furnaces solely for material recovery," in part, because "there are certain situations where control of burning for material recovery in industrial furnaces could lead to an impermissible intrusion into the production process and so be beyond EPA's authority under RCRA." 50 Fed. Reg. at 49,167. Such situations, the Agency explained, "involve circumstances where the secondary material being burned is indigenous to the process in which the industrial furnace is used, for example, because the secondary material contains the same types and concentrations of constituents . . . as the raw materials normally burned in the industrial furnace." *Id.* The Agency proceeded to apply this reasoning as part of its response to the request by certain entities to

exclude Cadence product from regulation as a hazardous waste fuel. After concluding that Cadence product was burned in blast furnaces partially for energy recovery, the Agency asserted:

> EPA does not believe that the question of jurisdiction over the Cadence product (or other similar waste-derived materials) need turn narrowly on the question of whether it is burned partially for energy recovery. Cadence product is composed of toxic chlorinated solvent still bottoms which (on a nationwide basis) are typically disposed of or incinerated. These still bottoms are not similar to raw materials customarily used in the iron-making process (i.e., toxic chlorinated solvents are not a typical feed or energy source to the iron-making process). The recycling practice, as well as prior transportation and storage, has the potential to cause substantial harm to human health and the environment if conducted improperly.
>
> EPA believes that recycling of hazardous secondary materials that are so different from the raw materials customarily utilized in the process is a prototypical situation it is empowered to control under RCRA Subtitle C. This is particularly true in this case because the recycling involves burning (viz. controlled flame combustion), and so resembles incineration. The recycling activity also is not part of a continuous industrial process, but rather involves unrelated parties and processes (i.e., the hazardous waste generators who generate spent solvents and hazardous still bottoms, intervening processors (who not only process but add additional hazardous still bottoms to the mixture), and the steel mill), in addition to involving secondary materials normally unrelated to the ironmaking process. For these reasons, EPA is prepared to exercise its authority to designate Cadence product, and all similar materials, as solid wastes pursuant to §261.2(d) when recycled via controlled thermal combustion in processes not customarily utilizing chlorinated toxicants as a fuel or raw material should this ever prove necessary. In light of the Agency's judgment that Cadence product is burned partially for energy recovery and so is subject to regulation as hazardous waste fuel, it is unnecessary to exercise this authority at the present time.

50 Fed. Reg. at 49,174.[40]

[40] The Agency closed its discussion on its authority to regulate Cadence product by "stress[ing] that it [was] not finding that Cadence is engaging in an unsafe or undesirable recycling practice. Quite the opposite – Cadence has found a means of utilizing resources in wastes, coupled with destruction of the wastes toxic constituents, that appears to be environmentally beneficial." 50 Fed. Reg. at 49,174. Indeed, the Agency had found through preliminary testing of emissions from a blast furnace burning Cadence material that "these devices may be able to destroy 99.99% of toxic organic constituents in the material." 50 Fed. Reg. at 49,174 n.26. Such a finding is consistent with the undisputed testimony of Mr. Rorick and Dr. Poveromo, who explained how organic compounds dissociate into carbon and hydrogen atoms upon being injected into the blast furnace. Tr. 2451-56, 2564-68. This seemingly raises the question, then, of whether materials used as injectants are, in fact, "part of the waste disposal problem."

The passages cited above reflect the Agency's view that its jurisdiction over materials burned in industrial furnaces is not limited to those burned for purposes of energy recovery but seemingly also extends to materials differing from the raw materials ordinarily burned in a given furnace in that they are "[n]ot ordinarily associated with the furnace," they are "different in composition," or they are "burned for a purpose ancillary to the chief function of the furnace," even if those materials are burned exclusively for purposes of material recovery. While the Agency believes that the question of jurisdiction over a material "need not turn narrowly on the question of whether it is burned partially for energy recovery," to find in an administrative proceeding that materials burned exclusively for material recovery are subject to regulation as "solid wastes" under RCRA based upon criteria enumerated in a preamble but not included in the text of the applicable regulations is troubling, especially where it would conflict with a finding based upon the evidentiary record that the materials are not subject to regulation on account of being "[u]sed or reused as ingredients in an industrial process to make a product" and thus falling within the recycling exemption set forth in the regulations. Indeed, "a preamble is merely the [A]gency's interpretation of what is stated in the rule; the preamble cannot set forth binding requirements or conditions which are not in the rule." *Consumers Recycling, Inc.*, EPA Docket Nos. CAA-5-2001-002, CWA-5-2001-006, RCRA-5-2001-008, MM-5-2001-001, 2002 EPA ALJ LEXIS 48, at * 29 (ALJ, Aug. 22, 2002). Accordingly, the undersigned finds that the criteria set forth in the preambles to the rulemakings at issue are not controlling here, and the injectants supplied by Respondent CIS to the blast furnace at the WCI Steel Facility, and the JLM and IFF materials in particular, are not subject to regulation on those grounds.

B. RESPONDENTS' LIABILITY FOR THE TEN COUNTS OF VIOLATION SET FORTH IN THE SECOND AMENDED COMPLAINT

In accordance with the findings above that Complainant did not sustain its burden in this proceeding of demonstrating by a preponderance of the evidence that the materials at issue constituted a "waste," as that term is defined by OAC § 3745-51-02, the undersigned concludes that the Agency's jurisdiction over the materials pursuant to Subtitle C of RCRA has not been established. Thus, the undersigned finds that Respondents are not liable for the ten counts of violation alleged in the Second Amended Complaint.

VII. ORDER

For the reasons set forth above, Respondents are held not to be liable for any of the counts charged in the Second Amended Complaint. Accordingly, the Second Amended Complaint is hereby dismissed.

Pursuant to 40 C.F.R. § 22.27(c), this Initial Decision shall become a final order 45 days after its service upon the parties, unless a party moves to reopen the hearing under 40 C.F.R. § 22.28, an appeal is taken to the Environmental Appeals Board within 30 days of service of this Initial Decision pursuant to 40 C.F.R. § 22.30(a), or the Board elects to review this Initial Decision *sua sponte*, as provided by 40 C.F.R. § 22.30(b).

__/S/_____
Susan L. Biro
Chief Administrative Law Judge

Dated: March 17, 2015
Washington, D.C.