IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF OHIO

UNITED STATES OF AMERICA;
the STATES OF IDAHO, ILLINOIS,
INDIANA, MICHIGAN, OHIO,
TENNESSEE, AND WEST VIRGINIA;
the COMMONWEALTHS OF
KENTUCKY AND VIRGINIA;
the OKLAHOMA DEPARTMENT OF
ENVIRONMENTAL QUALITY; and
the MARICOPA COUNTY AIR QUALITY
DEPARTMENT,

Plaintiffs,

v.

ALERIS INTERNATIONAL, INC.;
IMCO RECYCLING OF ILLINOIS, INC.;
IMCO RECYCLING OF MICHIGAN
L.L.C.; ALUMITECH OF WEST
VIRGINIA INC.; ROCK CREEK
ALUMINUM; IMSAMET OF ARIZONA;
COMMONWEALTH ALUMINUM
LEWISPORT, LLC; IMCO RECYCLING
OF IDAHO INC.; ALSCO METALS
CORPORATION; ALCHEM
ALUMINUM, INC.; ALCHEM
ALUMINUM SHELBYVILLE, INC.;
COMMONWEALTH ALUMINUM
CONCAST, INC.; IMCO RECYCLING
OF OHIO, INC.; and ALUMITECH OF
WABASH INC.,

Defendants.

Civil Action No. 1:09-cv-00340

Judge Ann Aldrich

CONSENT DECREE

TABLE OF CONTENTS

WHEREAS, Plaintiffs, the United States of America, on behalf of the United States Environmental Protection Agency ("EPA"), the State of Idaho, on behalf of the Idaho Department of Environmental Quality, the State of Illinois, on behalf of the People of the State of Illinois by Lisa Madigan, Attorney General of the State of Illinois on her own motion and at the request of the Illinois Environmental Protection Agency, the State of Indiana, on behalf of the Indiana Department of Environmental Management, the Commonwealth of Kentucky, on behalf of the Kentucky Department for Environmental Protection, the Maricopa County (Arizona) Air Quality Department, the State of Michigan, on behalf of the Michigan Department of Environmental Quality, the State of Ohio, on behalf of the Ohio Environmental Protection Agency, the Oklahoma Department of Environmental Quality, the State of Tennessee, on behalf of the Tennessee Department of Environment and Conservation, the Commonwealth of Virginia, on behalf of the Virginia Department of Environmental Quality, and the State of West Virginia, on behalf of the West Virginia Department of Environmental Protection, have filed an Amended Complaint in this action concurrently with this Consent Decree alleging that Defendants Aleris International, Inc., IMCO Recycling of Illinois, Inc., IMCO Recycling of Michigan L.L.C., Alumitech of West Virginia Inc., Rock Creek Aluminum, IMSAMET of Arizona, Commonwealth Aluminum Lewisport, LLC, IMCO Recycling of Idaho Inc., ALSCO Metals Corporation, Alchem Aluminum, Inc., Alchem Aluminum Shelbyville, Inc., Commonwealth Aluminum Concast, Inc., IMCO Recycling of Ohio, Inc., and Alumitech of Wabash Inc. (collectively, the "Companies") are and have been in violation of Section 112 of the Clean Air Act (the "Act"), 42 U.S.C. § 7412, the regulations promulgated thereunder at 40 C.F.R. Part 63, Subparts A and RRR, and related provisions of state and local law at 15 secondary aluminum production facilities described in Appendix A to this Consent Decree ("Covered Facilities");

WHEREAS, the Amended Complaint alleges that the Companies have failed to demonstrate compliance with emission standards through valid performance testing, to design and install adequate capture and collection systems, to correctly establish and monitor operating parameters, and to comply with recordkeeping and reporting requirements pursuant to 40 C.F.R. Part 63, Subparts A and RRR and related provisions of state and local law at these 15 Covered Facilities;

WHEREAS, the Amended Complaint alleges that Defendant IMCO Recycling of Illinois, Inc. is and has been in violation of Section 502(a) of the Act, 42 U.S.C. § 7661a(a), at its Covered Facility in Chicago Heights, Illinois;

WHEREAS, on November 14, 2005, EPA issued a Notice of Violation ("NOV") related to Subpart RRR requirements for Aleris International, Inc.'s Covered Facilities in Loudon, Tennessee, and Morgantown, Kentucky;

WHEREAS, on January 17, 2006, the Commonwealth of Kentucky issued an NOV related in part to Subpart RRR requirements for Aleris International, Inc.'s Covered Facility in Morgantown, Kentucky;

WHEREAS, on March 7, 2006, June 27, 2006, and July 27, 2006, the State of Tennessee issued NOVs related in part to Subpart RRR requirements for Alchem Aluminum Shelbyville, Inc.'s Covered Facility in Shelbyville, Tennessee;

WHEREAS, following the formation of Aleris International, Inc. in December 2004, Aleris International, Inc., in coordination with the other Companies, conducted an internal environmental compliance review of the Covered Facilities;

WHEREAS, on March 17, 2006, following lengthy discussions with the Plaintiffs, Aleris International, Inc., on behalf of the Companies, voluntarily executed a letter of commitment to negotiate with the Plaintiffs to settle the Companies' potential liability under 40 C.F.R. Part 63, Subparts A and RRR and related provisions of state and local law at the Covered Facilities, including Covered Facilities against which the Plaintiffs had initiated no formal enforcement action, and including four Covered Facilities that were acquired after Aleris International, Inc.'s formation;

WHEREAS, the Companies have subsequently worked cooperatively with the Plaintiffs to structure a comprehensive settlement that includes a compliance schedule to bring the Covered Facilities into compliance with certain requirements of 40 C.F.R. Part 63, Subparts A and RRR and related provisions of state and local law;

WHEREAS, the Companies do not admit any liability to the Plaintiffs arising out of the transactions or occurrences alleged in the Amended Complaint and the NOVs;

WHEREAS, on January 11, 2008, and April 25, 2008, EPA issued two letters approving alternative stack testing, monitoring, recordkeeping, and reporting methodologies with respect to certain emission units at Aleris International Inc.'s Covered Facility in Morgantown, Kentucky and Commonwealth Aluminum Lewisport, LLC's Covered Facility in Lewisport, Kentucky, partly addressing violations alleged in the Second and Third Claims for Relief in the Amended Complaint;

WHEREAS, on June 6, 2008, and June 26, 2008, EPA issued two letters approving alternative methods proposed by the Companies for measuring, monitoring, and recording the molten metal level at reverberatory furnaces, addressing violations alleged in the Fourth Claim for Relief in the Amended Complaint;

WHEREAS, on October 9, 2008, and January 8, 2009, EPA issued two letters approving an alternative method of measuring, monitoring, and recording the addition of solid reactive flux at group 1 furnaces, partly addressing violations alleged in the Third Claim for Relief in the Amended Complaint;

WHEREAS, on February 12, 2009, each of the Companies except for IMSAMET of Arizona filed a petition for voluntary reorganization under Chapter 11 of the Bankruptcy Code in the United States Bankruptcy Court for the District of Delaware, In re Aleris International, Inc., et al., Case No. 09-10478 (BLS) ("Bankruptcy Case");

WHEREAS, the Parties recognize, and the Court by entering this Consent Decree finds, that this Consent Decree has been negotiated by the Parties in good faith and will avoid litigation among the Parties and that this Consent Decree is fair, reasonable, and in the public interest;

NOW, THEREFORE, before the taking of any testimony, without the adjudication or admission of any issue of fact or law except as provided in Section I, and with the consent of the Parties, IT IS HEREBY ADJUDGED, ORDERED, AND DECREED as follows:

I. JURISDICTION, VENUE, AND NOTICE

1. This Court has jurisdiction over the subject matter of this action and over the Parties pursuant to 28 U.S.C. §§ 1331, 1345, 1355, and 1367, and Sections 113(b) and 304(a) of the Act, 42 U.S.C. §§ 7413(b) and 7604(a). Venue lies in this District pursuant to Sections 113(b) and 304(c) of the Act, 42 U.S.C. §§ 7413(b) and 7604(c), and 28 U.S.C. §§ 1391(b) and (c) and 1395(a), because the corporate headquarters of the parent company of each Company is located in this judicial district. For purposes of this Decree, or any action to enforce this Decree, the Companies consent to the Court's jurisdiction over this Decree or such action and over the Companies and consent to venue in this judicial district.

2. Notice of the commencement of this action has been given to each Co-Plaintiff in this action as required by Section 113(b) of the Act, 42 U.S.C. § 7413(b), and to the EPA

Administrator and the Companies as required by Section 304(b) of the Act, 42 U.S.C. § 7604(b).

II. APPLICABILITY

3. The obligations of this Consent Decree apply to and are binding upon the Plaintiffs, upon each Applicable Company (and its successors, assigns, or other entities or persons otherwise bound by law) severally for its Covered Facility or Facilities as described in Appendix A to this Consent Decree, and upon Aleris International, Inc. (and its successors, assigns, or other entities or persons otherwise bound by law**)** jointly and severally with each respective Applicable Company with respect to that Company's Covered Facility or Facilities.

4. Any transfer of ownership or operation of any portion of a Covered Facility that is subject to 40 C.F.R. Part 63, Subpart RRR shall be conditioned on the transferee's assumption of the obligation to ensure that the terms of this Consent Decree with respect to that portion of that Covered Facility are implemented. At or before the time of execution of the written agreement for such transfer, the Applicable Company shall provide a copy of this Consent Decree to the proposed transferee. Within 10 days after execution of the written agreement for such transfer, the Applicable Company shall provide to the United States, the Applicable EPA Region, and the Applicable Co-Plaintiff a copy of the first page, relevant portion, and signature pages of such written agreement for such transfer evidencing the transferee's assumption of the obligation to ensure that the terms of this Consent Decree that apply to the portion of the Covered Facility to be transferred are implemented. During the pendency of the Bankruptcy Case with respect to an Applicable Company, the Applicable Company shall provide the United States, the Applicable EPA Region, and the Applicable Co-Plaintiff with written notice of the prospective transfer at or before the time that notice is required to be provided to any party holding a prepetition general unsecured claim in the Bankruptcy Case. Should this Consent Decree continue in effect with

respect to an Applicable Company after termination of the Bankruptcy Case with respect to such Applicable Company, the Applicable Company shall provide the United States, the Applicable EPA Region, and the Applicable Co-Plaintiff with written notice of the prospective transfer at least 30 days prior to such transfer. Any attempt to transfer ownership or operation of any portion of a Covered Facility that is subject to 40 C.F.R. Part 63, Subpart RRR without complying with this Paragraph constitutes a violation of this Decree.

5. Each Company shall provide a copy of this Consent Decree to all officers, plant managers, and their directly reporting supervisory managers, and shall ensure that each officer, employee, and agent whose duties might reasonably include compliance with any provision of this Decree is made aware of this Decree and specifically aware of the requirements of this Decree that fall within such person's duties, including any contractor retained to perform work required under this Consent Decree. Each Company shall condition any such contract upon performance of the work in conformity with the terms of this Consent Decree.

6. In any action to enforce this Consent Decree, no Company shall raise as a defense the failure by any of its officers, directors, employees, agents, or contractors to take any actions necessary to comply with the provisions of this Consent Decree.

III. DEFENDANTS

7. Aleris International, Inc., a Delaware corporation with corporate headquarters in Beachwood, Ohio, is a "person" as defined in Section 302(e) of the Act, 42 U.S.C. § 7602(e).

8. IMCO Recycling of Illinois, Inc., an Illinois corporation, is a "person" as defined in Section 302(e) of the Act, 42 U.S.C. § 7602(e).

9. IMCO Recycling of Michigan L.L.C., a Delaware corporation, is a "person" as defined in Section 302(e) of the Act, 42 U.S.C. § 7602(e).

10. Alumitech of West Virginia Inc., a Delaware corporation, is a “person” as defined in Section 302(e) of the Act, 42 U.S.C. § 7602(e).

11. Rock Creek Aluminum, an Ohio corporation, is a “person” as defined in Section 302(e) of the Act, 42 U.S.C. § 7602(e).

12. IMSAMET of Arizona, a partnership, is a “person” as defined in Section 302(e) of the Act, 42 U.S.C. § 7602(e).

13. Commonwealth Aluminum Lewisport, LLC, a Delaware corporation, is a “person” as defined in Section 302(e) of the Act, 42 U.S.C. § 7602(e).

14. IMCO Recycling of Idaho Inc., a Delaware corporation, is a “person” as defined in Section 302(e) of the Act, 42 U.S.C. § 7602(e).

15. ALSCO Metals Corporation, a Delaware corporation, is a “person” as defined in Section 302(e) of the Act, 42 U.S.C. § 7602(e).

16. Alchem Aluminum, Inc., a Delaware corporation, is a “person” as defined in Section 302(e) of the Act, 42 U.S.C. § 7602(e).

17. Alchem Aluminum Shelbyville, Inc., a Delaware corporation, is a “person” as defined in Section 302(e) of the Act, 42 U.S.C. § 7602(e).

18. Commonwealth Aluminum Concast, Inc., an Ohio corporation, is a “person” as defined in Section 302(e) of the Act, 42 U.S.C. § 7602(e).

19. IMCO Recycling of Ohio, Inc., a Delaware corporation, is a “person” as defined in Section 302(e) of the Act, 42 U.S.C. § 7602(e).

20. Alumitech of Wabash Inc., an Indiana corporation, is a “person” as defined in Section 302(e) of the Act, 42 U.S.C. § 7602(e).

21. At certain times relevant to the Amended Complaint, each Company owned and

operated its respective secondary aluminum production facility as described in Appendix A to this Consent Decree. Each secondary aluminum production facility described in Appendix A is a "secondary aluminum production facility" as defined in 40 C.F.R. § 63.1503. The requirements of 40 C.F.R. Part 63, Subparts A and RRR and the related provisions of state and local law cited in Paragraph 4 of the Amended Complaint apply to the owner and operator of a secondary aluminum production facility.

22. The Companies' secondary aluminum production facilities each process aluminum scrap and, in some instances, aluminum dross to produce various secondary aluminum products. The secondary aluminum production process results in emissions of regulated air pollutants, including dioxins and furans ("D/F"), hydrogen chloride ("HCl"), particulate matter ("PM"), and hydrocarbons. D/F and HCl are hazardous air pollutants ("HAPs"). PM from a secondary aluminum production facility is measured as a surrogate for individual HAP metals, while total hydrocarbon emissions serve as a surrogate for the emissions of organic HAP compounds.

23. The Chicago Heights, Lewisport, Morgantown, Coldwater, Uhrichsville, and Shelbyville facilities are "major sources" as defined in Section 112(a)(1) of the Act, 42 U.S.C. § 7412(a)(1), and the federal, state, and local regulations promulgated pursuant to the Act.

24. The Goodyear, Saginaw, and Friendly (Alumitech) facilities are "area sources" as defined in Section 112(a)(2) of the Act, 42 U.S.C. § 7412(a)(2), and the federal, state, and local regulations promulgated pursuant to the Act.

25. Subject to the provisions of Paragraphs 51 and 52, the Post Falls, Wabash, Sapulpa, Loudon, Richmond, and Friendly (Rock Creek) facilities are "area sources" as defined in Section 112(a)(2) of the Act, 42 U.S.C. § 7412(a)(2), and the federal, state, and local

regulations promulgated pursuant to the Act.

IV. DEFINITIONS

26. Terms used in this Consent Decree that are defined in the Act or in regulations promulgated pursuant to the Act shall have the meanings assigned to them in the Act or such regulations, unless otherwise provided in this Decree. Whenever the terms set forth below are used in this Consent Decree, the following definitions shall apply:

a. "ACGIH Manual" shall mean "Industrial Ventilation: A Manual of Recommended Practice," American Conference of Governmental Industrial Hygienists (23rd edition, 1998);

b. "Amended Complaint" shall mean the first amended complaint filed by the United States; the States of Idaho, Illinois, Indiana, Michigan, Ohio, Tennessee, and West Virginia; the Commonwealths of Kentucky and Virginia; the Oklahoma Department of Environmental Quality; and the Maricopa County Air Quality Department in this action;

c. "Applicable Company" for a particular Covered Facility shall mean the Company or Companies listed below that Covered Facility in Appendix A to this Consent Decree;

d. "Applicable Co-Plaintiff" for a particular Covered Facility shall mean the state or county listed below that Covered Facility in Appendix A to this Consent Decree;

e. "Applicable EPA Region" for a particular Covered Facility shall mean the EPA Region listed below that Covered Facility in Appendix A to this Consent Decree;

f. "Bankruptcy Case" shall mean the cases under Chapter 11 of the Bankruptcy Code of each of the Companies except for IMSAMET of Arizona which are being jointly administered in the United States Bankruptcy Court for the District of Delaware, <u>In re</u>

Aleris International, Inc., et al., Case No. 09-10478 (BLS);

g. “Bankruptcy Court” shall mean the United States Bankruptcy Court for the District of Delaware;

h. “Chicago Heights facility” shall mean the secondary aluminum production facility owned and operated by IMCO Recycling of Illinois, Inc. that is located in Chicago Heights, Illinois;

i. “Coldwater facility” shall mean the secondary aluminum production facility owned and operated by IMCO Recycling of Michigan L.L.C. and Alchem Aluminum, Inc. that is located in Coldwater, Michigan, comprising both the IMCO Recycling of Michigan L.L.C. plant and the Alchem Aluminum, Inc. plant;

j. “Company” shall mean a corporation or partnership listed in Paragraphs 7 through 20;

k. “Consent Decree” or “Decree” shall mean this Decree and all appendices attached hereto (listed in Section XXII);

l. “Co-Plaintiffs” shall mean the States of Idaho, Illinois, Indiana, Michigan, Ohio, Tennessee, and West Virginia; the Commonwealths of Kentucky and Virginia; the Oklahoma Department of Environmental Quality; and the Maricopa County Air Quality Department;

m. “Court” shall mean the United States District Court for the Northern District of Ohio;

n. “Covered Facility” shall mean any one of the 15 facilities identified in Appendix A to this Consent Decree;

o. “Covered Facility or Facilities” shall mean any one or more of the 15 facilities identified in Appendix A to this Consent Decree;

p. “Day” shall mean a calendar day unless expressly stated to be a business day. In computing any period of time under this Consent Decree, where the last day would fall on a Saturday, Sunday, or federal holiday, the period shall run until the close of business of the next business day;

q. “Effective Date” shall have the definition provided in Section XIV of this Consent Decree;

r. “EPA” shall mean the United States Environmental Protection Agency and any of its successor departments or agencies;

s. “Friendly (Rock Creek) facility” shall mean the secondary aluminum production facility owned and operated by Rock Creek Aluminum that is located in Friendly, West Virginia;

t. “Friendly (Alumitech) facility” shall mean the secondary aluminum production facility owned and operated by Alumitech of West Virginia Inc. that is located in Friendly, West Virginia;

u. “Goodyear facility” shall mean the secondary aluminum production facility owned and operated by IMSAMET of Arizona that is located in Goodyear, Maricopa County, Arizona;

v. “Idle Unit” shall mean any affected source or emission unit subject to Subpart RRR at a Covered Facility that is not operating, has not operated for at least six months, and has been maintained in a state ready to restart;

w. “Lewisport facility” shall mean the secondary aluminum production facility owned and operated by Commonwealth Aluminum Lewisport, LLC that is located in

Lewisport, Kentucky;

x. "Loudon facility" shall mean the secondary aluminum production facility owned and operated by Aleris International, Inc. that is located in Loudon, Tennessee;

y. "Morgantown facility" shall mean the secondary aluminum production facility owned and operated by Aleris International, Inc. that is located in Morgantown, Kentucky;

z. "Paragraph" shall mean a portion of this Decree identified by an Arabic numeral;

aa. "Parties" shall mean the Plaintiffs and the Companies;

bb. "Plaintiffs" shall mean the United States and the Co-Plaintiffs;

cc. "Post Falls facility" shall mean the secondary aluminum production facility owned and operated by IMCO Recycling of Idaho Inc. that is located in Post Falls, Idaho;

dd. "Richmond facility" shall mean the secondary aluminum production facility owned and operated by ALSCO Metals Corporation that is located in Richmond, Virginia;

ee. "Saginaw facility" shall mean the secondary aluminum production facility owned and operated by Alchem Aluminum, Inc. that is located in Saginaw, Michigan;

ff. "Sapulpa facility" shall mean the secondary aluminum production facility owned and operated by Aleris International, Inc. that is located in Sapulpa, Oklahoma;

gg. "Section" shall mean a portion of this Decree identified by a roman numeral;

hh. "Shelbyville facility" shall mean the secondary aluminum production facility owned and operated by Alchem Aluminum Shelbyville, Inc. that is located in

Shelbyville, Tennessee;

ii. “Subpart RRR” shall mean 40 C.F.R. Part 63, Subpart RRR;

jj. “Uhrichsville facility” shall mean the secondary aluminum production facility owned and operated by Commonwealth Aluminum Concast, Inc. and IMCO Recycling of Ohio, Inc. that is located in Uhrichsville, Ohio, comprising both the IMCO Recycling of Ohio, Inc. plant and the Commonwealth Aluminum Concast, Inc. plant;

kk. “Unit Operation,” for an affected source or emission unit, shall mean the period beginning when the feed material is first charged to the operation and ending when all material charged to the operation has been processed, and includes the fluxing, refining, alloying, and tapping of molten aluminum, but does not include periods of startup, shutdown, and malfunction;

ll. “United States” shall mean the United States of America, acting on behalf of EPA;

mm. “Wabash facility” shall mean the secondary aluminum production facility owned and operated by Alumitech of Wabash Inc. that is located in Wabash, Indiana.

V. COMPLIANCE REQUIREMENTS

A. FACILITY-SPECIFIC REQUIREMENTS

27. Morgantown facility. Within 270 days after the Effective Date, Aleris International, Inc. shall equip the delacquering kiln at the Morgantown facility with an afterburner that meets the design and operational requirements of 40 C.F.R. § 63.1505(e), and demonstrate through a new performance test within 90 days after startup that the delacquering kiln complies with the emission standards set forth in 40 C.F.R. § 63.1505(e). In reporting the results of a performance test conducted pursuant to this Paragraph, Aleris International, Inc. shall

submit to EPA Region 4 and the Commonwealth of Kentucky documentation demonstrating that the afterburner meets the design and operational requirements of 40 C.F.R. § 63.1505(e). This documentation shall include schematic drawings of the afterburner, calculations demonstrating the afterburner's design residence time, and information documenting that the afterburner is operated at a temperature of at least 1400°F. For purposes of this Consent Decree, to demonstrate that the afterburner has a residence time of at least one second, Aleris International, Inc. shall demonstrate the duration of time required for gases to pass through the reaction chamber of the afterburner in which the waste gas stream is exposed to the direct combustion flame and in which combustion of the pollutants takes place.

28. All performance testing pursuant to Paragraph 27 shall be conducted in accordance with the notification, testing, and reporting requirements of Section V.C of this Consent Decree (Performance Testing).

29. Chicago Heights facility. Within 180 days after the Effective Date, IMCO Recycling of Illinois, Inc. shall submit to the Illinois Environmental Protection Agency an application for a major source Clean Air Act Permit Program operating permit for its Chicago Heights facility. At the time of this submission, IMCO Recycling of Illinois, Inc. shall submit to EPA Region 5 a copy of the cover letter accompanying the application.

30. Lewisport, Morgantown, Coldwater, and Uhrichsville facilities. Within 180 days after the Effective Date, Aleris International, Inc., on behalf of each Applicable Company, shall submit to the Applicable EPA Regions and the Applicable Co-Plaintiffs documentation demonstrating that it has installed load cells, or equivalent technology that complies with 40 C.F.R. § 63.1510(j), to weigh flux at continuous flux-fed reverberatory furnaces at the Lewisport, Morgantown, Coldwater, and Uhrichsville facilities, and shall certify that such load

cells or equivalent technology are being operated in compliance with 40 C.F.R. § 63.1510(j).

B. CAPTURE AND COLLECTION SYSTEMS

31. Calculation of Minimum Exhaust Rate. At the collection hood or hoods for each Group 1 furnace, in-line fluxer, and inlet of a rotary dross cooler at its respective Covered Facility or Facilities, each Applicable Company shall maintain a minimum exhaust rate equal to or greater than the calculated rate using one of the following methods:

a. Enclosure (ACGIH Manual, Chapter 10). Maintain a minimum exhaust rate equivalent to 150 feet per minute ("fpm") or higher multiplied by the area of all openings (including all doors open at any time during Unit Operation), corrected for products of combustion and temperature, as calculated in accordance with the applicable calculation in Appendix K to this Consent Decree. For the purposes of this Paragraph, the "area of all openings (including all doors open at any time during Unit Operation)" shall not include any opening that is equipped with an air curtain operated during any period of opening, provided that the air curtain maintains a static pressure that meets or exceeds the baseline static pressure for that air curtain established pursuant to Paragraph 40 or 41 of this Consent Decree. The method described in this subparagraph may only be used at a source or emission unit that has been enclosed to the maximum extent technically and practically feasible, allowing for operational and safety considerations.

b. Enclosure With Alternative Demonstration. With the approval of the Applicable EPA Region, after the Applicable EPA Region's consultation with the Applicable Co-Plaintiff, demonstrate that no visible emissions escape capture during periods when the exhaust rate is not equivalent to 150 fpm or higher multiplied by the area of all openings (including all doors open at any time during Unit Operation), corrected for products of combustion and temperature, as calculated in accordance with the applicable calculation in Appendix K to this Consent Decree. The method described in this subparagraph may only be used at Coldwater reverberatory furnace #7S.

c. Low-Canopy Hood (ACGIH Manual, Section 3.9.3). Maintain a minimum exhaust rate calculated using the low-canopy hood equation in Section 3.9.3 of the ACGIH Manual. This method may only be used at a source or emission unit at which (i) the distance between the hood and the hot source does not exceed the diameter of the source or three feet, whichever is smaller; or (ii) any opening (including any door open at any time during Unit Operation) is equipped with an air curtain that is operated during any period of opening and that maintains a static pressure that meets or exceeds the baseline static pressure for that air curtain established pursuant to Paragraph 40 or 41 of this Consent Decree.

d. High-Canopy Hood (ACGIH Manual, Section 3.9.2). Maintain a minimum exhaust rate calculated using the high-canopy hood equations in Section 3.9.2 of the ACGIH Manual.

32. At each shredder and outlet of a rotary dross cooler at its respective Covered Facility or Facilities, each Applicable Company shall maintain a minimum exhaust rate equal to or greater than the rate calculated using Chapters 3, 5, and 10 of the ACGIH Manual in accordance with the applicable calculation in Appendix K to this Consent Decree.

33. In calculating a minimum exhaust rate for a source or emission unit pursuant to Paragraph 31 or 32 of this Consent Decree, each Applicable Company shall use the highest molten metal temperature reached during operation of that source or emission unit, wintertime ambient air conditions, and 100 fpm for Vr (required air velocity through the remaining hood area).

34. Capture and Collection System Improvement Plan. Within 30 days after the Effective Date, Aleris International, Inc. shall submit a Capture and Collection System Improvement Plan ("CCSIP") to the United States, and shall submit each portion of the CCSIP that concerns a particular Covered Facility to the Applicable EPA Region and Applicable Co-Plaintiff for that Covered Facility. The CCSIP shall include a description of all modifications completed since May 2006 and projected to be completed by each Applicable Company to bring the capture and collection systems at its respective Covered Facility or Facilities into compliance with Paragraph 31 or 32; photographs of each completed modification; and calculations generating the minimum exhaust rate for each capture and collection system, using one of the methods described in Paragraph 31 or 32 of this Consent Decree.

35. Within 60 days after receipt of the CCSIP, EPA, after consultation with the Applicable Co-Plaintiff(s), may notify Aleris International, Inc. in writing that the CCSIP is approved, or may notify Aleris International, Inc. in writing of any deficiency in the CCSIP. When notifying Aleris International, Inc. of any deficiency, EPA shall describe the deficiency. For any portion of the CCSIP that EPA does not approve or describe as deficient pursuant to this Paragraph within 60 days after the United States' receipt of the CCSIP, then as of 60 days following the United States' receipt of the CCSIP such portion of the CCSIP shall be deemed approved.

36. Aleris International, Inc. shall correct each deficiency identified by EPA pursuant to Paragraph 35 and submit to the United States, the Applicable EPA Region, and the Applicable Co-Plaintiff revisions to the deficient portions of the CCSIP within 30 days after the date of notification of such deficiency by EPA. Within 30 days after receipt of the revised CCSIP, EPA, after consultation with the Applicable Co-Plaintiff(s), may notify Aleris International, Inc. in

writing that the revised CCSIP is approved, or may notify Aleris International, Inc. in writing of any remaining deficiency in the revised CCSIP. When notifying Aleris International, Inc. of any remaining deficiency, EPA shall describe the deficiency. For any portion of the revised CCSIP that EPA does not approve or describe as deficient pursuant to this Paragraph within 30 days after the United States' receipt of the revised CCSIP, then as of 30 days following the United States' receipt of the revised CCSIP such portion of the revised CCSIP shall be deemed approved.

37. Within 180 days after the date of EPA approval of the CCSIP pursuant to Paragraph 35 or 36, each Applicable Company shall complete all improvements described in the CCSIP for its Covered Facility or Facilities, provided, however, that if an improvement is of such nature that it cannot reasonably be completed within such 180-day period, the Applicable EPA Region, after consultation with the Applicable Co-Plaintiff, may agree in writing to an extension of time upon the written request of the Applicable Company.

38. <u>Flow Rate Measurement</u>. During each performance test conducted pursuant to Paragraph 44 of this Consent Decree, the Applicable Company shall measure and record the actual volumetric flow rate into the capture and collection system, in accordance with the methodologies prescribed in EPA Reference Methods 1 and 2 (and EPA Reference Methods 3 and 4 if needed) contained in 40 C.F.R. Part 60, Appendix A, and the following requirements:

a. Average three duct traverses with each sample being a minimum of five minutes to establish the baseline volumetric flow rate.

b. Take each actual volumetric flow rate measurement described in Paragraph 38(a) at a location in the duct work downstream of the furnace hood that is representative of the actual volumetric flow rate without the interference of leaks, the introduction of ambient air for cooling, or ducts manifolded from other hoods.

c. If the capture and collection system is equipped with a dilution damper, ensure that the damper is completely open during each actual volumetric flow rate measurement. The volumetric flow rate measurement may be taken at the maximum open operating position, provided that the Applicable Company either installs a physical stop or programs a logic stop to prevent opening beyond the maximum open operating position.

d. Measure and record the capture and collection system's fan revolutions per minute ("RPM"). Take three measurements with at least five minutes between each measurement, then average the three measurements.

Where physical constraints of the existing ductwork or worker safety concerns do not allow an Applicable Company to measure the actual volumetric flow rate in accordance with the methodologies prescribed in EPA Reference Methods 1 and 2, or the requirements of subparagraph b of this Paragraph, the Applicable Company may submit a written proposal to the Applicable EPA Region and Applicable Co-Plaintiff to measure the actual volumetric flow rate in an alternate location, and may measure the actual volumetric flow rate in the proposed location with the approval of the Applicable EPA Region, after the Applicable EPA Region's consultation with the Applicable Co-Plaintiff.

39. For each source and emission unit listed in Paragraph 45 of this Consent Decree, the Applicable Company shall, within 90 days after the Effective Date, measure and record the capture and collection system's fan RPM using the procedure set forth in Paragraph 38.d. The Applicable Company shall take this measurement at a time when the baseline volumetric flow rate into the capture and collection system (determined as set forth in Paragraph 38 of this Consent Decree) meets or exceeds the baseline volumetric flow rate recorded during the

performance test for that source or emission unit. In the NOCSR it submits pursuant to Paragraph 56, the Applicable Company shall include the results of such measurement and supporting documentation. For any source or emission unit subject to this Paragraph that is not in operation as of the Effective Date, the Applicable Company must meet the requirements of this Paragraph within 90 days after the date of startup of such source or emission unit.

40. Air Curtain Static Pressure. During each performance test conducted pursuant to Paragraph 44 of this Consent Decree, for any source or emission unit located at a Covered Facility that utilizes an air curtain to meet the minimum exhaust rate as described in Paragraph 31, the Applicable Company shall measure and record the static pressure of the air curtain at a location where the air flow is not cyclonic. The Applicable Company shall average three measurements to establish the baseline static pressure.

41. For each source and emission unit listed in Paragraph 45 of this Consent Decree that utilizes an air curtain to meet the minimum exhaust rate as described in Paragraph 31, the Applicable Company shall, within 90 days after the Effective Date, measure and record the static pressure of the air curtain at a location where the air flow is not cyclonic, while the air curtain is operating as it did during the performance test of that source or emission unit. The Applicable Company shall average three measurements to establish the baseline static pressure. In the NOCSR it submits pursuant to Paragraph 56, the Applicable Company shall include the baseline static pressure established, supporting documentation, and a certification that during such measurement the air curtain was operating as it did during the performance test of that source or emission unit. For any source or emission unit subject to this Paragraph that is not in operation as of the Effective Date, the Applicable Company must meet the requirements of this Paragraph within 90 days after the date of startup of such source or emission unit.

42. Capture and Collection System Compliance Information. At the same time it submits a Performance Test Report pursuant to Paragraph 50 of this Consent Decree, each Applicable Company shall also submit the following information to the Applicable EPA Region and the Applicable Co-Plaintiff:

a. A certification that the modifications made to the capture and collection system are as described in the CCSIP;

b. Photographs of each modification for which photographs were not included in the CCSIP;

c. Calculations generating the minimum exhaust rate for the capture and collection system, using one of the methods described in Paragraph 31 or 32 of this Consent Decree;

d. A diagram indicating the location in which each actual volumetric flow rate measurement was taken; and

e. The results of the actual volumetric flow rate measurement taken pursuant to Paragraph 38 of this Consent Decree that demonstrate that the baseline volumetric flow rate meets or exceeds the calculated minimum exhaust rate.

43. If EPA, within 30 days after receipt of the information set forth in the previous Paragraph and after consultation with the Applicable Co-Plaintiff, notifies an Applicable Company in writing that the Applicable Company has failed to demonstrate a capture and collection system's compliance with Paragraph 31 or 32 of this Consent Decree and describes such failure, the Applicable Company shall submit to the Applicable EPA Region and the Applicable Co-Plaintiff revised information, in accordance with the requirements of the previous Paragraph, demonstrating the capture and collection system's compliance with Paragraph 31 or

32 of this Decree. If EPA, within 30 days after its receipt of the resubmittal and after consultation with the Applicable Co-Plaintiff, notifies the Applicable Company of any remaining deficiency in its attempted demonstration of compliance and describes such deficiency, the Applicable Company shall address such deficiency in accordance with this Paragraph.

C. PERFORMANCE TESTING

44. Within one year after the Effective Date, each Applicable Company shall conduct a performance test in accordance with 40 C.F.R. §§ 63.1511 and 63.1512 of each affected source and emission unit at its respective Covered Facility that is subject to an emission standard set forth in 40 C.F.R. § 63.1505 to demonstrate compliance with each such standard, with the exception of the sources and emission units listed in Paragraph 45.

45. The following sources and emission units have been tested in accordance with the requirements of Section V.C of this Consent Decree, prior to the Effective Date of this Decree:

Chicago Heights rotary furnaces #1, 2 (for D/F, HCl only)
Coldwater reverberatory furnaces #1N, 7N, 8N, 7S
Coldwater rotary furnaces #1S, 2S
Coldwater scrap dryers #N, S
Coldwater shredder
Friendly (Alumitech) rotary furnace #1
Goodyear rotary furnaces #1, 2
Lewisport in-line fluxer
Loudon rotary furnaces #1, 2, 3
Morgantown rotary furnaces #1, 2, 3, 4, 5, 6
Morgantown shredder
Post Falls rotary furnace #3
Saginaw reverberatory furnaces #1, 2, 3
Sapulpa rotary furnace #5

Accordingly, the requirements of Paragraphs 46 through 55 shall not apply to the Applicable Companies with respect to these sources and emission units.

46. Notification of Testing. No less than 60 days prior to the first day of a

performance test to be conducted pursuant to Paragraph 44 of this Consent Decree, the Applicable Company shall submit a notification of intention to conduct a performance test to the Applicable EPA Region and the Applicable Co-Plaintiff. The notification shall identify the name of the facility, the time and date of the test, and the persons conducting the test, and shall include a copy of the proposed site-specific test plan that meets the following requirements:

a. A performance test of a rotary furnace at a major source shall be conducted in accordance with a site-specific test plan that takes the form of the model test protocol attached as Appendix B to this Consent Decree.

b. A performance test of a rotary furnace at an area source shall be conducted in accordance with a site-specific test plan that takes the form of the model test protocol attached as Appendix C to this Consent Decree.

c. A performance test of a batch-fed reverberatory furnace shall be conducted in accordance with a site-specific test plan that takes the form of the model test protocol attached as Appendix D to this Consent Decree.

d. A performance test of a commonly ducted reverberatory furnace and thermal chip dryer shall be conducted in accordance with a site-specific test plan that takes the form of the model test protocol attached as Appendix E to this Consent Decree.

e. A performance test of a commonly ducted reverberatory furnace and delacquering kiln shall be conducted in accordance with a site-specific test plan that takes the form of the model test protocol attached as Appendix F to this Consent Decree.

f. A performance test of an uncontrolled reverberatory furnace at the Lewisport facility shall be conducted in accordance with a site-specific test plan that takes the form of the model test protocol attached as Appendix G to this Consent Decree.

g. A performance test of any other furnace, shredder, delacquering kiln, thermal chip dryer, in-line fluxer, or rotary dross cooler shall be conducted in accordance with a site-specific test plan that meets the requirements of 40 C.F.R. §§ 63.7(c) and 63.1511(a).

h. For any performance test of an uncontrolled furnace or uncontrolled in-line fluxer for which an Applicable Company claims that representative testing is appropriate, that Applicable Company shall include information in its site-specific test plan demonstrating that the furnace or in-line fluxer meets the requirements of 40 C.F.R. § 63.1511(f), as in the model test protocol attached as Appendix G to this Consent Decree.

Notwithstanding the foregoing, if the Applicable EPA Region, after consultation with the Applicable Co-Plaintiff, agrees in writing upon the written request of the Applicable Company, the notification period set forth in this Paragraph may be reduced to less than 60 days.

47. Charge Material Reports. Prior to a performance test conducted pursuant to Paragraph 44 of this Consent Decree, the Applicable Company shall submit to the Applicable EPA Region and the Applicable Co-Plaintiff a Charge Material Report that takes the form of the model Charge Material Report attached as Appendix H to this Decree. The Charge Material Report shall identify the charge material to be processed during the performance test, provide targeted production rates for that charge material, and provide a short narrative explaining why the charge material is representative of those materials processed in the affected source or emission unit which are likely to generate the highest emissions.

48. Testing. During a performance test conducted pursuant to Paragraph 44 of this Consent Decree, the Applicable Company shall (a) operate the affected source or emission unit as set forth in its site-specific test plan; (b) use charge material that is representative of those materials processed in the source or emission unit which are likely to generate the highest

emissions; (c) record the lime injection rate in pounds per hour after each test run and take the average of the three test runs to establish a lime injection rate parameter for that source or emission unit; and (d) ensure that the source or emission unit's capture and collection system effectively captures emissions and transfers them into the hood and meets the other requirements of 40 C.F.R. § 63.1506(c).

49. During any performance test conducted pursuant to Paragraph 44 of this Consent Decree at a Covered Facility listed in Paragraph 25 of this Decree, the Applicable Company shall measure HCl emissions to confirm that its respective Covered Facility is properly classified as an area source as defined in Section 112(a)(2) of the Act, 42 U.S.C. § 7412(a)(2), and the federal, state, and local regulations promulgated pursuant to the Act.

50. Performance Test Reports. Within 60 days after the completion of a performance test conducted pursuant to Paragraph 44, the Applicable Company shall submit to the Applicable EPA Region and the Applicable Co-Plaintiff a Performance Test Report that includes, *inter alia*, the baseline flow rate and fan RPM established pursuant to Paragraph 38, the baseline static pressure for each air curtain established pursuant to Paragraph 40 (if applicable), and supporting documentation.

51. Potential-to-Emit Analyses. Within 60 days after the completion of performance testing conducted pursuant to Paragraph 44 of this Consent Decree at a Covered Facility listed in Paragraph 25 of this Decree, the Applicable Company shall submit to the Applicable EPA Region and the Applicable Co-Plaintiff a complete HCl potential-to-emit analysis for its respective Covered Facility that takes the form of the Model Potential-to-Emit Analysis attached as Appendix L to this Decree. As part of this potential-to-emit analysis for any such Covered Facility that includes an Idle Unit, the Applicable Company shall either (a) include potential

emissions from the Idle Unit, and, if the Idle Unit is a delacquering kiln or scrap dryer equipped with an afterburner, submit documentation demonstrating that the afterburner meets the design and operational requirements of 40 C.F.R. § 63.1505(e), if the Applicable Company intends for the delacquering kiln or scrap dryer to comply with the emission standards set forth in 40 C.F.R. § 63.1505(e) if brought online; or (b) submit documentation demonstrating that the Applicable Company has submitted a written request to the applicable permitting authority to remove the Idle Unit from all applicable air permits.

52. If an Applicable Company's potential-to-emit analysis demonstrates that its Covered Facility listed in Paragraph 25 of this Consent Decree has been improperly classified as an area source as that term is defined in Section 112(a)(2) of the Act, 42 U.S.C. § 7412(a)(2), that Applicable Company shall take the following measures:

a. Within 90 days after that Applicable Company's submission of the potential-to-emit analysis, the Applicable Company shall conduct a performance test in accordance with 40 C.F.R. §§ 63.1511 and 63.1512 of each affected source and emission unit at the relevant Covered Facility to demonstrate compliance with the applicable emission standard for each pollutant for which testing was not previously conducted pursuant to this Consent Decree. This performance testing shall be conducted in accordance with the notification, testing, and reporting requirements of Section V.C of this Decree.

b. Within 270 days after that Applicable Company's submission of the potential-to-emit analysis pursuant to Paragraph 51, its Covered Facility shall comply with all requirements for major sources pursuant to 40 C.F.R. Part 63, Subparts A and RRR.

c. Within 180 days after that Applicable Company submission of the potential-to-emit analysis pursuant to Paragraph 51, that Applicable Company shall submit to the applicable permitting authority an application for a Title V, Part 70 operating permit for its relevant Covered Facility, with a copy of the cover letter accompanying the application submitted simultaneously to the Applicable EPA Region.

d. If corrective action is required to meet the applicable emission limits for major sources subject to Subpart RRR, the Applicable Company shall submit a Corrective Action Plan to EPA Region 4, the Applicable EPA Region and the Applicable Co-Plaintiff within 90 days after that Applicable Company's submission of the potential-to-emit analysis pursuant to Paragraph 51. The Corrective Action Plan shall include provisions for the design, installation, and testing of any required pollution control equipment, a description of any modification of operating practices and a proposed schedule to meet the requirements of (a) through (c) above. Within 180 days after the submission of the Corrective Action Plan, that Applicable Company shall complete the performance testing, permitting and compliance requirements in (a) through (c) above, unless the Applicable EPA Region, after consultation with the Applicable Co-Plaintiff, agrees in writing to an extension of time.

53. If EPA, within 30 days after receipt of the Performance Test Report and after consultation with the Applicable Co-Plaintiff, notifies the Applicable Company in writing of any deficiency in the Applicable Company's Performance Test Report and describes the deficiency, that Applicable Company shall correct each such deficiency and submit a revised Performance Test Report to the Applicable EPA Region and the Applicable Co-Plaintiff within 30 days after the date of notification by EPA.

54. If EPA, within 30 days after receipt of the Performance Test Report and after consultation with the Applicable Co-Plaintiff, notifies the Applicable Company in writing of any deficiency in the Applicable Company's performance test and describes the deficiency, that

Applicable Company shall correct each such deficiency, submit a revised site-specific test plan to the Applicable EPA Region and the Applicable Co-Plaintiff, and retest the source or emission unit within 90 days after the date of notification by EPA.

55. Failure to Demonstrate Compliance. If an affected source or emission unit tested pursuant to Paragraph 44 exceeds any applicable emission standard set forth in 40 C.F.R. § 63.1505 during the performance test, the Applicable Company shall take the following measures:

a. Within 30 days after the Applicable Company submits its Performance Test Report pursuant to Paragraph 50 of this Consent Decree, that Applicable Company shall submit a Corrective Action Plan to the Applicable EPA Region and the Applicable Co-Plaintiff. The Corrective Action Plan shall include a description of all actions taken or to be taken to achieve and maintain compliance at the source or emission unit and, with respect to actions not already completed, the schedule for their implementation.

b. Within 90 days after the submission of the Corrective Action Plan, that Applicable Company shall complete all corrective action specified therein, submit a revised site-specific test plan to the Applicable EPA Region and the Applicable Co-Plaintiff no less than 30 days prior to the first day of retesting, and retest the source or emission unit, unless EPA, after consultation with the Applicable Co-Plaintiff, agrees in writing to an extension of time.

c. Within 60 days after the completion of retesting, the Applicable Company shall submit a Performance Test Report to the Applicable EPA Region and the Applicable Co-Plaintiff as provided in Paragraph 50.

d. If EPA, after consultation with the Applicable Co-Plaintiff, notifies an Applicable Company in writing of any deficiency in that Applicable Company's retesting or its corresponding Performance Test Report within 30 days after EPA's receipt of the Performance Test Report for that retesting and describes the deficiency, that Applicable Company shall correct each deficiency and submit a revised Performance Test Report to the Applicable EPA Region and the Applicable Co-Plaintiff as provided in Paragraph 50.

e. If the Corrective Action Plan submitted by the Applicable Company pursuant to this Paragraph provides for retesting of an affected source or emission unit with a different blend or type of charge material than that used during the failed performance test, that Applicable Company shall not thereafter process, in that source or emission unit, the blend or type of charge material from a specific supplier processed in the proportion processed during the failed performance test, unless and until the Applicable Company conducts a new performance test of the source or emission unit using that blend or type of charge material in such proportion in which it demonstrates compliance with the applicable emission standards set forth in 40 C.F.R. § 63.1505. Within 30 days after the submission of the Corrective Action Plan pursuant to this Paragraph, the Applicable Company shall amend its Operation, Maintenance, and Monitoring Plan ("OM&M Plan") to prohibit the processing of that blend or type of charge material in such proportion in that source or emission unit, except as provided in this subparagraph, above. The Applicable Company shall thereafter certify in its semiannual report for its Covered Facility, submitted pursuant to 40 C.F.R. § 63.1516(b), that the prohibited charge material was not processed in that source or emission unit, except as provided in this subparagraph, above.

56. Notification of Compliance Status Reports. Each Applicable Company shall submit to the Applicable EPA Region and the Applicable Co-Plaintiff a revised Notification of Compliance Status Report ("NOCSR") for its respective Covered Facility or Facilities that meets

the requirements of 40 C.F.R. § 63.1515(b), within 90 days after the latest of the following five dates:

a. The Effective Date;

b. The date of completion of all capture and collection system improvements made pursuant to Paragraph 37 of this Consent Decree;

c. The date of completion of capture and collection system fan RPM measurement pursuant to Paragraph 39 for all affected sources and emission units at that Covered Facility;

d. The date of completion of air curtain static pressure measurement pursuant to Paragraph 41 for all affected sources and emission units at that Covered Facility; or

e. The date of completion of performance testing pursuant to Paragraph 44 of this Consent Decree for which EPA has not notified the Applicable Company, pursuant to Paragraph 53 or 54, of any deficiency, and in which that Applicable Company has demonstrated compliance with the applicable emission standards set forth in 40 C.F.R. § 63.1505, for all affected sources and emission units at that Covered Facility.

Each NOCSR submitted pursuant to this Paragraph shall include an OM&M Plan and Startup, Shutdown and Malfunction Plan (“SSMP”) that meet the requirements of Paragraph 57 of this Decree.

D. OPERATING, MONITORING, AND RECORDKEEPING

57. OM&M Plans and SSMPs. Starting no later than 90 days after the completion of a performance test pursuant to Paragraph 44 of this Consent Decree for which EPA has not notified the Applicable Company, pursuant to Paragraph 53 or 54, of any deficiency in its performance test or Performance Test Report, and in which that Applicable Company has

demonstrated compliance with the applicable emission standards set forth in 40 C.F.R. § 63.1505, that Applicable Company shall maintain an OM&M Plan and SSMP for its Covered Facility that meet the requirements of 40 C.F.R. §§ 63.1510(b), 63.6(e)(3), and 63.1516(a), and that are updated to reflect the results of the relevant performance test. Starting at the Effective Date, the Applicable Companies for the Goodyear, Coldwater, Friendly (Alumitech), and Saginaw facilities shall maintain an OM&M Plan and SSMP for their respective Covered Facilities that meet the requirements of 40 C.F.R. §§ 63.1510(b), 63.6(e)(3), and 63.1516(a), and that are updated to reflect the results of the relevant performance tests conducted prior to the Effective Date. Each OM&M Plan and SSMP shall take the form of the model OM&M Plan and SSMP attached as Appendix I to this Consent Decree, unless the Applicable EPA Region, after consultation with the Applicable Co-Plaintiff, agrees in writing to modifications upon the written request of the Applicable Company.

58. Capture and Collection Systems. Each Applicable Company shall, once per month, measure and record the fan RPM using the procedure set forth in Paragraph 38.d for each capture and collection system at its Covered Facility or Facilities and verify that the fan RPM meets or exceeds the level established during the actual flow rate measurement performed pursuant to Paragraph 38 or 39 of this Consent Decree at that capture and collection system. An Applicable Company may submit a written proposal to the Applicable EPA Region and Applicable Co-Plaintiff for an alternative to the measurement of fan RPM required by this Paragraph, and may use such alternative with the written approval of the Applicable EPA Region, after the Applicable EPA Region's consultation with the Applicable Co-Plaintiff.

59. For any affected source or emission unit at which a door or other opening must be equipped with an air curtain to meet the minimum exhaust rate as described in Paragraph 31, the

air curtain shall operate at all times during Unit Operation when the door or other opening is open.

60. Each Applicable Company shall inspect each curtain that is part of a capture and collection system at its respective Covered Facility or Facilities once per month, and repair or replace each curtain at which deterioration or wear has caused the area of openings in the capture and collection system to be greater than the area measured for the calculations performed pursuant to Paragraph 31 or 32 of this Consent Decree. Each Applicable Company shall record the results of each inspection and shall maintain records of each inspection, repair, and replacement.

61. Once per quarter, each Applicable Company shall, for each air curtain that is part of a capture and collection system at its respective Covered Facility or Facilities and that is utilized to meet the minimum exhaust rate as described in Paragraph 31 of this Consent Decree, (a) visually inspect the air curtain to ensure that it is operating as designed; and (b) measure the static pressure of the air curtain (taking the average of three measurements) to demonstrate that the static pressure meets or exceeds the baseline static pressure established pursuant to Paragraph 40 or 41 of this Consent Decree. Each Applicable Company shall record the results of, and maintain records of, each inspection.

62. Starting on the Effective Date of this Consent Decree, each Applicable Company shall inspect each capture and collection system at its respective Covered Facility or Facilities at least once per year to ensure that it is operating in accordance with the operating requirements in 40 C.F.R. § 63.1506(c). As part of the annual inspection, for purposes of this Decree, each Applicable Company shall do the following:

a. Perform, and record the results of, an inspection of the integrity of the entire capture and collection system that includes a visual inspection. In inspecting the integrity of the capture and collection system, each Applicable Company shall make a good faith effort to place an emphasis on those parts of the system that are more likely to deteriorate (e.g., elbows and saddles).

b. Measure the area of any openings in the capture and collection system to verify that the area of the openings is no greater than the area measured for the calculations performed pursuant to Paragraph 31 or 32 of this Consent Decree. If such measurements indicate that the area of the openings is greater than the area measured for the calculations performed pursuant to Paragraph 31 or 32, the Applicable Company shall recalculate the minimum exhaust rate to confirm its compliance with Paragraph 31 or 32.

c. Verify, for any capture and collection system using the method described in Paragraph 31.a, that the associated source or emission unit continues to be enclosed to the maximum extent technically and practically feasible, allowing for operational and safety considerations.

d. Verify that the fan RPM meets or exceeds the level established pursuant to Paragraph 38 or 39 of this Consent Decree and recorded in the OM&M Plan. If the fan RPM is found to be below the fan RPM established pursuant to Paragraph 38 or 39, the Applicable Company shall, as expeditiously as practicable in accordance with good air pollution control practices for minimizing emissions, determine the likely cause of the lower fan RPM, take corrective action as necessary, and measure the fan RPM again. Such Applicable Company shall repeat the procedures set forth in the previous sentence until the fan RPM meets or exceeds the level established pursuant to Paragraph 38 or 39. Each Applicable Company shall maintain records of all fan RPM measurements and corrective actions taken.

63. Within 30 months after the flow rate measurement conducted pursuant to Paragraph 38 of this Consent Decree, and every 30 months thereafter, each Applicable Company shall measure the actual volumetric flow rate into each capture and collection system at its respective Covered Facility or Facilities, in accordance with the methodologies prescribed in EPA Reference Methods 1 and 2 (and EPA Reference Methods 3 and 4 if needed) contained in 40 C.F.R. Part 60, Appendix A, and the requirements of Paragraph 38, to demonstrate that the baseline volumetric flow rate meets or exceeds the calculated minimum exhaust rate for the capture and collection system. Where physical constraints of the existing ductwork or worker safety concerns do not allow an Applicable Company to measure the actual volumetric flow rate in accordance with the methodologies prescribed in EPA Reference Methods 1 and 2, or the requirements of Paragraph 38.b of this Consent Decree, the Applicable Company may submit a written proposal to the Applicable EPA Region and Applicable Co-Plaintiff to measure the actual volumetric flow rate in an alternate location, and may measure the actual volumetric flow rate in the proposed location with the approval of the Applicable EPA Region, after the Applicable EPA Region's consultation with the Applicable Co-Plaintiff.

64. Lime Injection Rate. Each Applicable Company shall measure the lime injection rate in pounds per hour at each control device at its respective Covered Facility or Facilities every two months (or, if the control device is equipped with a Triboelectric flow meter, every four months) using the method used during the performance test conducted pursuant to Paragraph 44 of this Consent Decree. This lime injection rate measurement requirement shall not apply with respect to any control device for which the Applicable Company uses load cells to continuously measure the weight of lime injected. If the lime injection rate is found to be below the average rate established during the performance test conducted pursuant to Paragraph 44, the

Applicable Company shall, as expeditiously as practicable in accordance with good air pollution control practices for minimizing emissions, determine the likely cause of the parameter deviation, take corrective action as necessary, and measure the lime injection rate again. Such Applicable Company shall repeat the procedures set forth in the previous sentence until the lime injection rate is measured at or above the average rate established during the performance test. Each Applicable Company shall maintain records of all lime injection rates measured and corrective actions taken.

E. IDLE UNITS

65. The requirements of Paragraphs 34, 37, 39, 41, 44, 58, 60, 61, 62, 63, and 64 of this Consent Decree shall not apply with respect to any Idle Unit at a Covered Facility during the period that the source or emission unit is an "Idle Unit" as defined in Paragraph 26.v of this Decree.

66. Within 180 days after the date of startup of any Idle Unit brought online after the Effective Date of this Consent Decree, or within 12 months after the Effective Date, whichever is later, the Applicable Company shall take the following measures, unless such measures have already been taken pursuant to this Consent Decree:

a. Demonstrate the Idle Unit's compliance with the requirements of Section V.B, Paragraphs 31 through 33 and 38 through 42 of this Consent Decree; and

b. Conduct a performance test of the Idle Unit in accordance with 40 C.F.R. §§ 63.1511 and 63.1512 to demonstrate compliance with each applicable emission standard. This performance testing shall be conducted in accordance with the notification, testing, and reporting requirements of Section V.C of this Consent Decree.

F. REPORTING

67. Semiannual Reports. Each Applicable Company shall submit semiannual reports pursuant to 40 C.F.R. § 63.1516(b) in the form of the model semiannual report attached as Appendix J to this Consent Decree.

68. Quarterly Reports. Within two months after the end of each calendar-year quarter (i.e., by May 31, August 31, November 30, and February 28) after the Effective Date, until termination of this Decree pursuant to Section XVII, each Applicable Company shall submit to the United States, the Applicable EPA Region, and the Applicable Co-Plaintiff a quarterly report for the preceding quarter that shall include the following information for its Covered Facility or Facilities:

a. The status of all modifications, performance tests, permit applications, and other measures taken in accordance with the requirements of this Consent Decree;

b. A description of any noncompliance with the requirements of this Consent Decree, and an explanation of the noncompliance’s likely cause and of a the remedial steps taken, or to be taken, to prevent or minimize such noncompliance;

c. Except for startup, shutdown, and malfunction events and failures whose combined duration is less than one percent of the total operating time during the reporting period, a description of any failure to operate in accordance with an established monitoring parameter under 40 C.F.R. § 63.1510 for an affected source or emission unit at a Covered Facility that occurs after the performance test conducted pursuant to Paragraph 44 of this Consent Decree at that source or emission unit, and an explanation of the likely cause and of the remedial steps taken, or to be taken, to prevent or minimize such failure; and

d. A certification that, with the exception of any noncompliance or failure described pursuant to this Paragraph, each Applicable Company has complied with this Consent Decree and 40 C.F.R. Part 63, Subparts A and RRR at its respective Covered Facility or Facilities.

69. If the cause of a noncompliance or failure cannot be fully explained at the time the Quarterly Report is due, an Applicable Company shall so state in its report. The Applicable Company shall investigate the cause of such noncompliance, and shall then submit to the United States an amendment to the Quarterly Report, including a full explanation of the cause of the noncompliance, within 30 days after the day the Applicable Company becomes aware of the cause of the noncompliance. Nothing in this Paragraph or the following Paragraph relieves any Applicable Company of its obligation to provide the notice required by Section VIII of this Consent Decree (Force Majeure), if required.

70. Whenever any violation of this Consent Decree or any other event affecting an Applicable Company's performance under this Decree, or the performance of its Covered Facility, may pose an immediate threat to the public health or welfare or the environment, that Applicable Company shall notify the Applicable EPA Region and the Applicable Co-Plaintiff orally or by electronic or facsimile transmission as soon as possible, but no later than 24 hours after the Applicable Company first knew of the violation or event.

71. Each Quarterly Report submitted by an Applicable Company pursuant to Paragraph 68 shall be signed by an official of that Applicable Company and include the following certification:

> I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the

> information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

This certification requirement does not apply to emergency or similar notifications where compliance would be impractical.

72. Except as otherwise provided in Paragraph 46 of this Consent Decree, the reporting requirements of this Consent Decree do not relieve any Applicable Company of any reporting obligations required by the Clean Air Act or implementing regulations, or by any other federal, state, or local law, regulation, permit, or other requirement.

73. Any information provided pursuant to this Consent Decree may be used by the Plaintiffs in any proceeding to enforce the provisions of this Consent Decree and as otherwise permitted by law.

G. PERMITS

74. Where any compliance obligation under this Section requires an Applicable Company to obtain a federal, state, or local permit or approval for its Covered Facility, that Applicable Company shall submit timely and complete applications and take all other actions necessary to obtain all such permits or approvals. The Applicable Company may seek relief under the provisions of Section VIII of this Consent Decree (Force Majeure) for any delay in the performance of any such obligation resulting from a failure to obtain, or a delay in obtaining, any permit or approval required to fulfill such obligation, if that Applicable Company has submitted timely and complete applications and has taken all other actions necessary to obtain all such permits or approvals.

H. PERMANENT SHUTDOWN

75. Each Applicable Company shall provide written notice of the permanent shutdown of its Covered Facility, or the permanent shutdown of any source or emission unit subject to Subpart RRR at its Covered Facility, to the United States, the Applicable EPA Region, and the Applicable Co-Plaintiff. For purposes of this Paragraph, "permanent shutdown" shall mean that the Applicable Company has surrendered the air permits for the Covered Facility or for the relevant source or emission unit. Upon submission of a notice of the permanent shutdown of a Covered Facility, the requirements of Section V, with the exception of this Paragraph, shall not apply to the Applicable Company with respect to that Covered Facility. Upon submission a notice of the permanent shutdown of a specific source or emission unit subject to Subpart RRR at a Covered Facility, the requirements of Section V, with the exception of this Paragraph, shall not apply to the Applicable Company with respect to that specific source or emission unit at that Covered Facility.

VI. CIVIL PENALTY

76. In settlement and satisfaction of the claims set forth in Paragraph 119, the civil penalties assessed against Aleris International, Inc., on behalf of the Companies, shall be fixed in the amount of $4,600,000.

77. The amount of civil penalties set forth in Paragraph 76 shall be allowed as prepetition general unsecured claims in the Bankruptcy Case in favor of the respective Plaintiffs in the following amounts:

a. $2,300,000 for the United States.

b. $133,296 for the State of Idaho.

c. $133,296 for the State of Illinois.

d. $133,296 for the State of Indiana.

e. $521,420 for the Commonwealth of Kentucky.

f. $133,296 for the Maricopa County Air Quality Department.

g. $233,920 for the State of Michigan.

h. $334,545 for the State of Ohio.

i. $162,045 for the Oklahoma Department of Environmental Quality.

j. $205,170 for the State of Tennessee.

k. $162,045 for the Commonwealth of Virginia.

l. $147,671 for the State of West Virginia.

Such claims shall be treated in the same manner as other general unsecured claims and shall not be subject to discrimination or subordination.

78. All payments made pursuant to this Section shall be made in accordance with a plan or plans of reorganization approved by the United States Bankruptcy Court for the District of Delaware. The Companies shall not propose any plan of reorganization or take any other action in the Bankruptcy Case that is inconsistent with the terms or provisions of this Consent Decree. Plaintiffs shall not oppose any term or provision of a plan of reorganization filed by the Companies that is addressed by this Consent Decree. The Parties reserve all other rights and defenses they may have with respect to any plan of reorganization filed by the Companies.

79. All cash payments to the United States pursuant to this Section shall be made by FedWire Electronic Funds Transfer ("EFT") to the United States Department of Justice in accordance with written instructions to be provided to Aleris International, Inc., following lodging of the Consent Decree, by the Financial Litigation Unit of the U.S. Attorney's Office for the Northern District of Ohio. At the time of payment, Aleris International, Inc. shall send a

copy of the EFT authorization form and the EFT transaction record, together with a transmittal letter, which shall state that the payment is for the civil penalty owed pursuant to the Consent Decree in United States et al. v. Aleris International, Inc. et al., and shall reference the civil action number and DOJ Case Number 90-5-2-1-08603, to the United States in accordance with Section XIII of this Decree (Notices); by email to acctsreceivable.CINWD@epa.gov; and by mail to:

EPA Cincinnati Finance Office
26 Martin Luther King Drive
Cincinnati, OH 45268.

80. All non-cash distributions to the United States pursuant to this Section shall be made to the United States Department of Justice in accordance with written instructions to be provided to Aleris International, Inc., following lodging of the Consent Decree, by the Financial Litigation Unit of the U.S. Attorney's Office for the Northern District of Ohio.

81. All cash payments to the Co-Plaintiffs pursuant to this Section shall be made by certified or cashier's check according to the instructions set forth in Section XIII (Notices) and Appendix M to this Consent Decree.

82. All non-cash distributions to the Co-Plaintiffs pursuant to this Section shall be made in accordance with instructions provided by each Co-Plaintiff following lodging of the Consent Decree.

83. The Companies shall not deduct any penalties paid under this Decree pursuant to this Section or Section VII (Stipulated Penalties) in calculating their federal or state income tax.

VII. STIPULATED PENALTIES

84. Subject to the provisions of Paragraph 3 of this Consent Decree, each Applicable Company shall severally be liable for stipulated penalties for violations of this Decree at its

respective Covered Facility or Facilities as specified below, unless excused under Section VIII (Force Majeure). A violation includes failing to perform any obligation required by the terms of this Decree, including any work plan or schedule approved under this Decree, according to all applicable requirements of this Decree and within the specified time schedules established by or approved under this Decree.

85. Specific Obligations of Aleris International, Inc. If Aleris International, Inc. fails (a) to timely comply with the requirements of Paragraph 27 of this Consent Decree with respect to the Morgantown facility; (b) to timely submit to the Applicable EPA Regions and the Applicable Co-Plaintiffs complete documentation and certification required by Paragraph 30 of this Decree; or (c) to timely submit a CCSIP to the United States, and each portion of the CCSIP that concerns a particular Covered Facility to the Applicable EPA Region and Applicable Co-Plaintiff for that Covered Facility, pursuant to Paragraph 34 of this Decree, the following stipulated penalties shall accrue per violation per day against Aleris International, Inc.:

Penalty Per Day	Period of Noncompliance
$1,000	1st through 15th day
$2,000	16th through 30th day
$4,000	31st day and beyond

86. Permitting. For each failure by an Applicable Company to timely submit to the applicable permitting authority a permit application for its Covered Facility as required by Paragraph 29 or 52, the following stipulated penalties shall accrue per violation per day against that Applicable Company for that Covered Facility:

Penalty Per Violation Per Day	Period of Noncompliance
$1,000	1st through 15th day

$2,000	16th through 30th day
$4,000	31st day and beyond

87. Capture and Collection System Compliance Information. For each third successive submission by an Applicable Company, or any subsequent submission by that Applicable Company, for a capture and collection system at its Covered Facility pursuant to Paragraph 43 of this Consent Decree that fails to demonstrate the system's compliance with 40 C.F.R. § 63.1506(c), such Applicable Company shall pay a stipulated penalty of $5,000.

88. Area Source Classification. Where a potential-to-emit analysis pursuant to Paragraph 51 of this Consent Decree demonstrates that an Applicable Company's Covered Facility has been improperly classified as an area source, a stipulated penalty of $15,000 shall accrue against that Applicable Company for each such Covered Facility.

89. Emission Standards. If an emission unit exceeds an applicable emission standard for a pollutant as set forth in 40 C.F.R. § 63.1505 during a performance test conducted pursuant to Paragraph 44 of this Consent Decree, the following stipulated penalties shall accrue per pollutant, except that no stipulated penalty shall accrue pursuant to this Paragraph if the blend or type of charge material from a specific supplier used during the performance test has not been processed in such proportion in that emission unit at any time prior to the performance test:

Penalty Per Pollutant	Percent Above Standard
$3,000	0.01 - 10%
$6,000	10.01 - 50%
$12,000	50.01 - 100%
$18,000	> 100%

90. Charge Material. If an Applicable Company at a Covered Facility processes any

charge material that has been expressly prohibited from processing in that affected source or emission unit pursuant to Paragraph 55.e of this Consent Decree, a stipulated penalty of $10,000 per day shall accrue against that Applicable Company for that Covered Facility.

91. Operating and Monitoring Parameters. For each failure by an Applicable Company to operate in accordance with an operating or monitoring parameter required under 40 C.F.R. § 63.1510 for an affected source or emission unit at its Covered Facility that occurs after the date a revised NOCSR must be submitted pursuant to Paragraph 56 of this Consent Decree at that source or emission unit, the following stipulated penalties shall accrue per violation per day against that Applicable Company for that Covered Facility:

Penalty Per Violation Per Day	Period of Noncompliance
$500	1st through 15th day
$1,000	16th through 30th day
$2,000	31st day and beyond

92. For each failure by an Applicable Company to comply with any requirement of this Consent Decree not specifically referenced in Paragraphs 85 through 91 within the specified time schedules established by this Decree, the following stipulated penalties shall accrue per violation per day against that Applicable Company for that Covered Facility:

Penalty Per Violation Per Day	Period of Noncompliance
$500	1st through 15th day
$1,000	16th through 30th day
$2,000	31st day and beyond

93. Stipulated penalties under this Section shall begin to accrue on the day after performance is due or on the day a violation occurs, whichever is applicable, and shall continue

to accrue until performance is satisfactorily completed or until the violation ceases. Stipulated penalties shall accrue separately for separate violations of this Consent Decree.

94. An Applicable Company shall pay stipulated penalties to the United States and the Applicable Co-Plaintiff within 30 days of receiving a written demand by either Plaintiff. The Applicable Company shall pay 50 percent of the total stipulated penalty amount due to the United States and 50 percent to the Applicable Co-Plaintiff. The Plaintiff making a demand for payment of a stipulated penalty shall simultaneously send a copy of the demand to the United States or the Applicable Co-Plaintiff, as appropriate.

95. Any Plaintiff may, in the unreviewable exercise of its discretion, reduce or waive stipulated penalties otherwise due it under this Consent Decree.

96. Stipulated penalties shall continue to accrue as provided in Paragraph 93, above, during any Dispute Resolution, but need not be paid until the following:

a. If the dispute is resolved by agreement or by a decision of EPA that is not appealed to the Court, the Applicable Company shall pay accrued penalties determined to be owing, together with interest, within 30 days after the effective date of the agreement or the receipt of EPA’s decision or order.

b. If the dispute is appealed to the Court and the United States prevails in whole or in part, the Applicable Company shall pay all accrued penalties determined by the Court to be owing, together with interest, within 60 days after receiving the Court’s decision or order, except as provided in subparagraph (c), below.

c. If any Party appeals the Court’s decision, the Applicable Company shall pay all accrued penalties determined to be owing, together with interest, within 15 days after receiving the final appellate court decision.

97. Obligations Prior to the Effective Date. Upon the Effective Date of this Consent Decree, the stipulated penalty provisions of this Decree shall be retroactively enforceable with regard to any and all violations of Paragraph 27 and Section V.C that have occurred between the date of lodging of the Decree and the Effective Date, provided that stipulated penalties that may have accrued prior to the Effective Date may not be collected unless and until this Consent Decree is entered by the Court.

98. Each Applicable Company shall pay stipulated penalties it owes to the United States in the manner set forth and with the confirmation notices required by Paragraph 79, except that the transmittal letter shall state that the payment is for stipulated penalties and shall state for which violation(s) the penalties are being paid. Each Applicable Company shall pay stipulated penalties it owes to a Co-Plaintiff by certified or cashier's check according to the instructions set forth in XIII (Notices) and Appendix M to this Consent Decree.

99. If an Applicable Company fails to pay stipulated penalties according to the terms of this Consent Decree, that Applicable Company shall be liable for interest on such penalties, as provided for in 28 U.S.C. § 1961, accruing as of the date payment became due. Nothing in this Paragraph shall be construed to limit the Plaintiffs from seeking any remedy otherwise provided by law for the Applicable Company's failure to pay any stipulated penalties.

100. Subject to the provisions of Section XI of this Consent Decree (Effect of Settlement/Reservation of Rights), the stipulated penalties provided for in this Consent Decree shall be in addition to any other rights, remedies, or sanctions available to the Plaintiffs for any Applicable Company's violation of this Consent Decree or applicable law. Where a violation of this Consent Decree is also a violation of the Act or of federal, state, or local regulations implementing the Act, that Applicable Company shall be allowed a credit, for any stipulated

penalties paid, against any statutory penalties imposed for such violation.

VIII. FORCE MAJEURE

101. "Force majeure," for purposes of this Consent Decree, is defined as any event arising from causes beyond the control of the Applicable Company, of any entity controlled by the Applicable Company, or of the Applicable Company's contractors, that delays or prevents the performance of any obligation under this Consent Decree despite the Applicable Company's best efforts to fulfill the obligation. The requirement that an Applicable Company exercise "best efforts to fulfill the obligation" includes using best efforts to anticipate any potential force majeure event and best efforts to address the effects of any such event (a) as it is occurring and (b) after it has occurred to prevent or minimize any resulting delay to the greatest extent possible. "Force Majeure" does not include an Applicable Company's financial inability to perform any obligation under this Consent Decree.

102. If any event occurs or has occurred that may delay the performance of any obligation under this Consent Decree, whether or not caused by a force majeure event, the Applicable Company shall provide notice orally or by electronic or facsimile transmission to the United States, the Applicable EPA Region, and the Applicable Co-Plaintiff, within 72 hours of when that Applicable Company first knew that the event might cause a delay. Within seven days thereafter, that Applicable Company shall provide in writing to the United States, the Applicable EPA Region, and the Applicable Co-Plaintiff an explanation and description of the reasons for the delay; the anticipated duration of the delay; all actions taken or to be taken to prevent or minimize the delay; a schedule for implementation of any measures to be taken to prevent or mitigate the delay or the effect of the delay; the Applicable Company's rationale for attributing such a delay to a force majeure event if it intends to assert such a claim; and a statement as to

whether, in the opinion of the Applicable Company, such event may cause or contribute to an endangerment to public health, welfare, or the environment. The Applicable Company shall include with any notice all available documentation supporting the claim that the delay was attributable to a force majeure. Failure to comply with the above requirements shall preclude the Applicable Company from asserting any claim of force majeure for that event for the period of time of such failure to comply, and for any additional delay caused by such failure. The Applicable Company shall be deemed to know of any circumstance of which the Applicable Company, any entity controlled by the Applicable Company, or the Applicable Company's contractors knew.

103. If the United States, after consultation with the Applicable Co-Plaintiff, agrees that the delay or anticipated delay is attributable to a force majeure event, the time for performance of the obligations under this Consent Decree that are affected by the force majeure event will be extended by the United States, after consultation with the Applicable Co-Plaintiff, for such time as is necessary to complete those obligations. An extension of time for performance of the obligations affected by the force majeure event shall not, of itself, extend the time for performance of any other obligation. The United States will notify the Applicable Company in writing of the length of the extension, if any, for performance of the obligations affected by the force majeure event.

104. If the United States, after consultation with the Applicable Co-Plaintiff, does not agree that the delay or anticipated delay has been or will be caused by a force majeure event, the United States will notify the Applicable Company in writing of its decision.

105. If the Applicable Company elects to invoke the dispute resolution procedures set forth in Section IX (Dispute Resolution), it must do so no later than 15 days after receipt of the

United States' notice. In any such proceeding, the Applicable Company shall have the burden of demonstrating by a preponderance of the evidence that the delay or anticipated delay has been or will be caused by a force majeure event, that the duration of the delay or the extension sought was or will be warranted under the circumstances, that best efforts were exercised to avoid and mitigate the effects of the delay, and that the Applicable Company complied with the requirements of Paragraphs 101 and 102, above. If the Applicable Company carries this burden, the delay at issue shall be deemed not to be a violation by the Applicable Company of the affected obligation of this Consent Decree identified to the United States and the Court.

IX. DISPUTE RESOLUTION

106. Unless otherwise expressly provided for in this Consent Decree, the dispute resolution procedures of this Section shall be the exclusive mechanism to resolve disputes arising under or with respect to this Consent Decree and its terms and conditions. Any Applicable Company's failure to seek resolution of a dispute under this Section shall preclude that Applicable Company from raising any such issue as a defense to an action by a Plaintiff to enforce any obligation of that Applicable Company arising under this Decree.

107. Informal Dispute Resolution. Any dispute subject to Dispute Resolution under this Consent Decree shall first be the subject of informal negotiations. The dispute shall be considered to have arisen when an Applicable Company sends the United States and the Applicable Co-Plaintiff a written Notice of Dispute. Such Notice of Dispute shall state clearly the matter in dispute. The period of informal negotiations shall not exceed 20 days from the date the dispute arises, unless that period is modified by written agreement. If the appropriate Parties cannot resolve a dispute by informal negotiations, then the position advanced by the United States, after consultation with the Applicable Co-Plaintiff, shall be considered binding unless,

within 20 days after the conclusion of the informal negotiation period, the Applicable Company invokes formal dispute resolution procedures as set forth below.

108. Formal Dispute Resolution. Each Applicable Company shall invoke formal dispute resolution procedures, within the time period provided in the preceding Paragraph, by serving on the United States and the Applicable Co-Plaintiff a written Statement of Position regarding the matter in dispute. The Statement of Position shall include, but may not necessarily be limited to, any factual data, analysis, or opinion supporting that Applicable Company's position and any supporting documentation relied upon by the Applicable Company.

109. The United States, after consultation with the Applicable Co-Plaintiff, shall serve its Statement of Position within 45 days after receipt of that Applicable Company's Statement of Position. The United States' Statement of Position shall include, but need not be limited to, any factual data, analysis, or opinion supporting that position and any supporting documentation relied upon by the United States. The United States' Statement of Position shall be binding on that Applicable Company, unless that Applicable Company files a motion for judicial review of the dispute in accordance with the following Paragraph.

110. That Applicable Company may seek judicial review of the dispute by filing with the Court and serving on the United States and the Applicable Co-Plaintiff a motion requesting judicial resolution of the dispute. The motion must be filed within 10 days after receipt of the United States' Statement of Position pursuant to the preceding Paragraph. The motion shall contain a written statement of that Applicable Company's position on the matter in dispute, including any supporting factual data, analysis, opinion, or documentation, and shall set forth the relief requested and any schedule within which the dispute must be resolved for orderly implementation of the Consent Decree.

111. The United States, after consultation with the Applicable Co-Plaintiff, shall respond to the Applicable Company's motion within the time period allowed by the Local Rules of this Court. That Applicable Company may file a reply memorandum, to the extent permitted by the Local Rules.

112. Standard of Review

a. Disputes Concerning Matters Accorded Record Review. Except as otherwise provided in this Consent Decree, in any dispute brought under Paragraph 108 pertaining to the adequacy or appropriateness of plans, procedures to implement plans, schedules or any other items requiring approval by Plaintiffs under this Consent Decree; the adequacy of the performance of work undertaken pursuant to this Consent Decree; and all other disputes that are accorded review on the administrative record under applicable principles of administrative law, the Applicable Company shall have the burden of demonstrating, based on the administrative record, that the position of the United States is arbitrary and capricious or otherwise not in accordance with law.

b. Other Disputes. Except as otherwise provided in this Consent Decree, in any other dispute brought under Paragraph 108, the Applicable Company shall bear the burden of demonstrating that its position complies with this Consent Decree and furthers the objectives of the Consent Decree.

113. The invocation of dispute resolution procedures under this Section shall not, by itself, extend, postpone, or affect in any way any obligation of the Applicable Company under this Consent Decree, unless and until final resolution of the dispute so provides. Stipulated penalties with respect to the disputed matter shall continue to accrue from the first day of noncompliance, but payment shall be stayed pending resolution of the dispute as provided in

Paragraph 96, above. If the Applicable Company does not prevail on the disputed issue, stipulated penalties shall be assessed and paid as provided in Section VII (Stipulated Penalties).

X. INFORMATION COLLECTION AND RETENTION

114. The Plaintiffs and their representatives, including attorneys, contractors, and consultants, shall have the right of entry into any facility covered by this Consent Decree, at all reasonable times, upon presentation of credentials, to:

a. observe any performance testing conducted pursuant to this Decree;

b. monitor the progress of activities required under this Consent Decree;

c. verify any data or information submitted to a Plaintiff in accordance with the terms of this Consent Decree;

d. obtain unprivileged documentary evidence, including photographs and similar data; and

e. assess an Applicable Company's compliance with this Consent Decree.

115. Until two years after the termination of this Consent Decree as to each separate Applicable Company, such Applicable Company shall retain, and shall instruct its contractors and agents to preserve, all non-identical copies of all documents, records, or other information (including documents, records, or other information in electronic form) in its or its contractors' or agents' possession or control, or that come into its or its contractors' or agents' possession or control, and that relate in any manner to that Applicable Company's performance of its obligations under this Consent Decree. This information-retention requirement shall apply regardless of any contrary corporate or institutional policies or procedures. At any time during this information-retention period, upon request by a Plaintiff, that Applicable Company shall provide copies of any unprivileged documents, records, or other information required to be

maintained under this Paragraph.

116. At the conclusion of the information-retention period provided in the preceding Paragraph, each Applicable Company shall notify the United States and the Applicable Co-Plaintiff at least 90 days prior to the destruction of any documents, records, or other information subject to the requirements of the preceding Paragraph and, upon request by the United States or the Applicable Co-Plaintiff, that Applicable Company shall deliver any such unprivileged documents, records, or other information to the United States or the Applicable Co-Plaintiff. The Applicable Company may assert that certain documents, records, or other information is privileged under the attorney-client privilege or any other privilege recognized by law. If an Applicable Company asserts such a privilege, it shall provide the following: (1) the title of the document, record, or information; (2) the date of the document, record, or information; (3) the name and title of each author of the document, record, or information; (4) the name and title of each addressee and recipient; (5) a description of the subject of the document, record, or information; and (6) the privilege asserted by the Applicable Company. Such privilege log need not be compiled and provided until the Applicable Company receives a request by the United States or the Applicable Co-Plaintiff pursuant to this Paragraph to deliver documents, records, or other information.

117. Each Applicable Company may also assert that information required to be provided under this Consent Decree is protected as Confidential Business Information ("CBI") under 40 C.F.R. Part 2 or related state and/or local provisions. As to any information that an Applicable Company seeks to protect as CBI, that Applicable Company shall follow the procedures set forth in 40 C.F.R. Part 2 and the applicable state and/or local provisions.

118. This Consent Decree in no way limits or affects any right of entry and inspection,

or any right to obtain information, held by the Plaintiffs pursuant to applicable federal, state, or local laws, regulations, or permits, nor does it limit or affect any duty or obligation of each Applicable Company to maintain documents, records, or other information imposed by applicable federal, state, or local laws, regulations, or permits.

XI. EFFECT OF SETTLEMENT/RESERVATION OF RIGHTS

119. This Consent Decree resolves the Companies' civil and administrative liability for (a) any violations of 40 C.F.R. Part 63, Subparts A and RRR, related provisions of state and local law, and permit provisions specifically implementing or derived from 40 C.F.R. Part 63, Subparts A and RRR at each of their respective Covered Facilities arising out of facts and events that occurred prior to the date of lodging of this Decree; (b) the civil claims of the Plaintiffs for the violations alleged in the Amended Complaint through the date of lodging of this Decree; and (c) the civil claims of the Plaintiffs for the violations alleged in each NOV cited in this Decree.

120. The Plaintiffs reserve all legal and equitable remedies available to enforce the provisions of this Consent Decree. This Consent Decree shall not be construed to limit the rights of the Plaintiffs to obtain penalties or injunctive relief under the Act or implementing regulations, or under other federal, state, or local laws, regulations, or permit conditions, except as expressly specified in Paragraph 119. The Plaintiffs further reserve all legal and equitable remedies to address any situation which may present an imminent and substantial endangerment to the public health or welfare or the environment arising at, or posed by, any of the Covered Facilities, whether related to the violations addressed in this Consent Decree or otherwise.

121. In any subsequent administrative or judicial proceeding initiated by a Plaintiff for injunctive relief, civil penalties, or other appropriate relief relating to a Covered Facility, no Applicable Company shall assert or maintain any defense or claim based upon the principles of

waiver, res judicata, collateral estoppel, issue preclusion, claim preclusion, claim-splitting, or other defenses based upon any contention that the claims raised by the Plaintiff in the subsequent proceeding were or should have been brought in the instant case, except with respect to claims that have been specifically resolved pursuant to Paragraph 119 of this Section.

122. This Consent Decree is not a permit, or a modification of any permit, under any federal, state, or local laws or regulations. Each Applicable Company is responsible for achieving and maintaining complete compliance with all applicable federal, state, and local laws, regulations, and permits, and neither an Applicable Company's compliance with this Consent Decree, nor the fact that the Plaintiffs did not notify an Applicable Company of any deficiency in a plan, report, or other item required to be submitted pursuant to this Consent Decree, shall be a defense to any action commenced pursuant to any such laws, regulations, or permits, except as set forth herein. The Plaintiffs do not, by their consent to the entry of this Consent Decree, warrant or aver in any manner that an Applicable Company's compliance with any aspect of this Consent Decree will result in compliance with provisions of the Act, 42 U.S.C. § 7401 et seq., or with any other provisions of federal, state, or local laws, regulations, or permits.

123. This Consent Decree does not limit or affect the rights of the Companies or the Plaintiffs against any third parties, not party to this Consent Decree, nor does it limit the rights of third parties, not party to this Consent Decree, against the Companies, except as otherwise provided by law.

124. This Consent Decree shall not be construed to create rights in, or grant any cause of action to, any third party not party to this Consent Decree.

XII. COSTS

125. The Parties shall bear their own costs of this action, including attorneys' fees,

except that the Plaintiffs shall be entitled to collect the costs (including attorneys' fees) incurred in any judicial action necessary to collect any portion of the civil penalty or any stipulated penalties due but not paid by an Applicable Company.

XIII. NOTICES

126. Unless otherwise specified herein, whenever written notifications, submissions, or communications, or payments are required by this Consent Decree, they shall be addressed and/or paid as set forth in Appendix M to this Decree.

127. Any Party may, by written notice to the other Parties, change its designated notice recipient or notice address provided in Appendix M to this Decree.

128. Each report, notification, or other submission by an Applicable Company shall be submitted as specified in the Consent Decree, with a copy to EPA Region 4, as set forth in Appendix M to this Decree.

129. Each notification or other communication by a Plaintiff to an Applicable Company shall be made as specified in the Consent Decree, with copies to Aleris International, Inc., as set forth in Appendix M to this Decree.

130. Notices submitted pursuant to this Section shall be deemed submitted upon mailing, unless otherwise provided in this Consent Decree or by mutual agreement of the Parties in writing.

XIV. EFFECTIVE DATE

131. The effective date of this Consent Decree shall be the date upon which this Consent Decree is entered by the Court or a motion to enter the Consent Decree is granted, whichever occurs first, as recorded on the Court's docket, provided that the Bankruptcy Court has previously entered an order approving the Consent Decree and authorizing the Companies to

sign it. If the Bankruptcy Court has not entered its order prior to the Court's entry of the Consent Decree or granting of a motion to enter, then the effective date of this Consent Decree shall be the date of the subsequent Bankruptcy Court order.

XV. RETENTION OF JURISDICTION

132. The Court shall retain jurisdiction over this case until termination of this Consent Decree, for the purpose of resolving disputes arising under this Decree or entering orders modifying this Decree, pursuant to Sections IX and XVI, or effectuating or enforcing compliance with the terms of this Decree.

XVI. MODIFICATION

133. Except as otherwise set forth in Paragraph 31.b (calculation of minimum exhaust rate at Coldwater reverberatory furnace #7S), 37 (time period for capture and collection system improvements), 38 (flow rate measurement methodology), 46 (performance test notification period), 52.d (time period for corrective action to meet major source emission limits), 55.b (time period for corrective action to address emission exceedance during performance test), 57 (form of OM&M Plan and SSMP), 58 (fan RPM verification), 63 (flow rate measurement methodology), or 127 (notice recipients and addresses) of this Consent Decree, the terms of this Decree may be modified only by a subsequent written agreement signed by the United States, the Applicable Co-Plaintiff(s), and the Applicable Company or Companies. Where the modification constitutes a material change to this Decree, it shall be effective only upon approval by the Court.

134. Any disputes concerning modification of this Decree shall be resolved pursuant to Section IX of this Decree (Dispute Resolution), provided, however, that, instead of the burden of proof provided by Paragraph 112, the Party seeking the modification bears the burden of

demonstrating that it is entitled to the requested modification in accordance with Federal Rule of Civil Procedure 60(b).

XVII. TERMINATION

135. After an Applicable Company has completed the requirements of Section V (Compliance Requirements) of this Decree for its Covered Facility or Facilities, has complied with all other requirements of this Consent Decree for its Covered Facility or Facilities, has thereafter maintained satisfactory compliance with this Consent Decree and 40 C.F.R. Part 63, Subparts A and RRR for a period of one year at its Covered Facility or Facilities, and has paid any accrued stipulated penalties for its Covered Facility or Facilities as required by this Consent Decree, that Applicable Company may serve upon the United States, the Applicable EPA Region, and the Applicable Co-Plaintiff a Request for Termination, stating that the Applicable Company has satisfied those requirements, together with all necessary supporting documentation.

136. Following receipt of an Applicable Company's Request for Termination, that Applicable Company, the United States, and the Applicable Co-Plaintiff shall confer informally concerning the Request and any disagreement that such Parties may have as to whether that Applicable Company has satisfactorily complied with the requirements for termination of this Consent Decree as to that Applicable Company. If the United States, after consultation with the Applicable Co-Plaintiff, agrees that the Decree may be terminated as to that Applicable Company, the Applicable Company, the United States, and the Applicable Co-Plaintiff shall submit, for the Court's approval, a joint stipulation terminating the Decree as to that Applicable Company.

137. If the United States, after consultation with the Applicable Co-Plaintiff, does not

agree that the Decree may be terminated as to that Applicable Company, that Applicable Company may invoke Dispute Resolution under Section IX of this Decree. However, no Applicable Company shall seek Dispute Resolution of any dispute regarding termination, under Paragraph 108 of Section IX, until 60 days after service of its Request for Termination upon the United States.

XVIII. PUBLIC PARTICIPATION

138. This Consent Decree shall be lodged with the Court for a period of not less than 30 days for public notice and comment in accordance with 28 C.F.R. § 50.7. The United States reserves the right to withdraw or withhold its consent if the comments regarding the Consent Decree disclose facts or considerations indicating that the Consent Decree is inappropriate, improper, or inadequate. The Companies consent to entry of this Consent Decree without further notice and agrees not to withdraw from or oppose entry of this Consent Decree by the Court or to challenge any provision of the Decree, unless the United States has notified the Companies and the Co-Plaintiffs in writing that it no longer supports entry of the Decree.

XIX. SIGNATORIES/SERVICE

139. The undersigned representatives of each Applicable Company and of each Co-Plaintiff and the Assistant Attorney General for the United States certify that they are fully authorized to enter into the terms and conditions of this Consent Decree and to execute and legally bind the Party they represent to this document.

140. This Consent Decree may be signed in counterparts, and its validity shall not be challenged on that basis.

141. The Companies agree to accept service of process by mail with respect to all matters arising under or relating to this Consent Decree and to waive the formal service

requirements set forth in Rules 4 and 5 of the Federal Rules of Civil Procedure and any applicable Local Rules of this Court including, but not limited to, service of a summons.

XX. INTEGRATION

142. This Consent Decree constitutes the final, complete, and exclusive agreement and understanding among the Parties with respect to the settlement embodied in the Decree and supersedes all prior agreements and understandings, whether oral or written, concerning the settlement embodied herein. No other document, nor any representation, inducement, agreement, understanding, or promise, constitutes any part of this Decree or the settlement it represents, nor shall it be used in construing the terms of this Decree.

XXI. FINAL JUDGMENT

143. Upon approval and entry of this Consent Decree by the Court, this Consent Decree shall constitute a final judgment of the Court as to the United States; the States of Idaho, Illinois, Indiana, Michigan, Ohio, Tennessee, and West Virginia; the Commonwealths of Kentucky and Virginia; the Oklahoma Department of Environmental Quality; the Maricopa County Air Quality Department; and the Companies.

XXII. APPENDICES

144. The following Appendices are attached to and part of this Consent Decree:

Appendix A: Covered Facilities, Affected Sources, and Emission Units

Appendix B: Major Source Rotary Furnace Test Protocol

Appendix C: Area Source Rotary Furnace Test Protocol

Appendix D: Batch-Fed Reverberatory Furnace Test Protocol

Appendix E: Reverberatory Furnace/Thermal Chip Dryer Test Protocol

Appendix F: Reverberatory Furnace/Delacquering Kiln Test Protocol

Appendix G: Lewisport Uncontrolled Reverberatory Furnace Test Protocol

Appendix H: Model Charge Material Report

Appendix I: Model OM&M Plan and SSMP

Appendix J: Model Semiannual Report

Appendix K: Model ACGIH Calculations

Appendix L: Model Potential-to-Emit Analysis

Appendix M: Notice and Penalty Payment Provisions

Dated and entered this ______ day of ______________, 200__.

ANN ALDRICH
United States District Judge
Northern District of Ohio

THE UNDERSIGNED PARTIES enter into this Consent Decree in the matter of United States et al. v. Aleris International, Inc. et al. (N.D. Ohio):

FOR PLAINTIFF UNITED STATES OF AMERICA:

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JOHN A. BENEDICT, Director
West Virginia Division of Air Quality

THE UNDERSIGNED PARTIES enter into this Consent Decree in the matter of United States et al. v. Aleris International, Inc. et al. (N.D. Ohio):

FOR PLAINTIFF COMMONWEALTH OF KENTUCKY:

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FOR PLAINTIFF OKLAHOMA DEPARTMENT OF ENVIRONMENTAL QUALITY:

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STEVEN A. THOMPSON
Executive Director
Oklahoma Department of Environmental Quality

THE UNDERSIGNED PARTIES enter into this Consent Decree in the matter of United States et al. v. Aleris International, Inc. et al. (N.D. Ohio):

FOR PLAINTIFF MARICOPA COUNTY AIR QUALITY DEPARTMENT:

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Maricopa County Air Quality Department
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THE UNDERSIGNED PARTIES enter into this Consent Decree in the matter of United States et al. v. Aleris International, Inc. et al. (N.D. Ohio):

FOR DEFENDANTS ALERIS INTERNATIONAL, INC.; IMCO RECYCLING OF ILLINOIS, INC.; IMCO RECYCLING OF MICHIGAN L.L.C.; ALUMITECH OF WEST VIRGINIA INC.; ROCK CREEK ALUMINUM; IMSAMET OF ARIZONA; COMMONWEALTH ALUMINUM LEWISPORT, LLC; IMCO RECYCLING OF IDAHO, INC.; ALSCO METALS CORPORATION; ALCHEM ALUMINUM, INC.; ALCHEM ALUMINUM SHELBYVILLE, INC.; COMMONWEALTH ALUMINUM CONCAST, INC.; IMCO RECYCLING OF OHIO, INC.; AND ALUMITECH OF WABASH INC.:

Steven J. Demetriou
Chairman and Chief Executive Officer
Aleris International, Inc.
25825 Science Park Drive
Suite 400
Beachwood, OH 44122

Agent authorized to accept service on behalf of above-signed party:

Roy M. Harsch
Drinker Biddle & Reath
Suite 3700
191 N. Wacker Drive
Chicago, Illinois 60610

APPENDIX A
Covered Facilities, Affected Sources, and Emission Units

Chicago Heights facility IMCO Recycling of Illinois, Inc. 400 East Lincoln Highway Chicago Heights, IL 60411 *Applicable EPA Region:* Region 5 *Applicable Co-Plaintiff:* Illinois	*Affected Sources and Emission Units:* 2 Group 1 rotary furnaces 2 Group 2 reverberatory furnaces
Coldwater facility IMCO Recycling of Michigan L.L.C. 267 North Fillmore Road Coldwater, MI 49036 Alchem Aluminum, Inc. 368 West Garfield Avenue Coldwater, MI 49036 *Applicable EPA Region:* Region 5 *Applicable Co-Plaintiff:* Michigan	*Affected Sources and Emission Units:* 2 Group 1 rotary furnaces 4 Group 1 reverberatory furnaces 1 Group 2 reverberatory furnace 1 scrap dryer 1 thermal chip dryer 1 shredder
Friendly (Alumitech) facility Alumitech of West Virginia Inc. 3816 South State Route 2 Friendly, WV 26146 *Applicable EPA Region:* Region 3 *Applicable Co-Plaintiff:* West Virginia	*Affected Sources and Emission Units:* 1 Group 1 rotary furnace
Friendly (Rock Creek) facility Rock Creek Aluminum 4203 S. State Route 2 Friendly, WV 26146 *Applicable EPA Region:* Region 3 *Applicable Co-Plaintiff:* West Virginia	*Affected Sources and Emission Units:* 2 Group 1 rotary furnaces 1 Group 2 reverberatory furnace

Goodyear facility IMSAMET of Arizona 3829 South Estrella Parkway Goodyear, AZ 85338 *Applicable EPA Region:* Region 9 *Applicable Co-Plaintiff:* Maricopa County Air Quality Department	*Affected Sources and Emission Units:* 2 Group 1 rotary furnaces
Lewisport facility Commonwealth Aluminum Lewisport, LLC 1372 State Road 1957 Lewisport, KY 42351 *Applicable EPA Region:* Region 4 *Applicable Co-Plaintiff:* Kentucky	*Affected Sources and Emission Units:* 22 Group 1 reverberatory furnaces 1 Group 2 reverberatory furnace 2 delacquering kilns 2 shredders 2 rotary dross coolers 5 in-line fluxers
Loudon facility Aleris International, Inc. 388 Williamson Drive Loudon, TN 37774 *Applicable EPA Region:* Region 4 *Applicable Co-Plaintiff:* Tennessee	*Affected Sources and Emission Units:* 3 Group 1 rotary furnaces 1 Group 1 reverberatory furnace
Morgantown facility Aleris International, Inc. 609 Gardner Camp Road, Highway 1468 Morgantown, KY 42261 *Applicable EPA Region:* Region 4 *Applicable Co-Plaintiff:* Kentucky	*Affected Sources and Emission Units:* 6 Group 1 rotary furnaces 1 Group 1 reverberatory furnace 1 delacquering kiln 1 shredder
Post Falls facility IMCO Recycling of Idaho Inc. 16168 West Prairie Avenue Post Falls, ID 83854 *Applicable EPA Region:* Region 10 *Applicable Co-Plaintiff:* Idaho	*Affected Sources and Emission Units:* 2 Group 1 rotary furnaces

Richmond facility ALSCO Metals Corporation 1801 Reymet Road Richmond, VA 23237 *Applicable EPA Region:* Region 3 *Applicable Co-Plaintiff:* Virginia	*Affected Sources and Emission Units:* 4 Group 1 reverberatory furnaces
Saginaw facility Alchem Aluminum, Inc. 2600 Nodular Drive Saginaw, MI 48601 *Applicable EPA Region:* Region 5 *Applicable Co-Plaintiff:* Michigan	*Affected Sources and Emission Units:* 3 Group 1 reverberatory furnaces
Sapulpa facility Aleris International, Inc. 1508 North 8th Street Highway 97 North Sapulpa, OK 74067 *Applicable EPA Region:* Region 6 *Applicable Co-Plaintiff:* Oklahoma Department of Environmental Quality	*Affected Sources and Emission Units:* 4 Group 1 rotary furnaces 1 Group 2 reverberatory furnace
Shelbyville facility (shut down) Alchem Aluminum Shelbyville, Inc. 1605 Railroad Avenue Shelbyville, TN 37160 *Applicable EPA Region:* Region 4 *Applicable Co-Plaintiff:* Tennessee	*Affected Sources and Emission Units:* On October 6, 2008, Alchem Aluminum Shelbyville, Inc. submitted a letter to the State of Tennessee requesting that the Title V permit for the Shelbyville facility be voluntarily withdrawn.

Uhrichsville facility Commonwealth Aluminum Concast, Inc. 7319 Newport Road, S.E. Uhrichsville, OH 44683 IMCO Recycling of Ohio, Inc. 7335 Newport Road, S.E. Uhrichsville, OH 44683 *Applicable EPA Region:* Region 5 *Applicable Co-Plaintiff:* Ohio	*Affected Sources and Emission Units:* 10 Group 1 rotary furnaces 6 Group 1 reverberatory furnaces 3 Group 2 reverberatory furnaces 1 delacquering kiln 2 shredders 2 in-line fluxers
Wabash facility Alumitech of Wabash Inc. 305 Dimension Avenue Wabash, IN 46992 *Applicable EPA Region:* Region 5 *Applicable Co-Plaintiff:* Indiana	*Affected Sources and Emission Units:* 2 Group 1 rotary furnaces

APPENDIX B
Major Source Rotary Furnace Test Protocol

SITE-SPECIFIC TEST PLAN
FOR THE

MAJOR SOURCE
SECONDARY ALUMINUM
PRODUCTION FACILITY

LOCATED IN

CITY, STATE

Month Year

Table of Contents

List of Tables

List of Appendices

Section 1

Introduction

Section 2
Source Information

Plant Name and Address

Source Identification

Source Contact

Section 3
Testing Firm Information

Testing Firm Name and Address

Test Team Contact

Section 4
Test Program Description

To satisfy the requirements of the secondary aluminum NESHAP regulations, the facility will conduct a performance test to determine the compliance status of xxx group 1 rotary furnaces and the associated emission control devices (lime-injected baghouses).

This site specific test plan has been developed to address the federal requirements of the secondary aluminum NESHAP regulations.

4.1 General Description

A sampling and analytical program will be conducted on the outlet stack of the fabric filter baghouse that controls the emissions from each source being tested. All of the required operating and monitoring conditions for this program will be discussed in the Process Parameters and Operation Information section of this Plan.

All testing will be performed in strict conformance with specifications stipulated in EPA Reference Method 1, Method 2, Method 3, Method 4, Method 5, Method 23, and Method 26A (40 CFR 60 Appendix A). The regulated pollutants will be measured to demonstrate compliance with the Secondary Aluminum Production NESHAP Standard, 40 CFR Part 63, Subpart RRR. **Table 4-1** presents an outline and tentative schedule for the emissions testing program. The following is a summary of the proposed testing and the planned schedule.

- Testing is being performed to satisfy requirements of the 40 CFR Part 63, Subpart RRR (Secondary Aluminum Production NESHAP).
- Materials to be processed will be identified and targeted production rates provided in a separate communication prior to the test.
- Testing for HCl, D/F, and PM will be performed on rotary furnace a and b, which are ducted to a common xxx cell shaker type lime injected baghouse.

✓ The HCl test will be used to establish a maximum flux limit (% flux) to be used as an internal measure. The flux chemistry and weight will be recorded. From the test, the lb Cl/ton charged will be calculated. The allowable flux % will be calculated from this value using the chemical makeup of the flux and the molar weight of the compounds. This test will consist of three runs, each being one furnace cycle (beginning of feed to end of tap) in length. The test material will be representative of those materials which require the maximum flux percent and thus are likely to generate the highest HCl emissions.

✓ The D/F test will be used to determine the maximum baghouse inlet temperature. The D/F test will consist of three runs, each being one furnace cycle in length. Test materials will be selected based on the presence of high levels of organics and prior experience with the reaction of the scrap when charged into the furnace. During furnace processing, organic material, combined with chlorine from fluxing activities, is likely to generate the highest D/F emissions when the temperature is in the D/F formation range.

- ✓ PM will be measured and averaged during the three D/F runs.

- ■ Testing for HCl, D/F, and PM will be performed on rotary furnace c which is ducted to a dedicated xxx cell shaker type lime injected baghouse.

- ✓ The HCl test will be used to establish a maximum flux limit (% flux) to be used as an internal measure. The flux chemistry and weight will be recorded. From the test, the lb Cl/ton charged will be calculated. The allowable flux % will be calculated from this value using the chemical makeup of the flux and the molar weight of the compounds. This test will consist of three runs, each being one furnace cycle (beginning of feed to end of tap) in length. The test material will be representative of those materials which require the maximum flux percent and thus are likely to generate the highest HCl emissions.

- ✓ The D/F test will be used to determine the maximum baghouse inlet temperature. The D/F test will consist of three runs, each being one furnace cycle in length. Test materials will be selected based on the presence of high levels of organics and prior experience with the reaction of the scrap when charged into the furnace. During furnace processing, organic material, combined with chlorine from fluxing activities, is likely to generate the highest D/F emissions when the temperature is in the D/F formation range.

- ✓ PM will be measured and averaged during the three D/F runs.

- ■ Velocity and volumetric flow measurements will be taken using EPA Method 2.

- ■ This testing program is proposed to be conducted during XXXX

4.2 Process Parameters and Operation Information

Plant personnel or their designated consultant will collect parametric data from the furnace operations and the associated control device. The following identifies the measurements, observations, and records that will be collected during the testing events. A worksheet found in Appendix C will be used for the collection of the required production records as described within this Plan.

All Sources and Associated Control Devices

The furnace systems operations are further described in **Section 5** of this Plan. The methods that will be used to demonstrate compliance rely on the operating data collected during the performance test runs. To properly evaluate the emissions from the sources, a sampling plan is being proposed to monitor emissions during near maximum production. The following parameters are to be identified in the facility's OM&M plan and will be maintained during the testing event.

- The usage rate of the reactive flux material in the furnaces will be monitored by tracking the weight of the reactive flux charged to each of the furnaces.
- The process feed rate to the rotary furnace systems will be calculated by recording the weights of the individual loads of metal charged using the production tracking system. The total weight of all charged material will be calculated for the production period monitored during the performance test. This total production weight will be used to calculate the feed rate for each furnace.
- All charged materials will be weighed using certified scales that are calibrated at least every six (6) months.
- The lime injection rates will be checked each shift to ensure that the proper setting is maintained. The minimum effective lime usage rate will be set during the performance test to ensure compliance with the standard under all conditions. The feed system will be evaluated prior to the performance test to establish the operating settings to establish this minimum feed rate.
- Lime flow rate will be checked following each run of the test.
- To insure lime is free flowing, each feeder will be checked and documented hourly during the test period.
- Inlet temperatures of the lime injected baghouse control devices are regulated by the introduction of cooling air through an automated damper. This temperature parameter will be monitored in 15-minute averages during the performance test. A 3-hour average will be calculated from the 15-minute averages collected during the test. The inlet temperature system will be calibrated prior to conducting the performance test to establish an accurate 3-hour block average temperature.
- The bag leak detection systems will be monitored during the performance test to establish proper operation of the baghouses and the monitors. The equipment will be configured and operated as suggested by the manufacturers and where appropriate, the EPA’s “Fabric Filter Bag Leak Detection Guidance.”

Table 4-1

Program Outline and Tentative Test Schedule

(Test Schedule will vary by plant and number of installed furnaces.)

SOURCE	PARAMETER	SAMPLING METHOD	NUMBER OF RUNS	RUN DURATION [1]	ESTIMATED ONSITE TIME

Section 5
Sources and Sampling Location Descriptions

5.1 Source Description - XXX Group 1 Furnaces with Add-on Control Devices

5.2 Sampling Locations

All samples will be collected from the baghouse exhaust stack. All exhaust stack and sample port locations are designed to meet minimum EPA Reference Method 1 requirements (i.e. two and one-half diameters). All stack diameters or depths and widths, upstream and downstream disturbance distances and nipple lengths will be measured on site, with a verification measurement provided by the Field Team Leader.

Section 6
Quality Assurance Program

6.1 Internal Quality Assurance

Specific quality control (QC) procedures will be followed to ensure the continuous production of useful and valid data throughout the course of this test program. The QC checks and procedures described in this section represent an integral part of the overall sampling and analytical scheme. Strict adherence to prescribed procedures is quite often the most applicable QC check. A discussion of both the sampling and analytical QC checks that will be utilized during this program is presented below.

6.2 Equipment Inspection and Maintenance

Each item of calibrated field test equipment purchased by XXXXXXX is assigned a unique, permanent identification number. An effective preventive maintenance program is necessary to ensure data quality. Each item of equipment returning from the field is inspected before it is returned to storage. During the course of these inspections, items are cleaned, repaired, reconditioned, and recalibrated where necessary. Each item of equipment transported to the field for this test program is inspected again before being packed to detect equipment problems which may originate during periods of storage. This minimizes lost time on the job site due to equipment failure. Occasional equipment failure in the field is unavoidable despite the most rigorous inspection and maintenance procedures. For this reason, XXXXXXX routinely transports to the job site replacement equipment for all critical sampling train components.

6.3 Equipment Calibration

New items for which calibration is required are calibrated before initial field use. Equipment whose calibration status may change with use or time is inspected in the field before testing begins and again upon return from each field use. When an item of equipment is found to be out of calibration, it is repaired and recalibrated or retired from service. All equipment is periodically recalibrated in full, regardless of the outcome of these regular inspections.

Calibrations are conducted in a manner, and at a frequency, which meets or exceeds U. S. EPA specifications. XXXXXXX follows the calibration procedures outlined in the EPA Methods, and those recommended within the Quality Assurance Handbook for Air Pollution Measurement Systems: Volume III (EPA-600/4-77-027b, August, 1977). When these methods are inapplicable,

XXXXXXX uses methods such as those prescribed by the American Society for Testing and Materials (ASTM).

Data obtained during calibrations are recorded on standardized forms, which are checked for completeness and accuracy by the quality assurance manager. Data reduction and subsequent calculations are performed using XXXXXXX's own computer facilities. Calculations are checked at least twice for accuracy. Copies of calibration forms are included in the test or project reports.

Emissions sampling equipment requiring calibration includes pitot tubes, pressure gauges, thermometers, dry gas meters, and barometers. The following sections elaborate on the calibration procedures followed by XXXXXXX for these items of equipment.

A: <u>Pitot Tubes.</u> All Type S pitot tubes used by XXXXXXX, whether separate or attached to a sampling probe, are constructed by Apex Instruments or Environmental Supply. Each new pitot is calibrated in accordance with the geometry standards contained in EPA Method 2. A Type S pitot tube, constructed and positioned according to these standards, will have a coefficient of 0.84 ± 0.02. This coefficient will not change as long as the pitot tube is not damaged. Each pitot tube is inspected visually upon return from the field. If a cursory inspection indicates damage or raises doubt that the pitot remains in accordance with the EPA geometry standards, the pitot tube is refurbished as needed and recalibrated.

B: <u>Differential Pressure Gauges.</u> All meter consoles used by XXXXXXX are equipped with 10-in. water column (W.C.) inclined manometers. Fluid manometers do not require calibration other than leak checks. Manometers are leak checked in the field prior to each test series and again upon return from the field.

C: <u>Impinger Thermometer.</u> Prior to the start of testing, the thermometer used to monitor the temperature of the gas leaving the last impinger is compared with a mercury-in-glass thermometer which meets ASTM E-1 No. 63F specifications. The impinger thermometer is adjusted if necessary until it agrees within 2°F of the reference thermometer. If the thermometer is not adjustable, it is labeled with a correction factor.

D: <u>Dry Gas Meter Thermometer.</u> The thermometer used to measure the temperature of the metered gas sample is checked prior to each field trip against an ASTM mercury-in-glass thermometer. The dry gas meter thermometer is acceptable if the values agree within ± 1.5

percent absolute. Thermometers not meeting this requirement are adjusted or labeled with a correction factor.

E: Flue Gas Temperature Sensor. All thermocouples employed by XXXXXXX for the measurement of flue gas temperatures are calibrated upon receipt. Initial calibrations are performed at three points (ice bath, boiling water and hot oil). An ASTM mercury-in-glass thermometer is used as a reference. The thermocouple is acceptable if the agreement is within 1.5 percent (absolute) at each of the three calibration points.

On-site, prior to the start of testing and after testing, the reading from the flue gas thermocouple-potentiometer combination is compared with an ASTM mercury-in-glass reference thermometer. If the two agree within ± 1.5 percent (absolute), the thermocouple and potentiometer are considered to be in proper working order for the test series.

F: Dry Gas Meter and Orifice. Two procedures are used to calibrate the dry gas meter and orifice simultaneously. The full calibration is a complete laboratory procedure used to obtain the calibration factor of the dry gas meter. Full calibrations are performed over a wide range of orifice settings. A simpler procedure, the posttest calibration, is designed to check whether the calibration factor has changed. Posttest calibrations are performed after each field test series by calculating the Y_{qa} using data from each test run.

G: Dry Gas Meter. Each metering system receives a full calibration at the time of purchase. If the calibration factor, Y_{qa}, deviates by less than five percent from the last calibrated value, the test data is acceptable. If Y_{qa} deviates by more than 5 percent, the meter is recalibrated and the meter coefficient (initial or recalibrated) that yields the lowest sample volume for the test runs is used.

EPA Method 5 requires another full calibration anytime the posttest calibration check indicates that Y_{qa} has changed by more than 5 percent. Standard practice at XXXXXXX is to recalibrate the dry gas meter anytime Y_{qa} is found to be greater than 5 percent different or every six months.

H: Orifice. An orifice calibration factor is calculated for each flow setting during a full calibration. If the range of values does not vary by more than 0.20 in. H_2O over the range of 0.4 to 4.0 in. H_2O, the arithmetic average of the values obtained during the calibration is used.

I: Barometer. Each field barometer is adjusted before each test series to agree within ± 0.1 inches of a reference aneroid barometer. The reference barometer (mercury/glass) is checked weekly against the station pressure value (corrected for elevation difference) which is located at the local weather office.

6.4 Sampling Quality Control Procedures

The following pretest QC checks will be conducted:

- All sampling equipment will be thoroughly checked to ensure clean and operable components.
- Equipment will be inspected for possible damage from shipment.
- The oil manometer gauge used to measure pressure across the Type S pitot tube will be leveled and zeroed.
- The number and location of the sampling traverse points will be checked before taking measurements.
- The temperature measurement system will be visually checked for damage and operability by measuring the ambient temperature prior to each traverse.

In addition to the general QC procedures listed above, QC procedures specific to each sampling method will also be incorporated into the sampling scheme. These method specific procedures are discussed below.

A: Sampling Train QC Checks. The following QC procedures will be emphasized:

Prior to Start of Tests

- Keep all cleaned glassware and sample train components sealed until train assembly.
- Keep prepared sorbent traps sealed and cool until sample train assembly.
- Store all filters in filter holders or in individual Petri dishes.
- Assemble the sampling trains in an environment free from uncontrolled dust.
- Visually inspect each sampling train for proper assembly.
- Perform pretest calculations to determine the proper sampling nozzle size.

Prior to Testing Each Day

- Visually inspect the sampling nozzle.
- Visually inspect the Type S pitot tube.
- Leak check each leg of the Type S pitot tube.
- Leak check the entire sampling train.

During Testing Each Day

- Readings of temperature and differential pressure will be taken at each traverse point at 10-minute maximum intervals.
- All sampling data and calculations will be recorded on pre-formatted data sheets.
- All calibration data forms will be reviewed for completeness and accuracy.
- Any unusual occurrences will be noted during each run on the appropriate data form.
- The Field Team Leader will review sampling data sheets daily during testing.
- Properly maintain the roll and pitch axis of the Type S pitot tube and the sampling nozzle.
- Leak check the train before and after each test run or if a filter change takes place during the test run.
- Conduct additional leak checks if the sampling time exceeds 4 hours.
- Maintain the probe, filter and impingers at proper temperatures.
- Make proper readings of the dry gas meter, delta P and delta H, temperature, and pump vacuum during sampling at each traverse point.
- Maintain isokinetic sampling within ± 10% of 100%.

After Testing Each Day

- Visually inspect the sampling nozzle.
- Visually inspect the Type S pitot tube.
- Leak check each leg of the Type S pitot tube.
- Leak check the entire sampling train.

6.5 QC for Volumetric Air Flow Rate Determinations

A: Flue Gas Velocity. Data required to determine the flue gas velocity will be collected using the methodology specified in EPA Method 2. Quality control procedures are as follows:

- Visually inspect the Type S pitot tube before and after sampling.
- Leak check both legs of the pitot tube before and after sampling.
- Check the number and location of the sampling traverse points before taking measurements.

B: Flue Gas Molecular Weight. Samples to be used for determination of flue gas molecular weight will be collected using the integrated sampling technique specified in EPA Method 3. Quality control will focus on the following procedures:

- The sampling train will be leak checked before and after each run.
- A constant sampling rate will be used in withdrawing a sample.
- The sampling train will be purged prior to sample collection.
- The sampling port will be properly sealed to prevent air from leaking in.

C: Moisture Content. The moisture content of the gas stream will be determined using the technique specified in EPA Method 4. The following QC checks will be performed:

- The sampling train will be leak checked before and after each run.
- Ice will be maintained in the ice bath throughout each run.

6.6 Analytical Quality Control Procedures

All analyses for this program will be performed using accepted laboratory procedures in accordance with the specified analytical protocols. Adherence to prescribed QC procedures will ensure data of consistent and measurable quality. Analytical QC will focus upon the use of control standards to provide a measure of analytical precision and accuracy. Also, specific acceptance criteria are defined for various analytical operations including calibrations, control standard analyses, drift checks, blanks, etc. The following general QC procedures will be incorporated into the analytical effort:

- The onsite Field Team Leader will review all analytical data and QC data on a daily basis for completeness and acceptability.
- Analytical QC data will be tabulated using the appropriate charts and forms on a daily basis.
- Copies of the QC data tabulation will be submitted to the quality assurance manager following the completion of the test program.
- All hard-copy raw data (i.e., chromatograms, computer printouts, etc.) will be maintained in organized files.

Specific analytical QC procedures for the Baccarach "Fyrite" analyzer are listed below:

- The analyzer will be leveled and the fluid levels zeroed prior to use.
- The analyzer will be leak checked prior to use.
- The analyzer will be thoroughly purged with sample prior to analysis.
- The analyzer will be checked by analyzing an ambient air sample.

Appendix A
Description of Source Testing Methodology

General

This section contains a brief description of the sampling and analytical procedures for each method that will be employed during the test program. All equipment, procedures, and quality assurance measures necessary for the completion of the test program meet or exceed the specifications of the appropriate methods specified in the EPA Reference Methods. Deviations from the methods to ensure quality and representative nature of the results are also discussed.

Sampling Point/Traverse Points Determination - EPA Method 1

The number and locations of the sampling or traverse points will be determined according to the procedures outlined in EPA Method 1. Method 1 requires the accurate measurement of stack diameters, upstream and downstream distances, and location of the sample points. To determine the amount of sample points, the upstream and downstream distances are equated into equivalent diameters. The number of sample points are then determined using charts listed in EPA Method 1.

Gas Velocity and Volumetric Flow Rate - EPA Method 2

The flue gas velocity and volumetric flow rate will be determined according to the procedures outlined in EPA Method 2. Velocity measurements will be made using Type S pitot tubes conforming to the geometric specifications outlined in EPA Method 2. Accordingly, each has been assigned a coefficient of 0.84. Differential pressures will be measured with inclined, fluid manometers. Effluent gas temperatures will be measured with Type K thermocouples equipped with digital readouts.

A cyclonic flow check, using directional pitots and an angle finder, will be performed by XXXXXXX on all “non-tested” stacks to verify that airflow is not cyclonic. In most stationary sources, the direction of stack gas flow is within cyclonic specifications of the method. The following techniques are acceptable for this determination.

Level and zero the manometer. Connect a Type S pitot tube to the manometer to the manometer and leak-check system. Position the Type S pitot tube at each traverse point, in succession, so that the planes of the face openings of the pitot tube are perpendicular to the stack cross-sectional plane; when the Type S pitot tube is in this position, it is at "O° reference." Note the differential pressure (Δp) reading at each traverse point. If a null (zero) pitot reading is obtained at O° reference at a given traverse point, an acceptable flow condition exists at that point. If the pitot reading is not zero at O° reference, rotate the pitot tube (up to ±9O° yaw angle), until a null reading is obtained. Carefully determine and record the value of the rotation angle (α) to the nearest degree. After the null technique has been applied at each traverse point, calculate the average of the absolute values of α; assign α values of O° to those points for which no rotation was required, and include these in the overall average. If the average value of α is greater than 2O°, the overall flow condition in the stack is unacceptable, and alternative methodology, subject to the approval of the Administrator, must be used to perform accurate sample and velocity traverses.

Oxygen and Carbon Dioxide – EPA Method 3

The oxygen (O_2) and carbon dioxide (CO_2) will be determined at the test locations following Method 3 procedures. An integrated sample will be extracted during each isokinetic test run. The sampling system consists of a stainless steel probe, followed by a Teflon sample line attached to a condenser system, which is attached to a leak free pump with rotameter. The pump will be coupled with a leak free Tedlar bag. The concentration of oxygen and carbon dioxide in the sample will be determined by using a Bacharach "Fyrite" Gas Analyzer. Fyrite analysis provides for the selective absorption of oxygen in Burrell Oxysorbent and carbon dioxide in potassium hydroxide solutions. The difference in gas volume before and after the absorption represents the amount of constituent gas in the sample. Each sample will be analyzed three (3) times, and the average of the readings for each run will be used in calculating the emission rate for the respective test run.

Gas Moisture Content - EPA Method 4

The flue gas moisture content will be determined in conjunction with each isokinetic sampling train and in accordance the sampling and analytical procedures outlined in EPA Method 4. The impingers will be connected in series and will contain reagents as listed in the following method descriptions. The impingers will be contained in an ice bath to ensure condensation of the flue gas stream moisture. Any moisture that is not condensed in the impingers is captured in the silica gel; therefore, all moisture can be weighed and entered into moisture content calculations.

Particulate Matter - EPA Method 5

Sample Collection. Samples will be withdrawn at an isokinetic rate from the source using an EPA Method 5 sampling train. The sampling train will consist of a glass or stainless nozzle, a heated glass-lined or stainless-lined probe with a Type S Pitot tube attached, a tarred glass fiber or Teflon filter, four chilled impingers and a metering console. The first and second impingers will each contain 100 mL of impinger liquor, the third impinger will remain empty, and the fourth will contain pre-weighed silica gel. Each test run will be approximately 2.5 hours in duration.

Sample Recovery. Following the completion of each test run, the impingers will be weighed on an electronic balance to determine the amount of moisture gained during the run. Samples will be recovered in a dust free environment in XXXXXXX's mobile laboratory. Impinger cases will be used to transport the samples from the field to the mobile laboratory. A stainless steel spatula and tweezers will be used to remove the filter from the filter holder and place it in a labeled Petri dish. The probe and nozzle acetone rinses will be collected in glass sample containers, and the liquid levels will be marked.

Sample Analyses. The filter and front-half acetone rinse will be desiccated and weighed to a constant weight using Method 5 analytical procedures. An acetone blank will be taken, analyzed and interpreted as described in Method 5.

Dioxin/Furan - EPA Method 23

All glass components of the Method 23 sample train upstream of the adsorbent module, will be cleaned in accordance with section 3A of the "Manual of Analytical Methods for the Analysis of Pesticides in Human and Environmental Samples". No silicone grease sealants will be used for this sampling method. Glass-fiber filters will be pre-cleaned in the laboratory in a Soxhlet apparatus. Adsorbent modules will be cleaned as the filters and treated with the appropriate amount of the surrogate solution.

Samples will be withdrawn at an isokinetic rate from the source using an EPA Method 23 sampling train. The sample train is assembled and operated as a Method 5 with the following exception – immediately following the heated filter will be a non-contact, recirculating cold water condenser leading to the XAD-2 adsorbent trap which is attached to an empty modified Greenburg-Smith impinger. The next two impingers will contain 100 ml of HPLC water, the next impinger will be empty, and the last impinger will contain approximately 200 g silica gel. Each test run will be approximately 2.5 hours in duration.

Following the completion of each test run, the impingers will be weighed on an electronic balance to determine the amount of moisture gained during the run. The impinger contents will be discarded after determining the moisture gain. The filter will be removed from the filter holder and placed in Sample Container 1. The XAD sorbent module will be sealed on both ends, labeled, and stored on ice until transported to the laboratory. The nozzle, probe, front and back half of the filter holder, filter support, condenser coil, and connecting glassware will be rinsed with acetone and placed in Sample Container 2. All glassware cleaned for Sample Container 2 will be rinsed lastly with toluene and placed in Sample Container 3. Sample containers 3 and 4 will be amber glass containers.

All samples will be analyzed by Analytical Perspectives in Wilmington, North Carolina in accordance with the requirements listed in Method 23, Section 5.

Hydrogen Chloride – EPA Method 26A

Sampling Equipment Preparation. All glass components of the Method 26A sample train will be cleaned according to Code of Federal Regulations 40, Part 60, Appendix A. The Method 26A sample will be collected utilizing the impingers from the Method 5 train.

Sample Collection. Samples will be withdrawn at an isokinetic rate from the source using an EPA Method 5/26A sampling train. The sample train is assembled and operated as a Method 5 with the following exception – the first and second impinger solution will be 100 ml of 0.1 N H_2SO_4. Each test run will be approximately 2.5 hours in duration.

Sample Recovery. Following the completion of each test run, the impingers will be weighed on an electronic balance to determine the amount of moisture gained during the run. The 1st and 2nd impinger contents will be collected in a polyethylene sample container. All glassware, from the back-half of the filter holder to the outlet of the 2nd impinger, will be rinsed with DI water ,and these rinses added to the sample container.

Appendix B
Sample Calculations

Meter Pressure (Pm), in. Hg

$$Pm = Pb + \frac{\Delta H}{13.6}$$

where,

Pb = barometric pressure, in. Hg
ΔH = pressure differential of orifice in. H_2O

Absolute Stack Gas Pressure (Ps), in. Hg

$$Ps = Pb + \frac{Pg}{13.6}$$

where,

Pb = barometric pressure, in. Hg
Pg = static pressure, in. H_2O

Standard Meter Volume (Vmstd), dscf

$$Vmstd = \frac{17.647 \text{ x } Y \text{ x } Vm \text{ x } Pm}{Tm}$$

where,

Y = meter correction factor
Vm = meter volume, cf
Pm = meter pressure, in. Hg
Tm = meter temperature, ^{o}R

\

Standard Wet Volume (Vwstd), scf

$$Vwstd=0.04707x\ Vlc$$

where,

Vlc = volume of H_2O collected, ml

Moisture Fraction (BWS)

$$BWS = \frac{Vwstd}{(Vwstd + Vmstd)}$$

where,

Vwstd = standard wet volume, scf

Vmstd = standard meter volume, dscf

Moisture Content (MC), %

$$MC = BWS \ x \ 100$$

where,

BWS = moisture fraction, dimensionless

Molecular Weight (DRY) (Md), lb/lb-mole

$$Md = (0.44 \times CO_2) + (0.32 \times O_2) + (0.28 \ (100 - CO_2 - O_2))$$

where,

CO_2 = carbon dioxide concentration, %

O_2 = oxygen concentration, %

Molecular Weight (WET) (Ms), lb/lb-mole

$$Ms = Md \ (1 - BWS) + 18 (BWS)$$

where,

Md = molecular weight (DRY), lb/lb-mole

BWS = moisture fraction, dimensionless

Average Velocity (Vs), ft/sec

$$Vs = 85.49 \ x \ Cp \ x \ \sqrt{\Delta P} \ avg. \ x \ \sqrt{\frac{Ts}{Ps \ x \ Ms}}$$

where,

Cp = pitot tube coefficient

ΔP = velocity head of stack gas, in. H_2O

Ts = absolute stack temperature, ^{o}R

Ps = absolute stack gas pressure, in. Hg

Ms = molecular weight of stack gas, lb/lb-mole

Average Stack Gas Flow at Stack Conditions (Qa), acfm

$$Qa = 60 \text{ x } Vs \text{ x } As$$

where,

Vs = stack gas velocity, ft/sec
As = cross-sectional area of stack, ft^2

Average Stack Gas Flow at Standard Conditions (Qs), dscfm

$$Qs = 17.647 \text{ x } Qa \text{ x } (1 - BWS) \text{ x } \frac{Ps}{Ts}$$

where,

Qa = average stack gas flow at stack conditions, ft^3/min
BWS = moisture fraction, dimensionless
Ps = absolute stack gas pressure, in. Hg
Ts = absolute stack temperature, °R

Dioxin/Furan Concentration ($c_{D/F}$), ng/ft^3 – using 1989 D/F TEF's

$$c_{D/F} = \frac{m_{D/F}}{Vmstd \times 1.0E + 03}$$

where,

$m_{D/F}$ = D/F mass, pg
Vmstd = standard meter volume, dscf

D/F Emission Rate (ER_{DF}), lb/hr – using 1989 D/F TEF's

$$ER_{DF} = \frac{c_{D/F} \times Q_s \times 60}{454\,E + 09}$$

where,

$c_{D/F}$ = D/F concentration, ng/ft^3
Qs = stack gas flow at standard conditions, dscfm

D/F Emission Factor (EF_{DF}), grains /ton – using 1989 D/F TEF's

$$EF_{DF} = \frac{ER_{DF} \times 7.0E + 03 \times 2.0E + 03}{FR}$$

where,

ER_{DF} = D/F emission rate, lbs/hr
FR = feed rate, lbs/hr

D/F Emission Factor (EF_{DF}), ug/MG – using 1989 D/F TEF's

$$EF_{DF} = \frac{ER_{DF} \times 1.0E+12}{FR}$$

where,

ER_{DF} = D/F emission rate, lbs/hr
FR = feed rate, lbs/hr

Particulate Concentration (c_s), grains/dscf

$$c_S = \frac{M_n \times 0.0154}{Vmstd}$$

where,

Mn = particulate mass, mg
Vmstd = standard meter volume, dscf

Particulate Emission Rate (PMR), lbs/hr

$$PMR = \frac{c_s \times Qs \times 60}{7.0E+03}$$

where,

c_s = particulate concentration, grains/dscf
Qs = stack gas flow rate at standard conditions, dscfm

Particulate Emission Factor (EF_{PM}), lbs/ton

$$EF_{PM} = \frac{PMR \times 2.0E+03}{FR}$$

where,

PMR = particulate emission rate, lbs/hr
FR = feed rate, lbs/hr

Hydrogen Chloride Concentration (c_{HCl}) mg/dscm

$$c_{HCl} = \frac{M_{HCl} \times 35.313}{Vmstd}$$

where,

M_{HCl} = hydrogen chloride mass, mg
Vmstd = standard meter volume, dscf

Hydrogen Chloride Emission Rate (ER_{HCl}), lbs/hr

$$ER_{HCl} = \frac{M_{HCl} \times Qs \times 60}{Vmstd \times 4.54x10^{5}}$$

where,

M_{HCl} = hydrogen chloride mass, mg
Qs = stack gas flow rate at standard conditions, dscfm
Vmstd = standard meter volume, dscf

Hydrogen Chloride Emission Factor (EF_{HCl}), lbs/ton

$$EF_{HCl} = \frac{ER_{HCl} \times 2.0E + 03}{FR}$$

where,

ER_{HCl} = hydrogen chloride emission rate, lbs/hr
FR = feed rate, lbs/hr

Appendix C
Production Record

Appendix D
Sample Port Schematic

APPENDIX C
Area Source Rotary Furnace Test Protocol

SITE-SPECIFIC TEST PLAN
FOR THE

AREA SOURCE
SECONDARY ALUMINUM
PRODUCTION FACILITY

LOCATED IN

CITY, STATE

Month Year

Table of Contents

List of Tables

List of Appendices

Section 1
Introduction

Section 2
Source Information

Plant Name and Address

Source Identification

Source Contact

Section 3
Testing Firm Information

Testing Firm Name and Address

Test Team Contact

Section 4
Test Program Description

To satisfy the requirements of the secondary aluminum NESHAP regulations, the facility will conduct a performance test to determine the compliance status of two (2) rotary furnaces and the associated emission control system (lime-injected baghouse).

This site specific test plan has been developed to address the federal requirements of the secondary aluminum NESHAP regulations.

4.1 General Description

A sampling and analytical program will be conducted on the outlet stack of the fabric filter baghouse that controls the emissions from the sources being tested. All of the required operating and monitoring conditions for this program will be discussed in the Process Parameters and Operation Information section of this Plan.

All testing will be performed in strict conformance with specifications stipulated in EPA Reference Method 1, Method 2, Method 3, Method 4, Method 23, and Method 26A. The regulated pollutants will be measured to demonstrate compliance with the Secondary Aluminum Production NESHAP Standard, 40 CFR Part 63, Subpart RRR. **Table 4-1** presents an outline and tentative schedule for the emissions testing program. The following is a summary of the proposed testing and the planned schedule.

- Testing is being performed to satisfy requirements of the 40 CFR, Part 63, Subpart RRR (Secondary Aluminum Production NESHAP).
- Materials to be processed will be identified and targeted production rates provided in a separate communication prior to the test.
- The HCl test will be used to establish a maximum flux limit (% flux) to be used as an internal measure. The flux chemistry and weight will be recorded. From the test, the lb Cl/ton charged will be calculated. The allowable flux % will be calculated from this value using the chemical makeup of the flux and the molar weight of the compounds. This test will consist of three runs, each being one furnace cycle (beginning of feed to end of tap) in length. The test material will be representative of those materials which require the maximum flux percent and thus are likely to generate the highest HCl emissions.
- The D/F test will be used to determine the maximum baghouse inlet temperature. The D/F test will consist of three runs, each being one furnace cycle in length. Test materials will be selected based on the presence of high levels of organics and prior experience with the reaction of the scrap when charged into the furnace. During furnace processing,

organic material, combined with chlorine from fluxing activities, is likely to generate the highest D/F emissions when the temperature is in the D/F formation range.

- Velocity and volumetric flow measurements will be taken using EPA Method 2.
- This testing program is proposed to be conducted during XXXX.

4.2 Process Parameters and Operation Information

Plant personnel or their designated consultant will collect parametric data from the furnace operations and the associated control device. The following identifies the measurements, observations, and records that will be collected during the testing events. A worksheet found in Appendix C will be used for the collection of the required production records as described within this Plan.

All Sources and Associated Control Devices

The furnace operations are further described in **Section 5** of this Plan. The methods that will be used to demonstrate compliance rely on the operating data collected during the performance test runs. To properly evaluate the emissions from the sources, a sampling plan is being proposed to monitor emissions during near maximum production for those materials used during the test. The following parameters are to be identified in the facility's OM&M plan and will be maintained during the testing event.

- The usage rate of the reactive flux material in the rotary furnaces will be monitored by tracking the weight of the reactive flux charged to each furnace.
- The process feed rates to the rotary furnaces will be calculated by recording the weights of the individual loads of metal charged using the production tracking system. The total weight of all charged material will be calculated for the production period monitored during the performance test. This total production weight will be used to calculate the feed rate for each furnace.
- All charged materials will be weighed using certified scales that are calibrated at least every six (6) months.
- The lime injection rates will be checked each shift to ensure that the proper setting is maintained. The minimum effective lime usage rate will be set during the performance test to ensure compliance with the standard under all conditions. The feed system will be evaluated prior to the performance test to establish the operating settings to establish this minimum feed rate.
- Lime flow rate will be checked following each run of the test.
- To insure lime is free flowing, each feeder will be checked and documented hourly during the test period.

- Inlet temperatures of the lime injected baghouse control devices are regulated by the introduction of cooling air through an automated damper. This temperature parameter will be monitored in 15-minute averages during the performance test. A 3-hour average will be calculated from the 15-minute averages collected during the test. The inlet temperature system will be calibrated prior to conducting the performance test to establish an accurate 3-hour block average temperature.
- The bag leak detection systems will be monitored during the performance test to establish proper operation of the baghouses and the monitors. The equipment will be configured and operated as suggested by the manufacturers and where appropriate, the EPA's "Fabric Filter Bag Leak Detection Guidance."

Table 4-1

Program Outline and Tentative Test Schedule

(Test Schedule will vary by plant and number of installed furnaces.)

SOURCE	**PARAMETER**	**SAMPLING METHOD**	**NUMBER OF RUNS**	**RUN DURATION [1]**	**ESTIMATED ONSITE TIME**

Section 5
Sources and Sampling Location Descriptions

5.1 Source Description – XXX Group 1 Furnaces with Add-on Control Devices

The rotary furnaces are used to process aluminum dross and melt scrap aluminum. Each furnace is designed to rotate on its axis, mixing and tumbling the charge while heating. The furnace then tilts forward to pour out the molten aluminum (tapping) and dump out the remaining slag or Salt Cake.

Included with the metal charge is the feed of a salt flux material. The scrap or dross charge and salt mixture is rotated in the furnace while a natural gas burner directed into the open end of the furnace heats the mixture. When all of the aluminum in the batch has melted, the furnace is tilted forward and the molten aluminum is poured into sow molds to solidify. The remaining slag or salt cake is dumped out of the furnace by tilting and rotating into pans for cooling and ultimately disposal.

Emissions from these process units are captured by a hood and directed to a lime injected baghouse system for control of the regulated pollutants. The emission control system injects lime into the air stream prior to the inlet of the baghouse to reduce the concentration of specific pollutants present in the exhaust gases. The baghouse then captures the reacted lime and other particulate matter from the melting process.

5.2 Sampling Locations

All samples will be collected from the baghouse exhaust stack. All exhaust stack and sample port locations are designed to meet minimum EPA Reference Method 1 requirements (i.e. two and one-half diameters). All stack diameters or depths and widths, upstream and downstream disturbance distances and nipple lengths will be measured on site, with a verification measurement provided by the Field Team Leader.

Section 6
Quality Assurance Program

6.1 Internal Quality Assurance

Specific quality control (QC) procedures will be followed to ensure the continuous production of useful and valid data throughout the course of this test program. The QC checks and procedures described in this section represent an integral part of the overall sampling and analytical scheme. Strict adherence to prescribed procedures is quite often the most applicable QC check. A discussion of both the sampling and analytical QC checks that will be utilized during this program is presented below.

6.2 Equipment Inspection and Maintenance

Each item of calibrated field test equipment purchased by XXXXXXX is assigned a unique, permanent identification number. An effective preventive maintenance program is necessary to ensure data quality. Each item of equipment returning from the field is inspected before it is returned to storage. During the course of these inspections, items are cleaned, repaired, reconditioned, and recalibrated where necessary. Each item of equipment transported to the field for this test program is inspected again before being packed to detect equipment problems which may originate during periods of storage. This minimizes lost time on the job site due to equipment failure. Occasional equipment failure in the field is unavoidable despite the most rigorous inspection and maintenance procedures. For this reason, XXXXXXX routinely transports to the job site replacement equipment for all critical sampling train components.

6.3 Equipment Calibration

New items for which calibration is required are calibrated before initial field use. Equipment whose calibration status may change with use or time is inspected in the field before testing begins and again upon return from each field use. When an item of equipment is found to be out of calibration, it is repaired and recalibrated or retired from service. All equipment is periodically recalibrated in full, regardless of the outcome of these regular inspections.

Calibrations are conducted in a manner, and at a frequency, which meets or exceeds U. S. EPA specifications. XXXXXXX follows the calibration procedures outlined in the EPA Methods, and those recommended within the Quality Assurance Handbook for Air Pollution Measurement Systems: Volume III (EPA-600/4-77-027b, August, 1977). When these methods are inapplicable, XXXXXXX uses methods such as those prescribed by the American Society for Testing and Materials (ASTM).

Data obtained during calibrations are recorded on standardized forms, which are checked for completeness and accuracy by the quality assurance manager. Data reduction and subsequent calculations are performed using XXXXXXX's own computer facilities. Calculations are checked at least twice for accuracy. Copies of calibration forms are included in the test or project reports.

Emissions sampling equipment requiring calibration includes pitot tubes, pressure gauges, thermometers, dry gas meters, and barometers. The following sections elaborate on the calibration procedures followed by XXXXXXX for these items of equipment.

A: Pitot Tubes. All Type S pitot tubes used by XXXXXXX, whether separate or attached to a sampling probe, are constructed by Apex Instruments or Environmental Supply. Each new pitot is calibrated in accordance with the geometry standards contained in EPA Method 2. A Type S pitot tube, constructed and positioned according to these standards, will have a coefficient of 0.84 ± 0.02. This coefficient will not change as long as the pitot tube is not damaged. Each pitot tube is inspected visually upon return from the field. If a cursory inspection indicates damage or raises doubt that the pitot remains in accordance with the EPA geometry standards, the pitot tube is refurbished as needed and recalibrated.

B: Differential Pressure Gauges. All meter consoles used by XXXXXXX are equipped with 10-in. water column (W.C.) inclined manometers. Fluid manometers do not require calibration other than leak checks. Manometers are leak checked in the field prior to each test series and again upon return from the field.

C: Impinger Thermometer. Prior to the start of testing, the thermometer used to monitor the temperature of the gas leaving the last impinger is compared with a mercury-in-glass thermometer which meets ASTM E-1 No. 63F specifications. The impinger thermometer is adjusted if necessary until it agrees within 2°F of the reference thermometer. If the thermometer is not adjustable, it is labeled with a correction factor.

D: Dry Gas Meter Thermometer. The thermometer used to measure the temperature of the metered gas sample is checked prior to each field trip against an ASTM mercury-in-glass thermometer. The dry gas meter thermometer is acceptable if the values agree within ± 1.5 percent absolute. Thermometers not meeting this requirement are adjusted or labeled with a correction factor.

E: Flue Gas Temperature Sensor. All thermocouples employed by XXXXXXX for the measurement of flue gas temperatures are calibrated upon receipt. Initial calibrations are performed at three points (ice bath, boiling water and hot oil). An ASTM mercury-in-glass thermometer is used as a reference. The thermocouple is acceptable if the agreement is within 1.5 percent (absolute) at each of the three calibration points.

On-site, prior to the start of testing and after testing, the reading from the flue gas thermocouple-potentiometer combination is compared with an ASTM mercury-in-glass reference thermometer. If the two agree within ± 1.5 percent (absolute), the thermocouple and potentiometer are considered to be in proper working order for the test series.

F: Dry Gas Meter and Orifice. Two procedures are used to calibrate the dry gas meter and orifice simultaneously. The full calibration is a complete laboratory procedure used to obtain the calibration factor of the dry gas meter. Full calibrations are performed over a wide range of orifice settings. A simpler procedure, the posttest calibration, is designed to check whether the calibration factor has changed. Posttest calibrations are performed after each field test series by calculating the Y_{qa} using data from each test run.

G: Dry Gas Meter. Each metering system receives a full calibration at the time of purchase. If the calibration factor, Y_{qa}, deviates by less than five percent from the last calibrated value, the test data is acceptable. If Y_{qa} deviates by more than 5 percent, the meter is recalibrated and the meter coefficient (initial or recalibrated) that yields the lowest sample volume for the test runs is used.

EPA Method 5 requires another full calibration anytime the posttest calibration check indicates that Y_{qa} has changed by more than 5 percent. Standard practice at XXXXXXX is to recalibrate the dry gas meter anytime Y_{qa} is found to be greater than 5 percent different or every six months.

H: Orifice. An orifice calibration factor is calculated for each flow setting during a full calibration. If the range of values does not vary by more than 0.20 in. H_2O over the range of 0.4 to 4.0 in. H_2O, the arithmetic average of the values obtained during the calibration is used.

I: Barometer. Each field barometer is adjusted before each test series to agree within ± 0.1 inches of a reference aneroid barometer. The reference barometer (mercury/glass) is checked weekly against the station pressure value (corrected for elevation difference) which is located at the local weather office.

6.4 Sampling Quality Control Procedures

The following pretest QC checks will be conducted:

- All sampling equipment will be thoroughly checked to ensure clean and operable components.
- Equipment will be inspected for possible damage from shipment.
- The oil manometer gauge used to measure pressure across the Type S pitot tube will be leveled and zeroed.
- The number and location of the sampling traverse points will be checked before taking measurements.
- The temperature measurement system will be visually checked for damage and operability by measuring the ambient temperature prior to each traverse.

In addition to the general QC procedures listed above, QC procedures specific to each sampling method will also be incorporated into the sampling scheme. These method specific procedures are discussed below.

A: Sampling Train QC Checks. The following QC procedures will be emphasized:

Prior to Start of Tests

- Keep all cleaned glassware and sample train components sealed until train assembly.
- Keep prepared sorbent traps sealed and cool until sample train assembly.
- Store all filters in filter holders or in individual Petri dishes.
- Assemble the sampling trains in an environment free from uncontrolled dust.
- Visually inspect each sampling train for proper assembly.
- Perform pretest calculations to determine the proper sampling nozzle size.

Prior to Testing Each Day

- Visually inspect the sampling nozzle.
- Visually inspect the Type S pitot tube.

During Testing Each Day

- Readings of temperature and differential pressure will be taken at each traverse point at 10-minute maximum intervals.
- All sampling data and calculations will be recorded on pre-formatted data sheets.
- All calibration data forms will be reviewed for completeness and accuracy.
- Any unusual occurrences will be noted during each run on the appropriate data form.
- The Field Team Leader will review sampling data sheets daily during testing.
- Properly maintain the roll and pitch axis of the Type S pitot tube and the sampling nozzle.
- Leak check the train before and after each test run or if a filter change takes place during the test run.
- Leak check each leg of the Type S pitot tube before and after each test run.
- Maintain the probe, filter and impingers at proper temperatures.
- Make proper readings of the dry gas meter, delta P and delta H, temperature, and pump vacuum during sampling at each traverse point.
- Maintain isokinetic sampling within ± 10% of 100%.

After Testing Each Day

- Visually inspect the sampling nozzle.
- Visually inspect the Type S pitot tube.

6.5 QC for Volumetric Air Flow Rate Determinations

A: Flue Gas Velocity. Data required to determine the flue gas velocity will be collected using the methodology specified in EPA Method 2. Quality control procedures are as follows:

- Visually inspect the Type S pitot tube before and after sampling.
- Leak check both legs of the pitot tube before and after sampling.
- Check the number and location of the sampling traverse points before taking measurements.

B: Flue Gas Molecular Weight. Samples to be used for determination of flue gas molecular weight will be collected using the integrated sampling technique specified in EPA Method 3. Quality control will focus on the following procedures:

- The sampling train will be leak checked before and after each run.
- A constant sampling rate will be used in withdrawing a sample.
- The sampling train will be purged prior to sample collection.
- The sampling port will be properly sealed to prevent air from leaking in.

C: Moisture Content. The moisture content of the gas stream will be determined using the technique specified in EPA Method 4. The following QC checks will be performed:

- The sampling train will be leak checked before and after each run.
- Ice will be maintained in the ice bath throughout each run.

6.6 Analytical Quality Control Procedures

All analyses for this program will be performed using accepted laboratory procedures in accordance with the specified analytical protocols. Adherence to prescribed QC procedures will ensure data of consistent and measurable quality. Analytical QC will focus upon the use of control standards to provide a measure of analytical precision and accuracy. Also, specific acceptance criteria are defined for various analytical operations including calibrations, control standard analyses, drift checks, blanks, etc. The following general QC procedures will be incorporated into the analytical effort:

- The onsite Field Team Leader will review all analytical data and QC data on a daily basis for completeness and acceptability.
- Analytical QC data will be tabulated using the appropriate charts and forms on a daily basis.
- Copies of the QC data tabulation will be submitted to the quality assurance manager following the completion of the test program.
- All hard-copy raw data (i.e., chromatograms, computer printouts, etc.) will be maintained in organized files.

Specific analytical QC procedures for the Baccarach "Fyrite" analyzer are listed below:

- The analyzer will be leveled and the fluid levels zeroed prior to use.

- The analyzer will be leak checked prior to use.
- The analyzer will be thoroughly purged with sample prior to analysis.
- The analyzer will be checked by analyzing an ambient air sample.

Appendix A
Description of Source Testing Methodology

General

This section contains a brief description of the sampling and analytical procedures for each method that will be employed during the test program. All equipment, procedures, and quality assurance measures necessary for the completion of the test program meet or exceed the specifications of the appropriate methods specified in the EPA Reference Methods. Deviations from the methods to ensure quality and representative nature of the results are also discussed.

Sampling Point/Traverse Points Determination - EPA Method 1

The number and locations of the sampling or traverse points will be determined according to the procedures outlined in EPA Method 1. Method 1 requires the accurate measurement of stack diameters, upstream and downstream distances, and location of the sample points. To determine the amount of sample points, the upstream and downstream distances are equated into equivalent diameters. The number of sample points are then determined using charts listed in EPA Method 1.

Gas Velocity and Volumetric Flow Rate - EPA Method 2

The flue gas velocity and volumetric flow rate will be determined according to the procedures outlined in EPA Method 2. Velocity measurements will be made using Type S pitot tubes conforming to the geometric specifications outlined in EPA Method 2. Accordingly, each has been assigned a coefficient of 0.84. Differential pressures will be measured with inclined, fluid manometers. Effluent gas temperatures will be measured with Type K thermocouples equipped with digital readouts.

A cyclonic flow check, using directional pitots and an angle finder, will be performed to verify that airflow is not cyclonic. In most stationary sources, the direction of stack gas flow is within cyclonic specifications of the method. The following techniques are acceptable for this determination.

Level and zero the manometer. Connect a Type S pitot tube to the manometer to the manometer and leak-check system. Position the Type S pitot tube at each traverse point, in succession, so that the planes of the face openings of the pitot tube are perpendicular to the stack cross-sectional plane; when the Type S pitot tube is in this position, it is at "O° reference." Note the differential pressure (Δp) reading at each traverse point. If a null (zero) pitot reading is obtained at O° reference at a given traverse point, an acceptable flow condition exists at that point. If the pitot reading is not zero at O° reference, rotate the pitot tube (up to ±9O° yaw angle), until a null reading is obtained. Carefully determine and record the value of the rotation angle (α) to the nearest degree. After the null technique has been applied at each traverse point, calculate the average of the absolute values of α; assign α values of O° to those points for which no rotation was required, and include these in the overall average. If the average value of α is greater than 2O°, the overall flow condition in the stack is unacceptable, and alternative methodology, subject to the approval of the Administrator, must be used to perform accurate sample and velocity traverses.

Oxygen and Carbon Dioxide – EPA Method 3

The oxygen (O_2) and carbon dioxide (CO_2) will be determined at the test locations following Method 3 procedures. An integrated sample will be extracted during each isokinetic test run. The sampling system consists of a stainless steel probe, followed by a Teflon sample line attached to a condenser system, which is attached to a leak free pump with rotameter. The pump will be coupled with a leak free Tedlar bag. The concentration of oxygen and carbon dioxide in the sample will be determined by using a Bacharach "Fyrite" Gas Analyzer. Fyrite analysis provides for the selective absorption of oxygen in Burrell Oxysorbent and carbon dioxide in potassium hydroxide solutions. The difference in gas volume before and after the absorption represents the amount of constituent gas in the sample. Each sample will be analyzed three (3) times, and the average of the readings for each run will be used in calculating the emission rate for the respective test run.

Gas Moisture Content - EPA Method 4

The flue gas moisture content will be determined in conjunction with each isokinetic sampling train and in accordance the sampling and analytical procedures outlined in EPA Method 4. The impingers will be connected in series and will contain reagents as listed in the following method descriptions. The impingers will be contained in an ice bath to ensure condensation of the flue gas stream moisture. Any moisture that is not condensed in the impingers is captured in the silica gel; therefore, all moisture can be weighed and entered into moisture content calculations.

Dioxin/Furan - EPA Method 23

All glass components of the Method 23 sample train upstream of the adsorbent module, will be cleaned in accordance with section 3A of the "Manual of Analytical Methods for the Analysis of Pesticides in Human and Environmental Samples". No silicone grease sealants will be used for this sampling method. Glass-fiber filters will be pre-cleaned in the laboratory in a Soxhlet apparatus. Adsorbent modules will be cleaned as the filters and treated with the appropriate amount of the surrogate solution.

Samples will be withdrawn at an isokinetic rate from the source using an EPA Method 23 sampling train. The sample train is assembled and operated as a Method 5 with the following exception – immediately following the heated filter will be a non-contact, recirculating cold water condenser leading to the XAD-2 adsorbent trap which is attached to an empty modified Greenburg-Smith impinger. The next two impingers will contain 100 ml of HPLC water, the next impinger will be empty, and the last impinger will contain approximately 200 g silica gel.

Following the completion of each test run, the sampling train will be leak checked at a vacuum pressure greater than or equal to the highest vacuum pressure observed during the run. The impingers will be weighed on an electronic balance to determine the amount of moisture gained during the run. The impinger contents will be discarded after determining the moisture gain. The filter will be removed from the filter holder and placed in Sample Container 1. The XAD sorbent module will be sealed on both ends, labeled, and stored on ice until transported to the laboratory. The nozzle, probe, front and back half of the filter holder, filter support, condenser coil, and connecting glassware will be rinsed with acetone and placed in Sample Container 2. All glassware cleaned for Sample Container 2 will be rinsed lastly with toluene and placed in Sample Container 3. Sample containers 3 and 4 will be amber glass containers.

All samples will be analyzed by Analytical Perspectives in Wilmington, North Carolina in accordance with the requirements listed in Method 23, Section 5.

Hydrogen Chloride – EPA Method 26A

The hydrogen chloride testing will conducted in accordance with EPA Reference Method 26A. The complete sampling system will consist of a glass nozzle, heated glass-lined probe, Teflon filter, gas conditioning train, pump, and calibrated dry gas meter. The gas conditioning train will consist of four (4) chilled impingers - the first and second containing 100 mL of 0.1 N H_2SO_4, an empty third impinger, and the fourth containing approximately 200 grams of silica gel.

Following the completion of each test run, the sampling train will be leak checked at a vacuum pressure greater than or equal to the highest vacuum pressure observed during the run. The impingers will be weighed on an electronic balance to determine the amount of moisture gained during the run. The contents of the first three (3) impingers will be recovered in a Sample Container 1. All glassware, including the back half of the filter holder, will be rinsed with DI water and these rinses added to Sample Container 1.

All containers will be sealed, labeled, and liquid levels marked for transport to Maxxam Analytical's laboratory in Burlington, Ontario, Canada. The samples will be analyzed by high performance liquid chromatography (HPLC).

Appendix B
Sample Calculations

Meter Pressure (Pm), in. Hg

$$Pm = Pb + \frac{\Delta H}{13.6}$$

where,

Pb = barometric pressure, in. Hg

ΔH = pressure differential of orifice in. H_2O

Absolute Stack Gas Pressure (Ps), in. Hg

$$Ps = Pb + \frac{Pg}{13.6}$$

where,

Pb = barometric pressure, in. Hg

Pg = static pressure, in. H_2O

Standard Meter Volume (Vmstd), dscf

$$Vmstd = \frac{17.647 \text{ x } Y \text{ x } Vm \text{ x } Pm}{Tm}$$

where,

Y = meter correction factor

Vm = meter volume, cf

Pm = meter pressure, in. Hg

Tm = meter temperature, ^{o}R

\

Standard Wet Volume (Vwstd), scf

$$Vwstd = 0.04707x\ Vlc$$

where,

Vlc = volume of H_2O collected, ml

Moisture Fraction (BWS)

$$BWS = \frac{Vwstd}{(Vwstd + Vmstd)}$$

where,
Vwstd = standard wet volume, scf
Vmstd = standard meter volume, dscf

Moisture Content (MC), %

$$MC = BWS \ x \ 100$$

where,
BWS = moisture fraction, dimensionless

Molecular Weight (DRY) (Md), lb/lb-mole

$$Md = (0.44 \times CO_2) + (0.32 \times O_2) + (0.28 \ (100 - CO_2 - O_2))$$

where,
CO_2 = carbon dioxide concentration, %
O_2 = oxygen concentration, %

Molecular Weight (WET) (Ms), lb/lb-mole

$$Ms = Md \ (1 - BWS) + 18 (BWS)$$

where,
Md = molecular weight (DRY), lb/lb-mole
BWS = moisture fraction, dimensionless

Average Velocity (Vs), ft/sec

$$Vs = 85.49 \ x \ Cp \ x \ \sqrt{\Delta P} \ avg. \ x \ \sqrt{\frac{Ts}{Ps \ x \ Ms}}$$

where,
Cp = pitot tube coefficient
ΔP = velocity head of stack gas, in. H_2O
Ts = absolute stack temperature, ^oR
Ps = absolute stack gas pressure, in. Hg
Ms = molecular weight of stack gas, lb/lb-mole

Average Stack Gas Flow at Stack Conditions (Qa), acfm

$$Qa = 60 \times Vs \times As$$

where,

Vs = stack gas velocity, ft/sec

As = cross-sectional area of stack, ft^2

Average Stack Gas Flow at Standard Conditions (Qs), dscfm

$$Qs = 17.647 \times Qa \times (1 - BWS) \times \frac{Ps}{Ts}$$

where,

Qa = average stack gas flow at stack conditions, ft^3/min

BWS = moisture fraction, dimensionless

Ps = absolute stack gas pressure, in. Hg

Ts = absolute stack temperature, ^{o}R

Particulate Concentration (c_s), grains/dscf

$$c_S = \frac{M_n \times 0.0154}{Vmstd}$$

where,

Mn = particulate mass from filter and front half rinse, mg

Vmstd = standard meter volume, dscf

Particulate Emission Rate (PMR), lbs/hr

$$PMR = \frac{c_s \times Qs \times 60}{7000}$$

where,

c_s = particulate concentration, gr/dscf

Qs = average stack gas flow rate at standard conditions, dscfm

Particulate Emission Factor (EF_{PM}), lbs/ton

$$EF_{PM} = \frac{PMR}{FR} \times 2000$$

Dioxin/Furan Concentration ($c_{D/F}$), ng/ft^3 – using 1989 D/F TEF's

$$c_{D/F} = \frac{m_{D/F}}{Vmstd \times 1.0E + 03}$$

where,

$m_{D/F}$ = D/F mass, pg
Vmstd = standard meter volume, dscf

D/F Emission Rate (ER_{DF}), lb/hr – using 1989 D/F TEF's

$$ER_{DF} = \frac{c_{D/F} \times Q_s \times 60}{454\,E + 09}$$

where,

$c_{D/F}$ = D/F concentration, ng/ft^3
Qs = stack gas flow at standard conditions, dscfm

D/F Emission Factor (EF_{DF}), grains /ton – using 1989 D/F TEF's

$$EF_{DF} = \frac{ER_{DF} \times 7.0E + 03 \times 2.0E + 03}{FR}$$

where,

ER_{DF} = D/F emission rate, lbs/hr
FR = feed rate, lbs/hr

D/F Emission Factor (EF_{DF}), ug/MG – using 1989 D/F TEF's

$$EF_{DF} = \frac{ER_{DF} \times 1.0E + 12}{FR}$$

where,

ER_{DF} = D/F emission rate, lbs/hr
FR = feed rate, lbs/hr

Hydrogen Chloride Concentration (c_{HCl}) mg/dscm

$$c_{HCl} = \frac{M_{HCl} \times 35.313}{Vmstd}$$

where,

M_{HCl} = hydrogen chloride mass, mg
Vmstd = standard meter volume, dscf

Hydrogen Chloride Emission Rate (ER_{HCl}), lbs/hr

$$ER_{HCl} = \frac{M_{HCl} \times Qs \times 60}{Vmstd \times 4.54x10^{5}}$$

where,

M_{HCl} = hydrogen chloride mass, mg
Qs = stack gas flow rate at standard conditions, dscfm
Vmstd = standard meter volume, dscf

Hydrogen Chloride Emission Factor (EF_{HCl}), lbs/ton

$$EF_{HCl} = \frac{ER_{HCl} \times 2.0E+03}{FR}$$

where,

ER_{HCl} = hydrogen chloride emission rate, lbs/hr
FR = feed rate, lbs/hr

Appendix C
Production Record

APPENDIX D
Batch-Fed Reverberatory Furnace Test Protocol

SITE-SPECIFIC TEST PLAN
FOR THE

AREA SOURCE
SECONDARY ALUMINUM
PRODUCTION FACILITY

LOCATED IN

CITY, STATE

Table of Contents

List of Tables

List of Appendices

Section 1
Introduction

Section 2
Source Information

Plant Name and Address

Source Identification

Source Contact

Section 3
Testing Firm Information

Testing Firm Name and Address

Company Contact

Test Team Contact

Section 4
Test Program Description

To satisfy the requirements of the secondary aluminum NESHAP regulations, the facility will conduct a performance test to determine the compliance status of three group 1 reverberatory furnaces and the associated emission control devices (lime-injected baghouses).

This site specific test plan has been developed to address the federal requirements of the secondary aluminum NESHAP regulations.

4.1 General Description

A sampling and analytical program will be conducted on the outlet stack of the fabric filter baghouse that controls the emissions from the source being tested. All of the required operating and monitoring conditions for this program will be discussed in the Process Parameters and Operation Information section of this Plan.

All testing will be performed in strict conformance with specifications stipulated in EPA Reference Method 1, Method 2, Method 3, Method 4, Method 23 and Method 26A. The regulated pollutants will be measured to demonstrate compliance with the Secondary Aluminum Production NESHAP Standard, 40 CFR Part 63, Subpart RRR. **Table 4-1** presents an outline and tentative schedule for the emissions testing program. The following is a summary of the proposed testing and the planned schedule.

- Testing is being performed to satisfy requirements of the 40 CFR Part 63, Subpart RRR (Secondary Aluminum Production NESHAP).
- Materials to be processed will be identified and targeted production rates provided in a separate communication prior to the test.
- Reverberatory furnace #3 is ducted to a two cell Torit lime injected baghouse. The test will consist of three runs measuring D/F and HCl. The test result will be used to establish a maximum flux limit (% flux) and a maximum baghouse inlet temperature. HCl will be measured to demonstrate area source status.

  The HCl test will be used to establish a maximum flux limit (% flux) to be used as an internal measure. The flux chemistry and weight will be recorded. From the test, the lb Cl/ton charged will be calculated. The allowable flux % will be calculated from this value using the chemical makeup of the flux and the molar weight of the compounds.

  Fifteen minute average temperatures into the baghouse will be monitored and recorded during each run. These will be used to determine the maximum 3 hour block average.

This test will consist of three runs, each being one furnace cycle (beginning of feed to end of tap) in length.

Tap volume will be at the largest volume the furnace regularly taps in the course of normal operations. This will not preclude, during the course of normal operations, tapping varying amounts from the furnace as business conditions may require. The scrap blend into the reverberatory furnace will be representative of those materials commonly used to make a specification alloy.

Molten metal level in the furnace will be monitored to insure the level is maintained above the arch between the sidewell and main hearth.

Normal charging, melting, skimming alloying, and tapping practices will be followed.

- Reverberatory furnaces #1 and #2 are ducted to a four cell pulse jet lime injected baghouse. The test will consist of three runs measuring D/F and HCl. The test result will be used to establish a maximum flux limit (% flux) and a maximum baghouse inlet temperature. HCl will be measured to demonstrate area source status.

  The HCl test will be used to establish a maximum flux limit (% flux) to be used as an internal measure. The flux chemistry and weight will be recorded. From the test, the lb Cl/ton charged will be calculated. The allowable flux % will be calculated from this value using the chemical makeup of the flux and the molar weight of the compounds.

  Fifteen minute average temperatures into the baghouse will be monitored and recorded during each run. These will be used to determine the maximum 3 hour block average.

  This test will consist of three runs, each being one furnace cycle (beginning of feed to end of tap) in length.

  Tap volume will be at the largest volume the furnace regularly taps in the course of normal operations. This will not preclude, during the course of normal operations, tapping varying amounts from the furnace as business conditions may require.

  The scrap blend into the reverberatory furnace will be representative of those materials commonly used to make a specification alloy.

  Molten metal level in the furnace will be monitored to insure the level is maintained above the arch between the sidewell and main hearth.

  Normal charging, melting, skimming, alloying and tapping practices will be followed.

- Velocity and volumetric flow measurements will be taken using EPA Method 2.
- This testing program is proposed to be conducted during XXXXXX

4.2 Process Parameters and Operation Information

Plant personnel or their designated consultant will collect parametric data from the furnace operations and the associated control device. The following identifies the measurements, observations, and records that will be collected during the testing events. A worksheet,

Appendix C will be used for the collection of the required operating records as described within this Plan.

All Sources and Associated Control Devices

The furnace system's operations are further described in **Section 5** of this Plan. The methods that will be used to demonstrate compliance rely on the operating data collected during the performance test runs. To properly evaluate the emissions from the sources, a sampling plan is being proposed to monitor emissions during near maximum production. The following parameters are to be identified in the facility's OM&M plan and will be maintained during the testing event.

- The usage rate of the reactive flux material in the furnace will be monitored by tracking the weight of the reactive flux charged to the furnace.
- Scrap delivered in boxes to the furnace will be emptied when charged.
- The process feed rate to the reverberatory furnace system will be calculated by recording the weights of the individual loads of metal charged using the production tracking system. The total weight of all charged material will be calculated for the production period monitored during the performance test. This total production weight will be used to calculate the feed rate for the furnace.
- All charged materials will be weighed using certified scales that are calibrated at least every six (6) months to ensure continued compliance with the process rate limits standard.
- The lime injection rates will be checked each shift to ensure that the proper setting is maintained. The minimum effective lime usage rate will be set during the performance test to ensure compliance with the standard under all conditions. The feed system will be evaluated prior to the performance test to establish the operating settings to establish this minimum feed rate.
- Lime flow rate will be checked following each run of the test.
- To insure lime is free flowing, each feeder will be checked and documented hourly during the test period.
- Inlet temperatures of the lime injected baghouse control devices are regulated by the introduction of cooling air through an automated damper. This temperature parameter will be monitored in 15-minute averages during the performance test. A 3-hour average will be calculated from the 15-minute averages collected during the test. The inlet temperature system will be calibrated prior to conducting the performance test to establish an accurate 3-hour block average temperature.
- The bag leak detection systems will be monitored during the performance test to establish proper operation of the baghouses and the monitors. The equipment will be configured and operated as suggested by the manufacturers and where appropriate, the EPA's "Fabric Filter Bag Leak Detection Guidance."

Table 4-1
Program Outline and Tentative Test Schedule

SOURCE	PARAMETER	SAMPLING METHOD	NUMBER OF RUNS	RUN DURATION [1]	ESTIMATED ONSITE TIME

Section 5
Sources and Sampling Location Descriptions

5.1 Source Description - XXX Group 1 Furnaces with Add-on Control Devices

5.2 Sampling Locations

All samples will be collected from the relevant baghouse exhaust stack. The exhaust stack and sample port locations are designed to meet minimum EPA Reference Method 1 requirements (i.e. two and one-half diameters). The stack diameters or depths and widths, upstream and downstream disturbance distances and nipple lengths will be measured on site, with a verification measurement provided by the Field Team Leader.

Section 6
Quality Assurance Program

6.1 Internal Quality Assurance

Specific quality control (QC) procedures will be followed to ensure the continuous production of useful and valid data throughout the course of this test program. The QC checks and procedures described in this section represent an integral part of the overall sampling and analytical scheme. Strict adherence to prescribed procedures is quite often the most applicable QC check. A discussion of both the sampling and analytical QC checks that will be utilized during this program is presented below.

6.2 Equipment Inspection and Maintenance

Each item of calibrated field test equipment purchased by XXXXXXX is assigned a unique, permanent identification number. An effective preventive maintenance program is necessary to ensure data quality. Each item of equipment returning from the field is inspected before it is returned to storage. During the course of these inspections, items are cleaned, repaired, reconditioned, and recalibrated where necessary. Each item of equipment transported to the field for this test program is inspected again before being packed to detect equipment problems which may originate during periods of storage. This minimizes lost time on the job site due to equipment failure. Occasional equipment failure in the field is unavoidable despite the most rigorous inspection and maintenance procedures. For this reason, XXXXXXX routinely transports to the job site replacement equipment for all critical sampling train components.

6.3 Equipment Calibration

New items for which calibration is required are calibrated before initial field use. Equipment whose calibration status may change with use or time is inspected in the field before testing begins and again upon return from each field use. When an item of equipment is found to be out of calibration, it is repaired and recalibrated or retired from service. All equipment is periodically recalibrated in full, regardless of the outcome of these regular inspections.

Calibrations are conducted in a manner, and at a frequency, which meets or exceeds U. S. EPA specifications. XXXXXXX follows the calibration procedures outlined in the EPA Methods, and those recommended within the Quality Assurance Handbook for Air Pollution Measurement Systems: Volume III (EPA-600/4-77-027b, August, 1977). When these methods are inapplicable,

XXXXXXX uses methods such as those prescribed by the American Society for Testing and Materials (ASTM).

Data obtained during calibrations are recorded on standardized forms, which are checked for completeness and accuracy by the quality assurance manager. Data reduction and subsequent calculations are performed using XXXXXXX's own computer facilities. Calculations are checked at least twice for accuracy. Copies of calibration forms are included in the test or project reports.

Emissions sampling equipment requiring calibration includes pitot tubes, pressure gauges, thermometers, dry gas meters, and barometers. The following sections elaborate on the calibration procedures followed by XXXXXXX for these items of equipment.

A: <u>Pitot Tubes.</u> All Type S pitot tubes used by XXXXXXX, whether separate or attached to a sampling probe, are constructed by Apex Instruments or Environmental Supply. Each new pitot is calibrated in accordance with the geometry standards contained in EPA Method 2. A Type S pitot tube, constructed and positioned according to these standards, will have a coefficient of 0.84 ± 0.02. This coefficient will not change as long as the pitot tube is not damaged. Each pitot tube is inspected visually upon return from the field. If a cursory inspection indicates damage or raises doubt that the pitot remains in accordance with the EPA geometry standards, the pitot tube is refurbished as needed and recalibrated.

B: <u>Differential Pressure Gauges.</u> All meter consoles used by XXXXXXX are equipped with 10-in. water column (W.C.) inclined manometers. Fluid manometers do not require calibration other than leak checks. Manometers are leak checked in the field prior to each test series and again upon return from the field.

C: <u>Impinger Thermometer.</u> Prior to the start of testing, the thermometer used to monitor the temperature of the gas leaving the last impinger is compared with a mercury-in-glass thermometer which meets ASTM E-1 No. 63F specifications. The impinger thermometer is adjusted if necessary until it agrees within 2°F of the reference thermometer. If the thermometer is not adjustable, it is labeled with a correction factor.

D: <u>Dry Gas Meter Thermometer.</u> The thermometer used to measure the temperature of the metered gas sample is checked prior to each field trip against an ASTM mercury-in-glass thermometer. The dry gas meter thermometer is acceptable if the values agree within ± 1.5

percent absolute. Thermometers not meeting this requirement are adjusted or labeled with a correction factor.

E: Flue Gas Temperature Sensor. All thermocouples employed by XXXXXXX for the measurement of flue gas temperatures are calibrated upon receipt. Initial calibrations are performed at three points (ice bath, boiling water and hot oil). An ASTM mercury-in-glass thermometer is used as a reference. The thermocouple is acceptable if the agreement is within 1.5 percent (absolute) at each of the three calibration points.

On-site, prior to the start of testing and after testing, the reading from the flue gas thermocouple-potentiometer combination is compared with an ASTM mercury-in-glass reference thermometer. If the two agree within ± 1.5 percent (absolute), the thermocouple and potentiometer are considered to be in proper working order for the test series.

F: Dry Gas Meter and Orifice. Two procedures are used to calibrate the dry gas meter and orifice simultaneously. The full calibration is a complete laboratory procedure used to obtain the calibration factor of the dry gas meter. Full calibrations are performed over a wide range of orifice settings. A simpler procedure, the posttest calibration, is designed to check whether the calibration factor has changed. Posttest calibrations are performed after each field test series by calculating the Y_{qa} using data from each test run.

G: Dry Gas Meter. Each metering system receives a full calibration at the time of purchase. If the calibration factor, Y_{qa}, deviates by less than five percent from the last calibrated value, the test data is acceptable. If Y_{qa} deviates by more than 5 percent, the meter is recalibrated and the meter coefficient (initial or recalibrated) that yields the lowest sample volume for the test runs is used.

EPA Method 5 requires another full calibration anytime the posttest calibration check indicates that Y_{qa} has changed by more than 5 percent. Standard practice at XXXXXXX is to recalibrate the dry gas meter anytime Y_{qa} is found to be greater than 5 percent different or every six months.

H: Orifice. An orifice calibration factor is calculated for each flow setting during a full calibration. If the range of values does not vary by more than 0.20 in. H_2O over the range of 0.4 to 4.0 in. H_2O, the arithmetic average of the values obtained during the calibration is used.

I: Barometer. Each field barometer is adjusted before each test series to agree within ± 0.1 inches of a reference aneroid barometer. The reference barometer (mercury/glass) is checked weekly against the station pressure value (corrected for elevation difference) which is located at the local weather office.

6.4 Sampling Quality Control Procedures

The following pretest QC checks will be conducted:

- All sampling equipment will be thoroughly checked to ensure clean and operable components.
- Equipment will be inspected for possible damage from shipment.
- The oil manometer gauge used to measure pressure across the Type S pitot tube will be leveled and zeroed.
- The number and location of the sampling traverse points will be checked before taking measurements.
- The temperature measurement system will be visually checked for damage and operability by measuring the ambient temperature prior to each traverse.

In addition to the general QC procedures listed above, QC procedures specific to each sampling method will also be incorporated into the sampling scheme. These method specific procedures are discussed below.

A: Sampling Train QC Checks. The following QC procedures will be emphasized:

Prior to Start of Tests

- Keep all cleaned glassware and sample train components sealed until train assembly.
- Keep prepared sorbent traps sealed and cool until sample train assembly.
- Store all filters in filter holders or in individual Petri dishes.
- Assemble the sampling trains in an environment free from uncontrolled dust.
- Visually inspect each sampling train for proper assembly.
- Perform pretest calculations to determine the proper sampling nozzle size.

Prior to Testing Each Day

- Visually inspect the sampling nozzle.
- Visually inspect the Type S pitot tube.
- Leak check each leg of the Type S pitot tube.
- Leak check the entire sampling train.

During Testing Each Day

- Readings of temperature and differential pressure will be taken at each traverse point at 10-minute maximum intervals.
- All sampling data and calculations will be recorded on pre-formatted data sheets.
- All calibration data forms will be reviewed for completeness and accuracy.
- Any unusual occurrences will be noted during each run on the appropriate data form.
- The Field Team Leader will review sampling data sheets daily during testing.
- Properly maintain the roll and pitch axis of the Type S pitot tube and the sampling nozzle.
- Leak check the train before and after each test run or if a filter change takes place during the test run.
- Leak check each leg of the Type S pitot tube before and after each test run.
- Conduct additional leak checks if the sampling time exceeds 4 hours.
- Maintain the probe, filter and impingers at proper temperatures.
- Make proper readings of the dry gas meter, delta P and delta H, temperature, and pump vacuum during sampling at each traverse point.
- Maintain isokinetic sampling within ± 10% of 100%.

After Testing Each Day

- Visually inspect the sampling nozzle.
- Visually inspect the Type S pitot tube.
- Leak check each leg of the Type S pitot tube.
- Leak check the entire sampling train.

6.5 QC for Volumetric Air Flow Rate Determinations

A: Flue Gas Velocity. Data required to determine the flue gas velocity will be collected using the methodology specified in EPA Method 2. Quality control procedures are as follows:

- Visually inspect the Type S pitot tube before and after sampling.
- Leak check both legs of the pitot tube before and after sampling.
- Check the number and location of the sampling traverse points before taking measurements.

B: Flue Gas Molecular Weight. Samples to be used for determination of flue gas molecular weight will be collected using the integrated sampling technique specified in EPA Method 3. Quality control will focus on the following procedures:

- The sampling train will be leak checked before and after each run.
- A constant sampling rate will be used in withdrawing a sample.
- The sampling train will be purged prior to sample collection.
- The sampling port will be properly sealed to prevent air from leaking in.

C: Moisture Content. The moisture content of the gas stream will be determined using the technique specified in EPA Method 4. The following QC checks will be performed:

- The sampling train will be leak checked before and after each run.
- Ice will be maintained in the ice bath throughout each run.

6.6 Analytical Quality Control Procedures

All analyses for this program will be performed using accepted laboratory procedures in accordance with the specified analytical protocols. Adherence to prescribed QC procedures will ensure data of consistent and measurable quality. Analytical QC will focus upon the use of control standards to provide a measure of analytical precision and accuracy. Also, specific acceptance criteria are defined for various analytical operations including calibrations, control standard analyses, drift checks, blanks, etc. The following general QC procedures will be incorporated into the analytical effort:

- The onsite Field Team Leader will review all analytical data and QC data on a daily basis for completeness and acceptability.
- Analytical QC data will be tabulated using the appropriate charts and forms on a daily basis.
- Copies of the QC data tabulation will be submitted to the quality assurance manager following the completion of the test program.
- All hard-copy raw data (i.e., chromatograms, computer printouts, etc.) will be maintained in organized files.

Specific analytical QC procedures for the Baccarach “Fyrite” analyzer are listed below:

- The analyzer will be leveled and the fluid levels zeroed prior to use.
- The analyzer will be leak checked prior to use.
- The analyzer will be thoroughly purged with sample prior to analysis.
- The analyzer will be checked by analyzing an ambient air sample.

Appendix A
Description of Source Testing Methodology

General

This section contains a brief description of the sampling and analytical procedures for each method that will be employed during the test program. All equipment, procedures, and quality assurance measures necessary for the completion of the test program meet or exceed the specifications of the appropriate methods specified in the EPA Reference Methods. Deviations from the methods to ensure quality and representative nature of the results are also discussed.

Sampling Point/Traverse Points Determination - EPA Method 1

The number and locations of the sampling or traverse points will be determined according to the procedures outlined in EPA Method 1. Method 1 requires the accurate measurement of stack diameters, upstream and downstream distances, and location of the sample points. To determine the amount of sample points, the upstream and downstream distances are equated into equivalent diameters. The number of sample points are then determined using charts listed in EPA Method 1.

Gas Velocity and Volumetric Flow Rate - EPA Method 2

The flue gas velocity and volumetric flow rate will be determined according to the procedures outlined in EPA Method 2. Velocity measurements will be made using Type S pitot tubes conforming to the geometric specifications outlined in EPA Method 2. Accordingly, each has been assigned a coefficient of 0.84. Differential pressures will be measured with inclined, fluid manometers. Effluent gas temperatures will be measured with Type K thermocouples equipped with digital readouts.

A cyclonic flow check, using directional pitots and an angle finder, will be performed by XXXXXXX on all "non-tested" stacks to verify that airflow is not cyclonic. In most stationary sources, the direction of stack gas flow is within cyclonic specifications of the method. The following techniques are acceptable for this determination.

Level and zero the manometer. Connect a Type S pitot tube to the manometer to the manometer and leak-check system. Position the Type S pitot tube at each traverse point, in succession, so that the planes of the face openings of the pitot tube are perpendicular to the

stack cross-sectional plane; when the Type S pitot tube is in this position, it is at "O° reference." Note the differential pressure (Δp) reading at each traverse point. If a null (zero) pitot reading is obtained at O° reference at a given traverse point, an acceptable flow condition exists at that point. If the pitot reading is not zero at O° reference, rotate the pitot tube (up to ±9O° yaw angle), until a null reading is obtained. Carefully determine and record the value of the rotation angle (α) to the nearest degree. After the null technique has been applied at each traverse point, calculate the average of the absolute values of α; assign α values of O° to those points for which no rotation was required, and include these in the overall average. If the average value of α is greater than 2O°, the overall flow condition in the stack is unacceptable, and alternative methodology, subject to the approval of the Administrator, must be used to perform accurate sample and velocity traverses.

Oxygen and Carbon Dioxide – EPA Method 3

The oxygen (O_2) and carbon dioxide (CO_2) will be determined at the test locations following Method 3 procedures. An integrated sample will be extracted during each isokinetic test run. The sampling system consists of a stainless steel probe, followed by a Teflon sample line attached to a condenser system, which is attached to a leak free pump with rotameter. The pump will be coupled with a leak free Tedlar bag. The concentration of oxygen and carbon dioxide in the sample will be determined by using a Bacharach "Fyrite" Gas Analyzer. Fyrite analysis provides for the selective absorption of oxygen in Burrell Oxysorbent and carbon dioxide in potassium hydroxide solutions. The difference in gas volume before and after the absorption represents the amount of constituent gas in the sample. Each sample will be analyzed three (3) times, and the average of the readings for each run will be used in calculating the emission rate for the respective test run.

Gas Moisture Content - EPA Method 4

The flue gas moisture content will be determined in conjunction with each isokinetic sampling train and in accordance the sampling and analytical procedures outlined in EPA Method 4. The impingers will be connected in series and will contain reagents as listed in the following method descriptions. The impingers will be contained in an ice bath to ensure condensation of the flue gas stream moisture. Any moisture that is not condensed in the impingers is captured in the silica gel; therefore, all moisture can be weighed and entered into moisture content calculations.

Dioxin/Furan - EPA Method 23

All glass components of the Method 23 sample train upstream of the adsorbent module, will be cleaned in accordance with section 3A of the "Manual of Analytical Methods for the Analysis of Pesticides in Human and Environmental Samples". No silicone grease sealants will be used for this sampling method. Glass-fiber filters will be pre-cleaned in the laboratory in a Soxhlet apparatus. Adsorbent modules will be cleaned as the filters and treated with the appropriate amount of the surrogate solution.

Samples will be withdrawn at an isokinetic rate from the source using an EPA Method 23 sampling train. The sample train is assembled and operated as a Method 5 with the following exception – immediately following the heated filter will be a non-contact, recirculating cold water condenser leading to the XAD-2 adsorbent trap which is attached to an empty modified Greenburg-Smith impinger. The next two impingers will contain 100 ml of HPLC water, the next impinger will be empty, and the last impinger will contain approximately 200 g silica gel. Each test run will be approximately 4 hours in duration.

Following the completion of each test run, the impingers will be weighed on an electronic balance to determine the amount of moisture gained during the run. The impinger contents will be discarded after determining the moisture gain. The filter will be removed from the filter holder and placed in Sample Container 1. The XAD sorbent module will be sealed on both ends, labeled, and stored on ice until transported to the laboratory. The nozzle, probe, front and back half of the filter holder, filter support, condenser coil, and connecting glassware will be rinsed with acetone and placed in Sample Container 2. All glassware cleaned for Sample Container 2 will be rinsed lastly with toluene and placed in Sample Container 3. Sample containers 3 and 4 will be amber glass containers.

All samples will be analyzed by Analytical Perspectives in Wilmington, North Carolina in accordance with the requirements listed in Method 23, Section 5.

Hydrogen Chloride – EPA Method 26A

Sampling Equipment Preparation. All glass components of the Method 26A sample train will be cleaned according to Code of Federal Regulations 40, Part 60, Appendix A. The Method 26A sample will be collected utilizing the impingers from the Method 5 train.

Sample Collection. Samples will be withdrawn at an isokinetic rate from the source using an EPA Method 5/26A sampling train. The sample train is assembled and operated as a Method 5 with the following exception – the first and second impinger solution will be 100 ml of 0.1 N H_2SO_4. Each test run will be approximately 4 hours in duration.

Sample Recovery. Following the completion of each test run, the impingers will be weighed on an electronic balance to determine the amount of moisture gained during the run. The 1st and 2nd impinger contents will be collected in a polyethylene sample container. All glassware, from the back-half of the filter holder to the outlet of the 2nd impinger, will be rinsed with DI water, and these rinses added to the sample container.

Appendix B
Sample Calculations

Meter Pressure (Pm), in. Hg

$$Pm = Pb + \frac{\Delta H}{13.6}$$

where,

Pb = barometric pressure, in. Hg
ΔH = pressure differential of orifice in. H_2O

Absolute Stack Gas Pressure (Ps), in. Hg

$$Ps = Pb + \frac{Pg}{13.6}$$

where,

Pb = barometric pressure, in. Hg
Pg = static pressure, in. H_2O

Standard Meter Volume (Vmstd), dscf

$$Vmstd = \frac{17.647 \text{ x } Y \text{ x } Vm \text{ x } Pm}{Tm}$$

where,

Y = meter correction factor
Vm = meter volume, cf
Pm = meter pressure, in. Hg
Tm = meter temperature, ^{o}R

\

Standard Wet Volume (Vwstd), scf

$$Vwstd = 0.04707x\ Vlc$$

where,

Vlc = volume of H_2O collected, ml

Moisture Fraction (BWS)

$$BWS = \frac{Vwstd}{(Vwstd + Vmstd)}$$

where,
Vwstd = standard wet volume, scf
Vmstd = standard meter volume, dscf

Moisture Content (MC), %

$$MC = BWS \ x \ 100$$

where,
BWS = moisture fraction, dimensionless

Molecular Weight (DRY) (Md), lb/lb-mole

$$Md = (0.44 \times CO_2) + (0.32 \times O_2) + (0.28 \ (100 - CO_2 - O_2))$$

where,
CO_2 = carbon dioxide concentration, %
O_2 = oxygen concentration, %

Molecular Weight (WET) (Ms), lb/lb-mole

$$Ms = Md \ (1 - BWS) + 18 (BWS)$$

where,
Md = molecular weight (DRY), lb/lb-mole
BWS = moisture fraction, dimensionless

Average Velocity (Vs), ft/sec

$$Vs = 85.49 \ x \ Cp \ x \ \sqrt{\Delta P} \ avg. \ x \ \sqrt{\frac{Ts}{Ps \ x \ Ms}}$$

where,
Cp = pitot tube coefficient
ΔP = velocity head of stack gas, in. H_2O
Ts = absolute stack temperature, ^oR
Ps = absolute stack gas pressure, in. Hg
Ms = molecular weight of stack gas, lb/lb-mole

Average Stack Gas Flow at Stack Conditions (Qa), acfm

$$Qa = 60 \, x \, Vs \; x \; As$$

where,

Vs = stack gas velocity, ft/sec
As = cross-sectional area of stack, ft^2

Average Stack Gas Flow at Standard Conditions (Qs), dscfm

$$Qs = 17.647 \; x \; Qa \; x \; (1 - BWS) \; x \; \frac{Ps}{Ts}$$

where,

Qa = average stack gas flow at stack conditions, ft^3/min
BWS = moisture fraction, dimensionless
Ps = absolute stack gas pressure, in. Hg
Ts = absolute stack temperature, ^oR

Dioxin/Furan Concentration ($c_{D/F}$), ng/ft^3 – using 1989 D/F TEF's

$$c_{D/F} = \frac{m_{D/F}}{Vmstd \times 1.0E+03}$$

where,

$m_{D/F}$ = D/F mass, pg
Vmstd = standard meter volume, dscf

D/F Emission Rate (ER_{DF}), lb/hr – using 1989 D/F TEF's

$$ER_{DF} = \frac{c_{D/F} \times Q_s \times 60}{454\,E+09}$$

where,

$c_{D/F}$ = D/F concentration, ng/ft^3
Qs = stack gas flow at standard conditions, dscfm

D/F Emission Factor (EF_{DF}), grains /ton – using 1989 D/F TEF's

$$EF_{DF} = \frac{ER_{DF} \times 7.0E+03 \times 2.0E+03}{FR}$$

where,

ER_{DF} = D/F emission rate, lbs/hr
FR = feed rate, lbs/hr

D/F Emission Factor (EF_{DF}), ug/MG – using 1989 D/F TEF's

$$EF_{DF} = \frac{ER_{DF} \times 1.0E+12}{FR}$$

where,

ER_{DF} = D/F emission rate, lbs/hr
FR = feed rate, lbs/hr

Particulate Concentration (c_s), grains/dscf

$$c_S = \frac{M_n \times 0.0154}{Vmstd}$$

where,

Mn = particulate mass, mg
Vmstd = standard meter volume, dscf

Particulate Emission Rate (PMR), lbs/hr

$$PMR = \frac{c_s \times Qs \times 60}{7.0E+03}$$

where,

c_s = particulate concentration, grains/dscf
Qs = stack gas flow rate at standard conditions, dscfm

Particulate Emission Factor (EF_{PM}), lbs/ton

$$EF_{PM} = \frac{PMR \times 2.0E+03}{FR}$$

where,

PMR = particulate emission rate, lbs/hr
FR = feed rate, lbs/hr

Hydrogen Chloride Concentration (c_{HCl}) mg/dscm

$$c_{HCl} = \frac{M_{HCl} \times 35.313}{Vmstd}$$

where,

M_{HCl} = hydrogen chloride mass, mg
Vmstd = standard meter volume, dscf

Hydrogen Chloride Emission Rate (ER_{HCl}), lbs/hr

$$ER_{HCl} = \frac{M_{HCl} \times Qs \times 60}{Vmstd \times 4.54x10^{5}}$$

where,

M_{HCl} = hydrogen chloride mass, mg
Qs = stack gas flow rate at standard conditions, dscfm
Vmstd = standard meter volume, dscf

Hydrogen Chloride Emission Factor (EF_{HCl}), lbs/ton

$$EF_{HCl} = \frac{ER_{HCl} \times 2.0E+03}{FR}$$

where,

ER_{HCl} = hydrogen chloride emission rate, lbs/hr
FR = feed rate, lbs/hr

Appendix C
Production Record

Appendix D
Diagrams

To Be Added

APPENDIX E
Reverberatory Furnace/Thermal Chip Dryer Test Protocol

SITE-SPECIFIC TEST PLAN

FOR THE

SECONDARY ALUMINUM
PRODUCTION FACILITY

LOCATED IN

Table of Contents

List of Tables

List of Appendices

Section 1

Introduction

Section 2
Source Information

Plant Name and Address

Source Identification

Source Contact

Section 3
Testing Firm Information

Testing Firm Name and Address

Test Firm Contact

Test Team Contact

Section 4
Test Program Description

To satisfy the requirements of the secondary aluminum NESHAP regulations and the Title V Permit No. the facility will conduct a performance test to determine the compliance status of one (1) reverberatory furnace, one (1) thermal chip dryer and the associated emission control system (lime-injected baghouse).

This site specific test plan has been developed to address the federal and state requirements.

General Description

A sampling and analytical program will be conducted on the outlet stack of the fabric filter baghouse that controls the emissions from each source being tested. All of the required operating and monitoring conditions for this program will be discussed in the Process Parameters and Operation Information section of this Plan.

All testing will be performed in conformance with specifications stipulated in EPA Reference Method 1, Method 2, Method 3/3A, Method 4, Method 5, Method 6C, Method 7E, Method 23, Method 25A, Method 26 or 26A, Method 201A and Method 202. The regulated pollutants will be measured to demonstrate compliance with the Secondary Aluminum Production NESHAP Standard, 40 CFR Part 63, Subpart RRR and the Title V permit. **Table 4-1** presents an outline and tentative schedule for the emissions testing program. The following is a summary of the proposed testing and the planned schedule.

- Testing is being performed to satisfy requirements of the 40 CFR, Part 63, Subpart RRR (Secondary Aluminum Production NESHAP) and the Title V permit.
- Materials to be processed will be identified and targeted production rates provided in a separate communication prior to the test.
- Testing will be performed with lime injection rates below the level established by previous stack tests.
- The reverberatory furnace and thermal chip dryer are ducted to a four cell pulse jet lime injected baghouse. The test will consist of three runs measuring PM, PM10, D/F, HCl, NO_x HF, SO_2 and THC. The test result will be used to establish a maximum flux limit (% flux), maximum 3-hour block baghouse inlet temperature, and minimum 3-hour block afterburner temperature.
- Testing of the thermal chip dryer and reverberatory furnace will be in compliance with 63.1511(i) since they are both ducted to the same baghouse.
- The thermal chip dryer run period will match the reverberatory furnace cycle.

- The HCl test will be used to establish a maximum flux limit (% flux) to be used as an internal measure. The flux chemistry and weight will be recorded. From the test, the lb Cl_2/ton charged will be calculated. The allowable flux % will be calculated from this value using the chemical makeup of the flux and the molar weight of the compounds.
- Fifteen minute average temperatures into the baghouse will be monitored and recorded during each run. These will be used to determine the maximum 3 hour block average.
- Fifteen minute average temperatures out of the Hot Gas Generator/Afterburner will be monitored and recorded during each run. These will be used to determine the minimum 3 hour block average.
- This test will consist of three runs, each being one furnace cycle (beginning of feed to end of tap) in length.
- Tap volume will be at the largest volume the furnace regularly taps in the course of normal operations. This will not preclude, during the course of normal operations, tapping varying amounts from the furnace as business conditions may require. The scrap blend into the reverberatory furnace will be representative of those materials commonly used.
- Molten metal level in the furnace will be monitored to insure the level is maintained above the arch between the sidewell and main hearth.
- Velocity and volumetric flow measurements will be taken using EPA Method 2.
- This testing program is proposed to be conducted during

Process Parameters and Operation Information

Plant personnel or their designated consultant will collect parametric data from the furnace, thermal chip dryer and shredder operations and the associated control devices. The following identifies the measurements, observations, and records that will be collected during the testing events. A worksheet will be developed for the collection of the required operating records as described within this Plan.

All Sources and Associated Control Devices

The systems operation is further described in **Section 5** of this Plan. The methods that will be used to demonstrate compliance rely on the operating data collected during the performance test runs. To properly evaluate the emissions from the sources, a sampling plan is being proposed to monitor emissions during near maximum production. The following parameters are to be identified in the facility's OM&M plan and will be maintained during the testing event.

- Solid flux will be continuously fed onto a conveyor and transported to the scrap ingestion system in the sidewell of the furnace.

- The flux feeder load cell calibration will be verified during the two months prior to the test.
- Direct charge scrap for the thermal chip dryer and the reverberatory furnace will be weighed on scales with an accuracy of ± 1% that are calibrated at least every six (6) months and then placed into the respective feed hoppers.
- The lime injection setting will be checked daily to ensure that the proper setting is maintained. The minimum effective lime usage rate will be set during the performance test to ensure compliance with the standard under all conditions. The feed system will be evaluated prior to the performance test to establish the operating settings to establish this minimum feed rate.
- Lime flow rate will be checked following each run of the test.
- To insure lime is free flowing, each feeder will be checked and documented hourly during the test period.
- The carbon injection setting will be checked daily to ensure that the proper setting is maintained. The minimum effective carbon usage rate will be set during the performance test to ensure compliance with the standard under all conditions. The feed system will be evaluated prior to the performance test to establish the operating settings to establish this minimum feed rate.
- Inlet temperatures of the lime injected baghouse are regulated by the introduction of cooling air through an automated damper. This temperature parameter will be monitored in 15-minute averages during the performance test. A 3-hour average will be calculated from the 15-minute averages collected during the test. The inlet temperature system will be calibrated prior to conducting the performance test to establish an accurate 3-hour block average temperature.
- Afterburner temperatures will be monitored in 15-minute averages during the performance test. A 3-hour average will be calculated from the 15-minute averages collected during the test. The Afterburner temperature system will be calibrated prior to conducting the performance test to establish an accurate 3-hour block average temperature.
- The bag leak detection systems will be monitored during the performance test to establish proper operation of the baghouses and the monitors. The equipment will be configured and operated as suggested by the manufacturers and where appropriate, the EPA's "Fabric Filter Bag Leak Detection Guidance."

Table 4-1

Program Outline and Tentative Test Schedule

SOURCES	PARAMETER	SAMPLING METHOD	NUMBER OF RUNS	RUN DURATION [1]	ESTIMATED ONSITE TIME

Section 5
Sources and Sampling Location Descriptions

Test Source Description - One Group 1 Furnace, One Thermal Chip Dryer with Add-on Pollution Control Device

The reverberatory furnace is used to melt aluminum scrap that has been processed by the existing drying system or directly charged scrap. The furnace is designed as a sidewell melter/holder unit to allow for continuous operation. The direct charged, and preprocessed scrap is charged to the sidewell of the furnace along with solid flux material and any alloying agents that are required for the production order. Once the materials are molten, the metal flows through a submerged opening to the hearth. Once properly alloyed, the furnace is tapped and the molten aluminum is transferred to refractory lined crucibles for delivery or transferred to sow molds and cast into RSI. The furnace operation is defined as a group 1 furnace in the regulation (40 CFR 63, Subpart RRR). All emissions from the reverb furnace are captured and directed to a lime injected baghouse for control of the regulated pollutants. Only clean charge materials are fed to the main hearth and no reactive flux materials are used in this section of the furnace.

The thermal chip dryer is used to remove lubricant from aluminum turnings and chips. The turnings and chips are charged into the thermal chip dryer via a conveyor where hot combustion gases burn-off the lubricant. The dried turnings and chips can now be charged directly into the sidewell of the reverberatory furnace.

Sampling Locations

The sample port locations for the reverberatory furnace duct and baghouse exhaust stack meet minimum EPA Reference Method 1 requirements (i.e. two and one-half diameters). Flow straightening vanes were recently installed on the reverberatory furnace duct to alleviate the presence of cyclonic flow. The thermal chip dryer sample port location does not meet the minimum distance (one-half diameter for Distance A) from the nearest downstream disturbance. Based on data provided from previous testing and the distance of straight duct upstream of the sample ports, cyclonic flow is not expected. The reverberatory furnace flue stack sampling location also meets minimum EPA Reference Method 1 requirements.

Cyclonic flow checks will be conducted at all sampling locations before performance testing is initiated. Appendices E through G provide detailed descriptions of the sample port locations.

Section 6
Quality Assurance Program

Internal Quality Assurance

Specific quality control (QC) procedures will be followed to ensure the continuous production of useful and valid data throughout the course of this test program. The QC checks and procedures described in this section represent an integral part of the overall sampling and analytical scheme. Strict adherence to prescribed procedures is quite often the most applicable QC check. A discussion of both the sampling and analytical QC checks that will be utilized during this program is presented below.

Equipment Inspection and Maintenance

Each item of calibrated field test equipment purchased by XXXXXX is assigned a unique, permanent identification number. An effective preventive maintenance program is necessary to ensure data quality. Each item of equipment returning from the field is inspected before it is returned to storage. During the course of these inspections, items are cleaned, repaired, reconditioned, and recalibrated where necessary. Each item of equipment transported to the field for this test program is inspected again before being packed to detect equipment problems which may originate during periods of storage. This minimizes lost time on the job site due to equipment failure. Occasional equipment failure in the field is unavoidable despite the most rigorous inspection and maintenance procedures. For this reason, XXXXXX routinely transports to the job site replacement equipment for all critical sampling train components.

Equipment Calibration

New items for which calibration is required are calibrated before initial field use. Equipment whose calibration status may change with use or time is inspected in the field before testing begins and again upon return from each field use. When an item of equipment is found to be out of calibration, it is repaired and recalibrated or retired from service. All equipment is periodically recalibrated in full, regardless of the outcome of these regular inspections.

Calibrations are conducted in a manner, and at a frequency, which meets or exceeds U. S. EPA specifications. XXXXXX follows the calibration procedures outlined in the EPA Methods, and those recommended within the Quality Assurance Handbook for Air Pollution Measurement Systems: Volume III (EPA-600/4-77-027b, August, 1977). When these methods are inapplicable, XXXXXX uses methods such as those prescribed by the American Society for Testing and Materials (ASTM).

Data obtained during calibrations are recorded on standardized forms, which are checked for completeness and accuracy by the quality assurance manager. Data reduction and subsequent calculations are performed using XXXXXX's own computer facilities. Calculations are checked at least twice for accuracy. Copies of calibration forms are included in the test or project reports.

Emissions sampling equipment requiring calibration includes pitot tubes, pressure gauges, thermometers, dry gas meters, and barometers. The following sections elaborate on the calibration procedures followed by XXXXXX for these items of equipment.

A: Pitot Tubes. All Type S pitot tubes used by XXXXXX, whether separate or attached to a sampling probe, are constructed by Apex Instruments or Environmental Supply. Each new pitot is calibrated in accordance with the geometry standards contained in EPA Method 2. A Type S pitot tube, constructed and positioned according to these standards, will have a coefficient of 0.84 ± 0.02. This coefficient will not change as long as the pitot tube is not damaged. Each pitot tube is inspected visually upon return from the field. If a cursory inspection indicates damage or raises doubt that the pitot remains in accordance with the EPA geometry standards, the pitot tube is refurbished as needed and recalibrated.

B: Differential Pressure Gauges. All meter consoles used by XXXXXX are equipped with 10-in. water column (W.C.) inclined manometers. Fluid manometers do not require calibration other than leak checks. Manometers are leak checked in the field prior to each test series and again upon return from the field.

C: Impinger Thermometer. Prior to the start of testing, the thermometer used to monitor the temperature of the gas leaving the last impinger is compared with a mercury-in-glass thermometer which meets ASTM E-1 No. 63F specifications. The impinger thermometer is adjusted if necessary until it agrees within 2°F of the reference thermometer. If the thermometer is not adjustable, it is labeled with a correction factor.

D: Dry Gas Meter Thermometer. The thermometer used to measure the temperature of the metered gas sample is checked prior to each field trip against an ASTM mercury-in-glass thermometer. The dry gas meter thermometer is acceptable if the values agree within ± 1.5

percent absolute. Thermometers not meeting this requirement are adjusted or labeled with a correction factor.

E: Flue Gas Temperature Sensor. All thermocouples employed by XXXXXX for the measurement of flue gas temperatures are calibrated upon receipt. Initial calibrations are performed at three points (ice bath, boiling water and hot oil). An ASTM mercury-in-glass thermometer is used as a reference. The thermocouple is acceptable if the agreement is within 1.5 percent (absolute) at each of the three calibration points.

On-site, prior to the start of testing and after testing, the reading from the flue gas thermocouple-potentiometer combination is compared with an ASTM mercury-in-glass reference thermometer. If the two agree within ± 1.5 percent (absolute), the thermocouple and potentiometer are considered to be in proper working order for the test series.

F: Dry Gas Meter and Orifice. Two procedures are used to calibrate the dry gas meter and orifice simultaneously. The full calibration is a complete laboratory procedure used to obtain the calibration factor of the dry gas meter. Full calibrations are performed over a wide range of orifice settings. A simpler procedure, the posttest calibration, is designed to check whether the calibration factor has changed. Posttest calibrations are performed after each field test series by calculating the Y_{qa} using data from each test run.

G: Dry Gas Meter. Each metering system receives a full calibration at the time of purchase. If the calibration factor, Y_{qa}, deviates by less than five percent from the last calibrated value, the test data is acceptable. If Y_{qa} deviates by more than 5 percent, the meter is recalibrated and the meter coefficient (initial or recalibrated) that yields the lowest sample volume for the test runs is used.

EPA Method 5 requires another full calibration anytime the posttest calibration check indicates that Y_{qa} has changed by more than 5 percent. Standard practice at XXXXXX is to recalibrate the dry gas meter anytime Y_{qa} is found to be greater than 5 percent different or every six months.

H: Orifice. An orifice calibration factor is calculated for each flow setting during a full calibration. If the range of values does not vary by more than 0.20 in. H_2O over the range of 0.4 to 4.0 in. H_2O, the arithmetic average of the values obtained during the calibration is used.

I: Barometer. Each field barometer is adjusted before each test series to agree within ± 0.1 inches of a reference aneroid barometer. The reference barometer (mercury/glass) is checked weekly against the station pressure value (corrected for elevation difference) which is located at the local weather office.

Sampling Quality Control Procedures

The following pretest QC checks will be conducted:

- All sampling equipment will be thoroughly checked to ensure clean and operable components.
- Equipment will be inspected for possible damage from shipment.
- The oil manometer gauge used to measure pressure across the Type S pitot tube will be leveled and zeroed.
- The number and location of the sampling traverse points will be checked before taking measurements.
- The temperature measurement system will be visually checked for damage and operability by measuring the ambient temperature prior to each traverse.

In addition to the general QC procedures listed above, QC procedures specific to each sampling method will also be incorporated into the sampling scheme. These method specific procedures are discussed below.

A: Sampling Train QC Checks. The following QC procedures will be emphasized:

Prior to Start of Tests

- Keep all cleaned glassware and sample train components sealed until train assembly.
- Keep prepared sorbent traps sealed and cool until sample train assembly.
- Store all filters in filter holders or in individual Petri dishes.
- Assemble the sampling trains in an environment free from uncontrolled dust.
- Visually inspect each sampling train for proper assembly.
- Perform pretest calculations to determine the proper sampling nozzle size.

Prior to Testing Each Day

- Visually inspect the sampling nozzle.
- Visually inspect the Type S pitot tube.

During Testing Each Day

- Readings of temperature and differential pressure will be taken at each traverse point at 10-minute maximum intervals.
- All sampling data and calculations will be recorded on pre-formatted data sheets.
- All calibration data forms will be reviewed for completeness and accuracy.
- Any unusual occurrences will be noted during each run on the appropriate data form.
- The Field Team Leader will review sampling data sheets daily during testing.
- Properly maintain the roll and pitch axis of the Type S pitot tube and the sampling nozzle.
- Leak check the train before and after each test run or if a filter change takes place during the test run.
- Conduct additional leak checks if the sampling time exceeds 4 hours.
- Maintain the probe, filter and impingers at proper temperatures.
- Make proper readings of the dry gas meter, delta P and delta H, temperature, and pump vacuum during sampling at each traverse point.
- Maintain isokinetic sampling within ± 10% of 100%.

After Testing Each Day

- Visually inspect the sampling nozzle.
- Visually inspect the Type S pitot tube.

QC for Volumetric Air Flow Rate Determinations

A: Flue Gas Velocity. Data required to determine the flue gas velocity will be collected using the methodology specified in EPA Method 2. Quality control procedures are as follows:

- Visually inspect the Type S pitot tube before and after sampling.
- Leak check both legs of the pitot tube before and after sampling.
- Check the number and location of the sampling traverse points before taking measurements.

B: Flue Gas Molecular Weight. Samples to be used for determination of flue gas molecular weight will be collected using the integrated sampling technique specified in EPA Method 3. Quality control will focus on the following procedures:

- The sampling train will be leak checked before and after each run.
- A constant sampling rate will be used in withdrawing each sample.
- The sampling train will be purged prior to sample collection.
- The sampling port will be properly sealed to prevent air from leaking in.

C: Moisture Content. The moisture content of the gas stream will be determined using the technique specified in EPA Method 4. The following QC checks will be performed:

- The sampling train will be leak checked before and after each run.
- Ice will be maintained in the ice bath throughout each run.

Analytical Quality Control Procedures

All analyses for this program will be performed using accepted laboratory procedures in accordance with the specified analytical protocols. Adherence to prescribed QC procedures will ensure data of consistent and measurable quality. Analytical QC will focus upon the use of control standards to provide a measure of analytical precision and accuracy. Also, specific acceptance criteria are defined for various analytical operations including calibrations, control standard analyses, drift checks, blanks, etc. The following general QC procedures will be incorporated into the analytical effort:

- The onsite Field Team Leader will review all analytical data and QC data on a daily basis for completeness and acceptability.
- Analytical QC data will be tabulated using the appropriate charts and forms on a daily basis.
- Copies of the QC data tabulation will be submitted to the quality assurance manager following the completion of the test program.
- All hard-copy raw data (i.e., chromatograms, computer printouts, etc.) will be maintained in organized files.

Appendix A
Description of Source Testing Methodology

General

This section contains a brief description of the sampling and analytical procedures for each method that will be employed during the test program. All equipment, procedures, and quality assurance measures necessary for the completion of the test program meet or exceed the specifications of the appropriate methods specified in the EPA Reference Methods. Deviations from the methods to ensure quality and representative nature of the results are also discussed.

Sampling Point/Traverse Points Determination - EPA Method 1

The number and locations of the sampling or traverse points will be determined according to the procedures outlined in EPA Method 1. Method 1 requires the accurate measurement of stack diameters, upstream and downstream distances, and location of the sample points. To determine the amount of sample points, the upstream and downstream distances are equated into equivalent diameters. The number of sample points is then determined using charts listed in EPA Method 1.

Gas Velocity and Volumetric Flow Rate - EPA Method 2

The flue gas velocity and volumetric flow rate will be determined according to the procedures outlined in EPA Method 2. Velocity measurements will be made using Type S pitot tubes conforming to the geometric specifications outlined in EPA Method 2. Accordingly, each has been assigned a coefficient of 0.84. Differential pressures will be measured with inclined, fluid manometers. Effluent gas temperatures will be measured with Type K thermocouples and pyrometers.

A cyclonic flow check, using directional pitots and an angle finder, will be performed to verify that airflow is not cyclonic. In most stationary sources, the direction of stack gas flow is within cyclonic specifications of the method. The following techniques are acceptable for this determination.

Level and zero the manometer. Connect a Type S pitot tube to the manometer to the manometer and leak-check system. Position the Type S pitot tube at each traverse point, in succession, so that the planes of the face openings of the pitot tube are perpendicular to the stack cross-sectional plane; when the Type S pitot tube is in this position, it is at "O° reference." Note the differential pressure (Δp) reading at each traverse point. If a null (zero) pitot reading is obtained at O° reference at a given traverse point, an acceptable flow condition exists at that point. If the pitot reading is not zero at O° reference, rotate the pitot tube (up to ±9O° yaw angle), until a null reading is obtained. Carefully determine and record the value of the rotation angle (α) to the nearest degree. After the null technique has been applied at each traverse point, calculate the average of the absolute values of α; assign α values of O° to those points for which no rotation was required, and include these in the overall average. If the average value of α is greater than 2O°, the overall flow condition in the stack is unacceptable, and alternative methodology, subject to the approval of the Administrator, must be used to perform accurate sample and velocity traverses.

Oxygen and Carbon Dioxide – EPA Method 3/3A

The oxygen (O_2) and carbon dioxide (CO_2) concentrations will be determined in accordance with sampling and analytical procedures outlined EPA Methods 3 and 3A. One (1) integrated sample will be extracted during each test run. Each bag sample will be analyzed onsite with a California Analytical Instruments Model 200P O_2/CO_2 or 300P $O_2/CO_2/CO$ analyzer. The remaining stack gas constituent will be assumed to be nitrogen for the stack gas molecular weight determination

Gas Moisture Content - EPA Method 4

The stack gas moisture contents will be determined in accordance the sampling and analytical procedures outlined in EPA Method 4. The impingers will be connected in series and will contain reagents as listed in the following method descriptions. The impingers will be contained in an ice bath to ensure condensation of the gas stream moisture. Any moisture that is not condensed in the impingers is captured in the silica gel; therefore, all moisture can be weighed and entered into moisture content calculations.

Particulate Matter - EPA Method 5

Sample Collection. Samples will be withdrawn at an isokinetic rate from the source using an EPA Method 5 sampling train. The sampling train will consist of a glass or stainless nozzle, a heated glass-lined or stainless-lined probe with a Type S Pitot tube attached, a tarred glass fiber or Teflon filter, four chilled impingers and a metering console. The first and second impingers will each contain 100 mL of impinger liquor, the third impinger will remain empty, and the fourth will contain pre-weighed silica gel.

Sample Recovery. Following the completion of each test run, the impingers will be weighed on an electronic balance to determine the amount of moisture gained during the run. Samples will be recovered in a dust free environment in XXXXXX's mobile laboratory. Impinger cases will be used to transport the samples from the field to the mobile laboratory. A stainless steel spatula and tweezers will be used to remove the filter from the filter holder and place it in a labeled Petri dish. The probe and nozzle acetone rinses will be collected in glass sample containers, and the liquid levels will be marked.

Sample Analyses. The filter and front-half acetone rinse will be desiccated and weighed to a constant weight using Method 5 analytical procedures. An acetone blank will be taken, analyzed and interpreted as described in Method 5.

Sulfur Dioxide - EPA Method 6C

The sulfur dioxide concentration will be determined in accordance EPA Method 6C. Data will be collected online and reported in one-minute averages. The sampling system will consist of a heated stainless steel probe, heated Teflon sample line(s), gas conditioning system and an Ametek Western Research Model 721M or Model 921M SO_2 analyzer. The gas conditioning system will be a non-contact condenser to remove moisture from the source gas. XXXXXX will use EPA Protocol 1 gases and a gas dilution system to accurately split concentrated gases to meet the calibration and bias/drift check requirements of Method 6C. A Method 205 field certification on the gas dilution system will be conducted before testing is initiated.

Nitrogen Oxides - EPA Method 7E

The concentration of nitrogen oxides will be determined in accordance with EPA Method 7E. Data will be collected online and reported in one-minute averages. The sampling system will consist of a heated stainless steel probe, heated Teflon sample line(s), gas conditioning system and California Analytical Model 400CLD analyzer. The gas conditioning system will be a non-contact condenser to remove moisture from the stack gas. XXXXXX will use EPA Protocol 1 gases and a gas dilution system to accurately split concentrated gases to meet the calibration and bias/drift check requirements of Method 7E. A Method 205 field certification on the gas dilution system and NO_2-NO converter check on the NO_x analyzer will be conducted before testing is initiated.

Dioxin/Furan - EPA Method 23

The dioxin and furan concentrations will be determined in accordance with EPA Test Method 23 with guidance from Alternative Method 034. All glassware leading to the XAD adsorbing resin will be cleaned at XXXXXX's laboratory before mobilizing to the site. Glassware cleaning will consist of washing with warm soapy water and rinsing with distilled water and acetone. Once the glassware is dry, the open ends will be sealed with Teflon tape. Analytical Perspectives in Wilmington, North Carolina provided the pre-cleaned filters and pre-cleaned, packed and spiked XAD resin traps.

The impinger train will be assembled in the sample recovery area. The first impinger (shortened stem) will be empty and used for a knockout impinger. The next two (2) impingers will be standard Greenberg-Smith impingers with each containing 100 mL of water. The fourth impinger will be empty while the fifth impinger will be charged with approximately 300 grams of indicating silica gel. The pre-cleaned glass fiber filter will be placed in a glass filter holder with a Teflon-coated filter support and connected to the condenser coil. All open ends of the sampling train will be sealed with Teflon tape prior to complete assembly at the sampling location.

The complete sampling system will consist of a glass nozzle, heated glass-lined probe, glass filter holder with pre-cleaned glass-fiber filter, condenser coil, XAD resin trap, gas conditioning train, pump and calibrated dry gas meter. The probe and filter box temperatures will be maintained at approximately 250°F. The sorbent module resin and impinger temperatures will be maintained at or below 68^{o}F throughout the testing.

Following the completion of each test run, the sampling train will be leak checked at a vacuum pressure greater than or equal to the highest vacuum pressure observed during the run. The filter will be removed from the filter holder and placed in sample Container 1. The XAD sorbent module will be sealed on both ends and placed on ice. The nozzle, probe liner, filter holder, condenser and all connecting glassware will be triple-rinsed with acetone, and these rinses recovered in sample Container 2. All glassware cleaned for sample Container 2, except the condenser, will also be triple-rinsed with toluene. Three (3) 5-minute soaks with toluene will be conducted on the condenser. The toluene rinses will be recovered in sample Container 3.

All samples will be sealed, labeled, stored on ice and shipped to Analytical Perspectives in Wilmington, North Carolina via an overnight courier. The sample analysis will be performed by high resolution gas chromatography and high resolution mass spectrometry.

Total Hydrocarbons- EPA Method 25A

The concentration of total hydrocarbons will be determined in accordance with EPA Method 25A. Data will be collected online and reported in one-minute averages. The sampling will consist of a heated stainless steel probe, heated Teflon sample line(s) and California Analytical Instruments Model 300 (or 300M) HFID analyzer. An initial analyzer calibration and three (3) system drift checks (one after each test run) will be conducted to ensure the integrity of the sampling system. A gas divider will be used to dilute concentrated propane in air calibration gas (EPA Protocol 1 gas) to obtain the necessary calibration gas concentrations described in Method 25A. The gas divider will be calibrated in the field in accordance with EPA Method 205 testing is initiated.

Hydrogen Chloride & Hydrogen Fluoride – EPA Method 26

Sample Collection. Samples will be withdrawn at a constant rate from the source using an EPA Method 26 or modified EPA Method 26 sampling train. If modified, 500 mL impingers and a Method 5 type dry gas meter will be used instead of the midget impingers and low-flow dry gas meter described in Method 26. The sampling train will consist of a heated glass-lined probe, a heated Teflon filter, four chilled impingers and a calibrated dry gas meter. The first and second impingers will each contain 0.1 N H_2SO_4, the third will be empty, and the fourth will contain pre-weighed silica gel.

Sample Recovery. Following the completion of each test run, samples will be recovered in a dust free environment in XXXXXX's mobile laboratory. Impinger cases will be used to transport the samples from the field to the mobile laboratory. The contents of impingers 1, 2 and 3 will be placed in Container 1. Each impinger and the connecting glassware will be rinsed with DI water, and these rinses will be recovered in Container 1. All samples containers will be labeled, sealed and liquid levels marked for transport to an offsite laboratory.

Sample Analyses. The concentrations will be determined by analyzing the samples using ion chromatography by Maxxam Analytical, Inc. in Burlington, Ontario, Canada.

Hydrogen Chloride, Chlorine & Hydrogen Fluoride – EPA Method 26A

Sampling Equipment Preparation. All glass components of the Method 26A sample train will be cleaned according to Code of Federal Regulations 40, Part 60, Appendix A. The Method 26A sample will be collected utilizing the impingers from the Method 5 train.

Sample Collection. Samples will be withdrawn at an isokinetic rate from the source using an EPA Method 5/26A sampling train. The sample train is assembled and operated as a Method 5 with the following exception – the first and second impinger solution will be 100 ml of 0.1 N H_2SO_4.

Sample Recovery. Following the completion of each test run, the impingers will be weighed on an electronic balance to determine the amount of moisture gained during the run. The 1st and 2nd impinger contents will be collected in a polyethylene sample container. All glassware, from the back-half of the filter holder to the outlet of the 2nd impinger.

Particulate Matter < 10 microns - EPA Method 5/202

The particulate matter < 10 microns testing on the reverberatory furnace duct, thermal chip dryer duct and associated baghouse exhaust stack will be conducted in accordance with EPA Methods 5 and 202. The complete sampling system will consist of a glass nozzle, a heated glass-lined probe with a Type S Pitot tube attached, a tarred glass fiber, a gas conditioning train and a calibrated dry gas meter. The gas conditioning train will consist of four (4) chilled impingers - the first and second containing 100 mL of de-ionized water (DI water), an empty third impinger and the fourth will contain approximately 200 grams of silica gel.

Following the completion of each test run, the sampling train will be leak checked at a vacuum pressure greater than or equal to the highest vacuum pressure observed during the run. The pre-weighed glass fiber filter will be carefully removed and placed in sample container 1. The nozzle and probe will be rinsed with acetone, and these rinses recovered in sample container 2. The contents of impingers 1-3 will be measured for moisture gain and then recovered in sample container 3. Impingers 1-3 will be rinsed with DI water, and these rinses added to container 3. The impingers will then be rinsed with MeCl, and these rinses recovered in container 4.

All containers will be sealed, labeled and liquid levels marked for transport to XXXXXX's laboratory in Decatur, Alabama.

Particulate Matter < 10 microns - EPA Method 201A/202

The particulate matter < 10 microns testing on the reverberatory furnace flue stack will be conducted in accordance with EPA Reference Methods 201A and 202. XXXXXX is requesting the use of a modified Method 201A/202 sample train on this source due to previous issues encountered during Method 201A testing on reverberatory furnace flues. The modified train will consist of a stainless steel nozzle, stainless steel in-stack cyclone, stainless steel probe liner, heated out-of-stack filter (83 mm), gas conditioning train, pump and calibrated dry gas meter. The filterable PM10 will consist of the back half cyclone rinse, probe rinse (with acetone), front half of filter holder rinse and filter. The condensable portion will consist of the back half rinse of the filter holder, impinger contents and rinses.

Following the completion of each test run, the sampling train will be leak checked at a vacuum pressure greater than or equal to the highest vacuum pressure observed during the run. The pre-weighed glass fiber filter will be carefully removed and placed in container 1. The nozzle and front half of the cyclone will be rinsed with acetone, and these rinses recovered in container 2. The back half of the cyclone will be rinsed with acetone, and these rinses recovered in container 3. The probe will be rinsed with DI water, and these rinses recovered in container 4. The probe will be rinsed with methylene chloride (MeCl), and these rinses recovered in container 5. The contents of impingers 1-3 will be measured and added to container 4. Impingers 1-3 will be rinsed with DI water, and these rinses recovered in container 4. The impingers will then be rinsed with MeCl, and these rinses recovered in container 5.

All containers will be sealed, labeled and liquid levels marked for transport to XXXXXX's laboratory in Decatur, Alabama.

Appendix B
Sample Calculations

Meter Pressure (Pm), in. Hg

$$Pm = Pb + \frac{\Delta H}{13.6}$$

where,

Pb = barometric pressure, in. Hg

ΔH = pressure differential of orifice in. H_2O

Absolute Stack Gas Pressure (Ps), in. Hg

$$Ps = Pb + \frac{Pg}{13.6}$$

where,

Pb = barometric pressure, in. Hg

Pg = static pressure, in. H_2O

Standard Meter Volume (Vmstd), dscf

$$Vmstd = \frac{17.647 \text{ x } Y \text{ x } Vm \text{ x } Pm}{Tm}$$

where,

Y = meter correction factor

Vm = meter volume, cf

Pm = meter pressure, in. Hg

Tm = meter temperature, ^oR

Standard Wet Volume (Vwstd), scf

$$Vwstd=0.04707x\ Vlc$$

where,

Vlc = volume of H_2O collected, ml

Moisture Fraction (BWS)

$$BWS = \frac{Vwstd}{(Vwstd + Vmstd)}$$

where,

Vwstd = standard wet volume, scf
Vmstd = standard meter volume, dscf

Molecular Weight (DRY) (Md), lb/lb-mole

$$Md = (0.44 \times CO_2) + (0.32 \times O_2) + (0.28\ (100 - CO_2 - O_2))$$

where,

CO_2 = carbon dioxide concentration, %
O_2 = oxygen concentration, %

Molecular Weight (WET) (Ms), lb/lb-mole

$$Ms = Md\ (1 - BWS) + 18\,(BWS)$$

where,

Md = molecular weight (DRY), lb/lb-mole
BWS = moisture fraction, dimensionless

Average Velocity (Vs), ft/sec

$$Vs = 85.49\ x\ Cp\ x\ \sqrt{\Delta P}\ avg.\ x\ \sqrt{\frac{Ts}{Ps\ x\ Ms}}$$

where,

Cp = pitot tube coefficient
ΔP = velocity head of stack gas, in. H_2O
Ts = absolute stack temperature, ^oR
Ps = absolute stack gas pressure, in. Hg
Ms = molecular weight of stack gas, lb/lb-mole

Average Stack Gas Flow at Stack Conditions (Qa), acfm

$$Qa = 60\ x\ Vs\ x\ As$$

where,

Vs = stack gas velocity, ft/sec
As = cross-sectional area of stack, ft^2

Average Stack Gas Flow at Standard Conditions (Qs), dscfm

$$Qs = 17.647 \ x \ Qa \ x \ (1 - BWS) \ x \ \frac{Ps}{Ts}$$

where,

Qa = average stack gas flow at stack conditions, ft^3/min
BWS = moisture fraction, dimensionless
Ps = absolute stack gas pressure, in. Hg
Ts = absolute stack temperature, ^{o}R

Particulate Concentration (c_s), grains/dscf

$$c_S = \frac{M_n \times 0.0154}{Vmstd}$$

where,

Mn = particulate mass from filter and front half rinse, mg
Vmstd = standard meter volume, dscf

Particulate Emission Rate (PMR), lbs/hr

$$PMR = \frac{c_s \times Qs \times 60}{7.0E + 03}$$

where,

c_s = particulate concentration, gr/dscf
Qs = average stack gas flow rate at standard conditions, dscfm

Particulate Emission Factor (EF_{PM}), lbs/ton

$$EF_{PM} = \frac{PMR}{FR} \times 2.0E + 03$$

where,

PMR = particulate emission rate, lbs/hr
FR = feed rate, lbs/hr

Dioxin/Furan Concentration ($c_{D/F}$), ng/ft^3 – using 1989 D/F TEF's

$$c_{D/F} = \frac{m_{D/F}}{Vmstd \times 1.0E + 03}$$

where,

$m_{D/F}$ = D/F mass, pg
Vmstd = standard meter volume, dscf

D/F Emission Rate (ER_{DF}), lb/hr – using 1989 D/F TEF's

$$ER_{DF} = \frac{c_{D/F} \times Q_s \times 60}{454E + 09}$$

where,

$c_{D/F}$ = D/F concentration, ng/ft^3

Qs = stack gas flow at standard conditions, dscfm

D/F Emission Factor (EF_{DF}), grains /ton – using 1989 D/F TEF's

$$EF_{DF} = \frac{ER_{DF} \times 7.0E + 03 \times 2.0E + 03}{FR}$$

where,

ER_{DF} = D/F emission rate, lbs/hr

FR = feed rate, lbs/hr

D/F Emission Factor (EF_{DF}), ug/MG – using 1989 D/F TEF's

$$EF_{DF} = \frac{ER_{DF} \times 1.0E + 12}{FR}$$

where,

ER_{DF} = D/F emission rate, lbs/hr

FR = feed rate, lbs/hr

Hydrogen Chloride Concentration (c_{HCl}), ppmvd

$$c_{HCl} = \frac{M_{HCl} \times 24.04}{Vmstd \times MW \times 28.32}$$

where,

M_{HCl} = hydrogen chloride mass, ug

Vmstd = standard meter volume, dscf

MW = hydrogen chloride molecular weight (36.5 g/mole)

Hydrogen Chloride Emission Rate (ER_{HCl}), lbs/hr

$$ER_{HCl} = \frac{M_{HCl} \times Qs \times 60}{Vmstd \times 4.54E + 08}$$

where,

M_{HCl} = hydrogen chloride mass, ug

Qs = stack gas flow rate at standard conditions, dscfm

Vmstd = standard meter volume, dscf

(The calculations for HF or Cl_2 will follow the same approach presented above for HCl.)

Hydrogen Chloride Emission Factor (EF_{HCl}), lbs/ton

$$EF_{HCl} = \frac{ER_{HCl} \times 2.0E+03}{FR}$$

where,

ER_{HCl} = hydrogen chloride emission rate, lbs/hr
FR = feed rate, lbs/hr

Nitrogen Oxides Emission Rate (ER_{NOx}), lbs/hr

$$ER_{NOx} = \frac{C_{NOx} \times MW \times Qs \times 60 \times 28.32}{24.04 \times 1.0E+06 \times 454}$$

where,

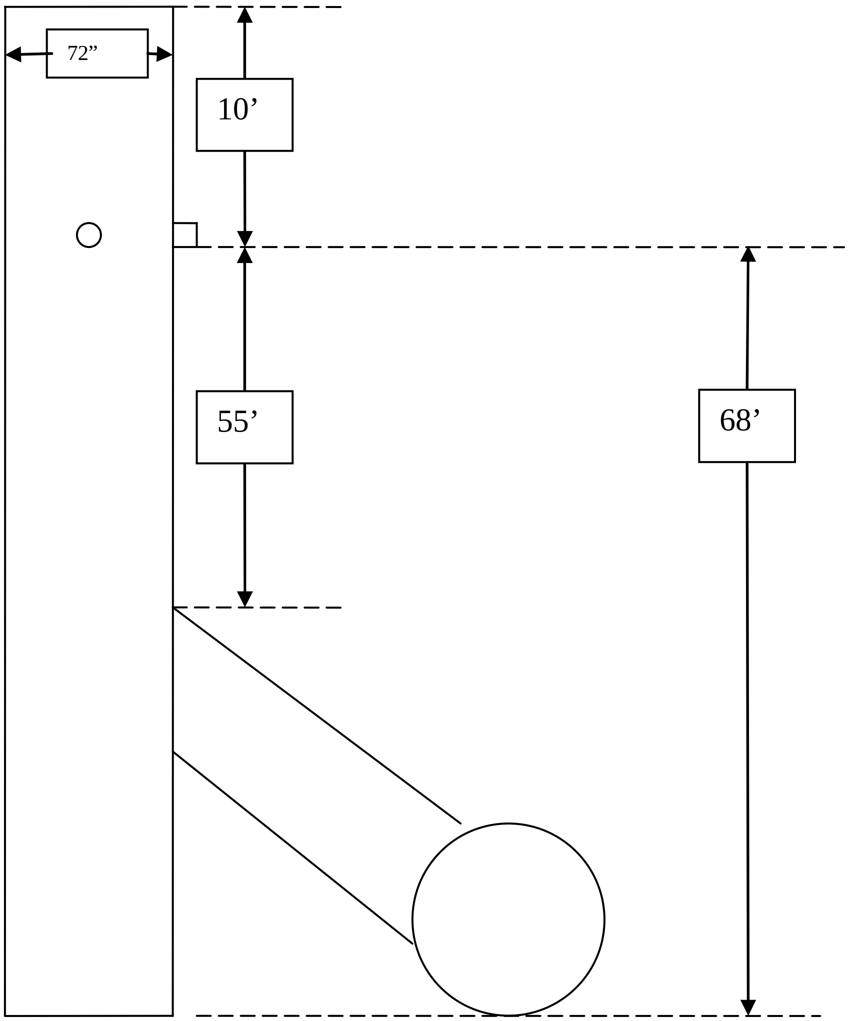
C_{NOx} = NOx concentration, ppmvd
MW = molecular weight of NOx (as NO_2), 46.01 g/g-mole
Qs = average stack gas flow at standard conditions, dscfm

(The calculations for SO_2 and THC will follow the same approach presented above for NOx.)

Appendix C
Production Record

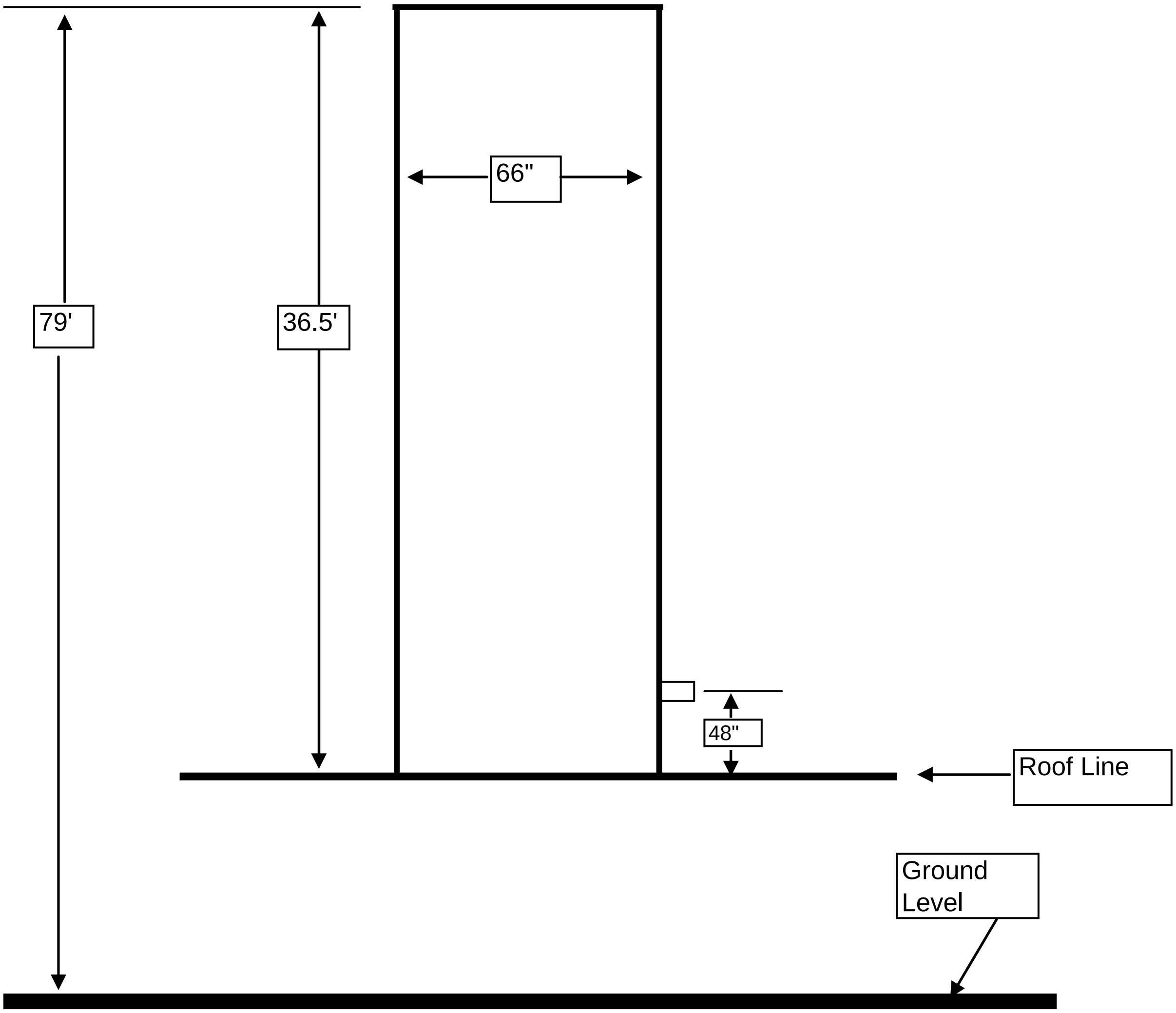
Appendix D
Production Record

Appendix E
Reverberatory Furnace and Thermal Chip Dryer Baghouse Sample Port Diagram



Appendix F
Reverberatory Furnace & Thermal Chip Dryer Exit Sample Port Diagram

Appendix G
Reverberatory Furnace Flue Sample Port Diagram



APPENDIX F
Reverberatory Furnace/Delacquering Kiln Test Protocol

SITE-SPECIFIC TEST PLAN
FOR THE

SECONDARY ALUMINUM
PRODUCTION FACILITY

LOCATED IN

Table of Contents

List of Tables

List of Appendices

Appendix A	Description of Source Testing Methodology
Appendix B	Sample Calculations
Appendix C	Production Record
Appendix D	Production Record
Appendix E	Reverberatory Furnace and Delacquering Kiln Baghouse Sample Port Diagram
Appendix F	Aluminum Scrap Shredder Baghouse Sample Port Diagram
Appendix G	Reverberatory Furnace & Delacquering Kiln Exit Sample Port Diagram

Section 1

Introduction

Section 2
Source Information

Plant Name and Address

Source Identification

Source Contact

Section 3
Testing Firm Information

Testing Firm Name and Address

Contacts

Section 4
Test Program Description

To satisfy the requirements of the secondary aluminum NESHAP regulations, the facility will conduct a performance test to determine the compliance status of one group 1 reverberatory furnace, one aluminum scrap shredder, one delacquering kiln and the associated emission control devices (lime-injected baghouses).

This site specific test plan has been developed to address the federal requirements of the secondary aluminum NESHAP regulations.

General Description

A sampling and analytical program will be conducted on the outlet stack of the fabric filter baghouse that controls the emissions from each source being tested. All of the required operating and monitoring conditions for this program will be discussed in the Process Parameters and Operation Information section of this Plan.

All testing will be performed in strict conformance with specifications stipulated in EPA Reference Method 1, Method 2, Method 3, Method 4, Method 5, Method 23, Method 25A, and Method 26A (40 CFR 60 Appendix A). The regulated pollutants will be measured to demonstrate compliance with the Secondary Aluminum Production NESHAP Standard, 40 CFR Part 63, Subpart RRR. **Table 4-1** presents an outline and tentative schedule for the emissions testing program. The following is a summary of the proposed testing and the planned schedule.

- Testing is being performed to satisfy requirements of the 40 CFR Part 63, Subpart RRR (Secondary Aluminum Production NESHAP).
- Materials to be processed will be identified and targeted production rates provided in a separate communication prior to the test.
- The reverberatory furnace will be tested under two operating scenarios. First consuming UBC processed by the delacquering kiln (Case 1). Second, using 100% direct charge scrap with the delacquering kiln not operating (Case 2).
- Case 1 - The reverberatory furnace and delacquering kiln are ducted to a four cell pulse jet lime injected baghouse. The test will consist of three runs measuring PM, D/F, HCl, and THC. The test result will be used to establish a maximum flux limit (% flux), maximum 3-hour block baghouse inlet temperature, and minimum 3-hour block afterburner temperature.

  Testing of the delacquering furnace and reverberatory furnace will be in compliance with 63.1511(i) since they are both ducted to the same baghouse.

The delacquering kiln run period will match the reverberatory furnace cycle.

The HCl test will be used to establish a maximum flux limit (% flux) to be used as an internal measure. The flux chemistry and weight will be recorded. From the test, the lb Cl_2/ton charged will be calculated. The allowable flux % will be calculated from this value using the chemical makeup of the flux and the molar weight of the compounds.

Fifteen minute average temperatures into the baghouse will be monitored and recorded during each run. These will be used to determine the maximum 3 hour block average.

Fifteen minute average temperatures out of the Hot Gas Generator/Afterburner will be monitored and recorded during each run. These will be used to determine the minimum 3 hour block average.

This test will consist of three runs, each being one furnace cycle (beginning of feed to end of tap) in length.

Tap volume will be at the largest volume the furnace regularly taps in the course of normal operations. This will not preclude, during the course of normal operations, tapping varying amounts from the furnace as business conditions may require. The scrap blend into the reverberatory furnace will be representative of those materials commonly used.

Molten metal level in the furnace will be monitored to insure the level is maintained above the arch between the sidewell and main hearth.

- Case 2 - The reverberatory furnace is ducted to a four cell pulse jet lime injected baghouse. The test will consist of three runs measuring PM, D/F, and HCl. The test result will be used to establish a maximum flux limit (% flux) and maximum 3-hour block baghouse inlet temperature.

  The HCl test will be used to establish a maximum flux limit (% flux) to be used as an internal measure. The flux chemistry and weight will be recorded. From the test, the lb Cl_2/ton charged will be calculated. The allowable flux % will be calculated from this value using the chemical makeup of the flux and the molar weight of the compounds.

  Fifteen minute average temperatures into the baghouse will be monitored and recorded during each run. These will be used to determine the maximum 3 hour block average.

  This test will consist of three runs, each being one furnace cycle (beginning of feed to end of tap) in length.

  Tap volume will be at the largest volume the furnace regularly taps in the course of normal operations. This will not preclude, during the course of normal operations, tapping varying amounts from the furnace as business conditions may require. The scrap blend into the reverberatory furnace will be representative of those materials commonly used.

  Molten metal level in the furnace will be monitored to insure the level is maintained above the arch between the sidewell and main hearth.

  The delacquering kiln will be idle in Case 2.

- An alternative method to calculate the total reactive flux injection rate has been submitted to the USEPA.

- An alternative method to calculate the total feed/charge to the reverberatory furnace has been submitted to the USEPA.
- An alternative method to calculate the total feed/charge to the delacquering kiln has been submitted to the USEPA.
- The aluminum scrap shredder is ducted to a Torit baghouse. The test will consist of three runs of three hours each measuring PM.
- Velocity and volumetric flow measurements will be taken using EPA Method 2.
- This testing program is proposed to be conducted during

Process Parameters and Operation Information

Plant personnel or their designated consultant will collect parametric data from the furnace, delacquering kiln and shredder operations and the associated control devices. The following identifies the measurements, observations, and records that will be collected during the testing events. A worksheet will be developed for the collection of the required operating records as described within this Plan.

All Sources and Associated Control Devices

The furnace systems operations are further described in **Section 5** of this Plan. The methods that will be used to demonstrate compliance rely on the operating data collected during the performance test runs. To properly evaluate the emissions from the sources, a sampling plan is being proposed to monitor emissions during near maximum production. The following parameters are to be identified in the facility's OM&M plan and will be maintained during the testing event.

- Solid flux will be continuously fed onto a conveyor and transported to the scrap ingestion system built into the sidewell of the furnace.
- The flux feeder will be calibrated using the following procedure.
  - ✓ Set the flux feeder controller to the desired setting. The digital readout displays units in hertz to one decimal point.
  - ✓ Discharge flux for a period of twenty minutes into a tub with a known tare weight.
  - ✓ Weigh the tub and calculate the net weight (flux weight).
  - ✓ Repeat #2 and #3 a total of three times.
  - ✓ Average the result.
  - ✓ Calculate the flux feed rate in pounds per hour.
- Flux weight will be calculated in the following manner.
  - ✓ Select the controller setting which provides the targeted Cl_2 #/ton charged.
  - ✓ Check the flux feeder calibration as described above before test run #1.
  - ✓ During the test runs, record the minutes and setting that the flux feeder operates.

- ✓ Calculate the total reactive flux injection rate for each test run using the following formula:

  (Flux Pounds/Hour x Run time (hours) x Cl_2 Percent in Flux x 2,000)/Charge Pounds

- ✓ Average the three test runs to calculate the total reactive flux injection rate.

- ■ Case 1 - To determine compliance with the Group 1 furnace emission limits, pounds produced by the reverberatory furnace will be weighed and divided by the average recovery of UBC to calculate pounds charged to the reverberatory furnace.
- ■ Case 2 – Direct charge scrap will be weighed on scales with an accuracy of ± 1% that are calibrated at least every six (6) months.
- ■ To determine compliance with the delacquering kiln emission limits, the input weight to the delacquering kiln will be calculated as follows.
  - ✓ The weight into the shredder during the period will be used as "pounds charged".
  - ✓ The weight into the delacquering kiln will be the pounds charged into the shredder less non-aluminum losses.
- ■ The process feed rate to the shredder will be calculated by recording the weights of the individual loads of metal charged. The total weight of all charged material will be calculated for the production period monitored during the performance test. This total production weight will be used to calculate the feed rate.
- ■ Subject to the previously discussed weight calculations, all charged materials will be weighed using certified scales that are calibrated at least every six (6) months.
- ■ The lime injection rates will be checked each shift to ensure that the proper setting is maintained. The minimum effective lime usage rate will be set during the performance test to ensure compliance with the standard under all conditions. The feed system will be evaluated prior to the performance test to establish the operating settings to establish this minimum feed rate.
- ■ Lime flow rate will be checked following each run of the test.
- ■ To insure lime is free flowing, each feeder will be checked and documented hourly during the test period.
- ■ Inlet temperatures of the lime injected baghouse control devices are regulated by the introduction of cooling air through an automated damper. This temperature parameter will be monitored in 15-minute averages during the performance test. A 3-hour average will be calculated from the 15-minute averages collected during the test. The inlet temperature system will be calibrated prior to conducting the performance test to establish an accurate 3-hour block average temperature.
- ■ Afterburner temperatures will be monitored in 15-minute averages during the performance test. A 3-hour average will be calculated from the 15-minute averages collected during the test. The Afterburner temperature system will be calibrated prior to conducting the performance test to establish an accurate 3-hour block average temperature.

- The bag leak detection systems will be monitored during the performance test to establish proper operation of the baghouses and the monitors. The equipment will be configured and operated as suggested by the manufacturers and where appropriate, the EPA's "Fabric Filter Bag Leak Detection Guidance."

Table 4-1

Program Outline and Tentative Test Schedule

SOURCE	PARAMETER	SAMPLING METHOD	NUMBER OF RUNS	RUN DURATION	ESTIMATED ONSITE TIME

Section 5
Sources and Sampling Location Descriptions

Test Source Description - One Group 1 Furnace, One Delacquering Kiln and One Aluminum Scrap Shredder with Add-on Pollution Control Devices

The reverberatory furnace is used to melt aluminum scrap that has been processed by the existing delacquering system or directly charged toll or purchased scrap. The furnace is designed as a sidewell melter/holder unit to allow for continuous operation. The toll, purchased, and preprocessed scrap is charged to the sidewell of the furnace along with solid flux material and any alloying agents that are required for the production order. Once the materials are molten, the metal flows through a submerged opening to the hearth. Once properly alloyed, the furnace is tapped and the molten aluminum is transferred to refractory lined crucibles for delivery or transferred to sow molds and cast into RSI. The furnace operation is defined as a group 1 furnace in the regulation (40 CFR 63, Subpart RRR). All emissions from the reverb furnace are captured and directed to a lime injected baghouse for control of the regulated pollutants. Only clean charge materials are fed to the main hearth and no reactive flux materials are used in this section of the furnace.

The aluminum scrap shredder is used to tear apart or shred used beverage cans (UBC) and aluminum siding. UBC scrap and aluminum siding are generally received in large bales that must be shredded prior to delacquering. The large bales are placed on a conveyor belt and transported to the shredding mill inlet. The bales are then pulverized by the mill and forced through a grate, which further reduces their size, before being discharged onto the mill’s shaker table/outlet conveyor. The ‘shreds’ are now processed through a magnetic and air separator to remove most of the non-aluminum materials. The shredded scrap is now conveyed to the delacquering kiln for further processing.

The delacquering kiln is used to remove paint and other undesirable coatings primarily from shredded used beverage cans (UBC) and shredded aluminum siding. The shredded scrap is charged into the delacquering kiln via a conveyor belt where hot combustion gases burn-off the undesirable paint and coatings. The delacquered, shredded scrap can now be charged directly into the sidewell of the reverberatory furnace.

Sampling Locations

All samples will be collected from the relevant baghouse exhaust stacks. All exhaust stacks and sample port locations are designed to meet minimum EPA Reference Method 1 requirements (i.e. two and one-half diameters). All stack diameters or depths and widths, upstream and downstream disturbance distances and nipple lengths will be measured on site, with a verification measurement provided by the Field Team Leader.

Section 6
Quality Assurance Program

Internal Quality Assurance

Specific quality control (QC) procedures will be followed to ensure the continuous production of useful and valid data throughout the course of this test program. The QC checks and procedures described in this section represent an integral part of the overall sampling and analytical scheme. Strict adherence to prescribed procedures is quite often the most applicable QC check. A discussion of both the sampling and analytical QC checks that will be utilized during this program is presented below.

Equipment Inspection and Maintenance

Each item of calibrated field test equipment purchased by XXXXXXX is assigned a unique, permanent identification number. An effective preventive maintenance program is necessary to ensure data quality. Each item of equipment returning from the field is inspected before it is returned to storage. During the course of these inspections, items are cleaned, repaired, reconditioned, and recalibrated where necessary. Each item of equipment transported to the field for this test program is inspected again before being packed to detect equipment problems which may originate during periods of storage. This minimizes lost time on the job site due to equipment failure. Occasional equipment failure in the field is unavoidable despite the most rigorous inspection and maintenance procedures. For this reason, XXXXXXX routinely transports to the job site replacement equipment for all critical sampling train components.

Equipment Calibration

New items for which calibration is required are calibrated before initial field use. Equipment whose calibration status may change with use or time is inspected in the field before testing begins and again upon return from each field use. When an item of equipment is found to be out of calibration, it is repaired and recalibrated or retired from service. All equipment is periodically recalibrated in full, regardless of the outcome of these regular inspections.

Calibrations are conducted in a manner, and at a frequency, which meets or exceeds U. S. EPA specifications. XXXXXXX follows the calibration procedures outlined in the EPA Methods, and those recommended within the Quality Assurance Handbook for Air Pollution Measurement Systems: Volume III (EPA-600/4-77-027b, August, 1977). When these methods are inapplicable,

XXXXXXX uses methods such as those prescribed by the American Society for Testing and Materials (ASTM).

Data obtained during calibrations are recorded on standardized forms, which are checked for completeness and accuracy by the quality assurance manager. Data reduction and subsequent calculations are performed using XXXXXXX's own computer facilities. Calculations are checked at least twice for accuracy. Copies of calibration forms are included in the test or project reports.

Emissions sampling equipment requiring calibration includes pitot tubes, pressure gauges, thermometers, dry gas meters, and barometers. The following sections elaborate on the calibration procedures followed by XXXXXXX for these items of equipment.

A: <u>Pitot Tubes.</u> All Type S pitot tubes used by XXXXXXX, whether separate or attached to a sampling probe, are constructed by Apex Instruments or Environmental Supply. Each new pitot is calibrated in accordance with the geometry standards contained in EPA Method 2. A Type S pitot tube, constructed and positioned according to these standards, will have a coefficient of 0.84 ± 0.02. This coefficient will not change as long as the pitot tube is not damaged. Each pitot tube is inspected visually upon return from the field. If a cursory inspection indicates damage or raises doubt that the pitot remains in accordance with the EPA geometry standards, the pitot tube is refurbished as needed and recalibrated.

B: <u>Differential Pressure Gauges.</u> All meter consoles used by XXXXXXX are equipped with 10-in. water column (W.C.) inclined manometers. Fluid manometers do not require calibration other than leak checks. Manometers are leak checked in the field prior to each test series and again upon return from the field.

C: <u>Impinger Thermometer.</u> Prior to the start of testing, the thermometer used to monitor the temperature of the gas leaving the last impinger is compared with a mercury-in-glass thermometer which meets ASTM E-1 No. 63F specifications. The impinger thermometer is adjusted if necessary until it agrees within 2°F of the reference thermometer. If the thermometer is not adjustable, it is labeled with a correction factor.

D: <u>Dry Gas Meter Thermometer.</u> The thermometer used to measure the temperature of the metered gas sample is checked prior to each field trip against an ASTM mercury-in-glass thermometer. The dry gas meter thermometer is acceptable if the values agree within ± 1.5

percent absolute. Thermometers not meeting this requirement are adjusted or labeled with a correction factor.

E: <u>Flue Gas Temperature Sensor.</u> All thermocouples employed by XXXXXXX for the measurement of flue gas temperatures are calibrated upon receipt. Initial calibrations are performed at three points (ice bath, boiling water and hot oil). An ASTM mercury-in-glass thermometer is used as a reference. The thermocouple is acceptable if the agreement is within 1.5 percent (absolute) at each of the three calibration points.

On-site, prior to the start of testing and after testing, the reading from the flue gas thermocouple-potentiometer combination is compared with an ASTM mercury-in-glass reference thermometer. If the two agree within ± 1.5 percent (absolute), the thermocouple and potentiometer are considered to be in proper working order for the test series.

F: <u>Dry Gas Meter and Orifice.</u> Two procedures are used to calibrate the dry gas meter and orifice simultaneously. The <u>full calibration</u> is a complete laboratory procedure used to obtain the calibration factor of the dry gas meter. Full calibrations are performed over a wide range of orifice settings. A simpler procedure, the posttest calibration, is designed to check whether the calibration factor has changed. Posttest calibrations are performed after each field test series by calculating the Y_{qa} using data from each test run.

G: <u>Dry Gas Meter.</u> Each metering system receives a full calibration at the time of purchase. If the calibration factor, Y_{qa}, deviates by less than five percent from the last calibrated value, the test data is acceptable. If Y_{qa} deviates by more than 5 percent, the meter is recalibrated and the meter coefficient (initial or recalibrated) that yields the lowest sample volume for the test runs is used.

EPA Method 5 requires another full calibration anytime the posttest calibration check indicates that Y_{qa} has changed by more than 5 percent. Standard practice at XXXXXXX is to recalibrate the dry gas meter anytime Y_{qa} is found to be greater than 5 percent different or every six months.

H: <u>Orifice.</u> An orifice calibration factor is calculated for each flow setting during a full calibration. If the range of values does not vary by more than 0.20 in. H_2O over the range of 0.4 to 4.0 in. H_2O, the arithmetic average of the values obtained during the calibration is used.

I: Barometer. Each field barometer is adjusted before each test series to agree within ± 0.1 inches of a reference aneroid barometer. The reference barometer (mercury/glass) is checked weekly against the station pressure value (corrected for elevation difference) which is located at the local weather office.

Sampling Quality Control Procedures

The following pretest QC checks will be conducted:

- All sampling equipment will be thoroughly checked to ensure clean and operable components.
- Equipment will be inspected for possible damage from shipment.
- The oil manometer gauge used to measure pressure across the Type S pitot tube will be leveled and zeroed.
- The number and location of the sampling traverse points will be checked before taking measurements.
- The temperature measurement system will be visually checked for damage and operability by measuring the ambient temperature prior to each traverse.

In addition to the general QC procedures listed above, QC procedures specific to each sampling method will also be incorporated into the sampling scheme. These method specific procedures are discussed below.

A: Sampling Train QC Checks. The following QC procedures will be emphasized:

Prior to Start of Tests

- Keep all cleaned glassware and sample train components sealed until train assembly.
- Keep prepared sorbent traps sealed and cool until sample train assembly.
- Store all filters in filter holders or in individual Petri dishes.
- Assemble the sampling trains in an environment free from uncontrolled dust.
- Visually inspect each sampling train for proper assembly.
- Perform pretest calculations to determine the proper sampling nozzle size.

Prior to Testing Each Day

- Visually inspect the sampling nozzle.
- Visually inspect the Type S pitot tube.
- Leak check each leg of the Type S pitot tube.
- Leak check the entire sampling train.

During Testing Each Day

- Readings of temperature and differential pressure will be taken at each traverse point at 10-minute maximum intervals.
- All sampling data and calculations will be recorded on pre-formatted data sheets.
- All calibration data forms will be reviewed for completeness and accuracy.
- Any unusual occurrences will be noted during each run on the appropriate data form.
- The Field Team Leader will review sampling data sheets daily during testing.
- Properly maintain the roll and pitch axis of the Type S pitot tube and the sampling nozzle.
- Leak check the train before and after each test run or if a filter change takes place during the test run.
- Conduct additional leak checks if the sampling time exceeds 4 hours.
- Maintain the probe, filter and impingers at proper temperatures.
- Make proper readings of the dry gas meter, delta P and delta H, temperature, and pump vacuum during sampling at each traverse point.
- Maintain isokinetic sampling within ± 10% of 100%.

After Testing Each Day

- Visually inspect the sampling nozzle.
- Visually inspect the Type S pitot tube.
- Leak check each leg of the Type S pitot tube.
- Leak check the entire sampling train.

QC for Volumetric Air Flow Rate Determinations

A: Flue Gas Velocity. Data required to determine the flue gas velocity will be collected using the methodology specified in EPA Method 2. Quality control procedures are as follows:

- Visually inspect the Type S pitot tube before and after sampling.
- Leak check both legs of the pitot tube before and after sampling.
- Check the number and location of the sampling traverse points before taking measurements.

B: Flue Gas Molecular Weight. Samples to be used for determination of flue gas molecular weight will be collected using the integrated sampling technique specified in EPA Method 3. Quality control will focus on the following procedures:

- The sampling train will be leak checked before and after each run.
- A constant sampling rate will be used in withdrawing a sample.
- The sampling train will be purged prior to sample collection.
- The sampling port will be properly sealed to prevent air from leaking in.

C: Moisture Content. The moisture content of the gas stream will be determined using the technique specified in EPA Method 4. The following QC checks will be performed:

- The sampling train will be leak checked before and after each run.
- Ice will be maintained in the ice bath throughout each run.

Analytical Quality Control Procedures

All analyses for this program will be performed using accepted laboratory procedures in accordance with the specified analytical protocols. Adherence to prescribed QC procedures will ensure data of consistent and measurable quality. Analytical QC will focus upon the use of control standards to provide a measure of analytical precision and accuracy. Also, specific acceptance criteria are defined for various analytical operations including calibrations, control standard analyses, drift checks, blanks, etc. The following general QC procedures will be incorporated into the analytical effort:

- The onsite Field Team Leader will review all analytical data and QC data on a daily basis for completeness and acceptability.
- Analytical QC data will be tabulated using the appropriate charts and forms on a daily basis.
- Copies of the QC data tabulation will be submitted to the quality assurance manager following the completion of the test program.
- All hard-copy raw data (i.e., chromatograms, computer printouts, etc.) will be maintained in organized files.

Specific analytical QC procedures for the Baccarach "Fyrite" analyzer are listed below:

- The analyzer will be leveled and the fluid levels zeroed prior to use.
- The analyzer will be leak checked prior to use.
- The analyzer will be thoroughly purged with sample prior to analysis.
- The analyzer will be checked by analyzing an ambient air sample.

Appendix A
Description of Source Testing Methodology

General

This section contains a brief description of the sampling and analytical procedures for each method that will be employed during the test program. All equipment, procedures, and quality assurance measures necessary for the completion of the test program meet or exceed the specifications of the appropriate methods specified in the EPA Reference Methods. Deviations from the methods to ensure quality and representative nature of the results are also discussed.

Sampling Point/Traverse Points Determination - EPA Method 1

The number and locations of the sampling or traverse points will be determined according to the procedures outlined in EPA Method 1. Method 1 requires the accurate measurement of stack diameters, upstream and downstream distances, and location of the sample points. To determine the amount of sample points, the upstream and downstream distances are equated into equivalent diameters. The number of sample points are then determined using charts listed in EPA Method 1.

Gas Velocity and Volumetric Flow Rate - EPA Method 2

The flue gas velocity and volumetric flow rate will be determined according to the procedures outlined in EPA Method 2. Velocity measurements will be made using Type S pitot tubes conforming to the geometric specifications outlined in EPA Method 2. Accordingly, each has been assigned a coefficient of 0.84. Differential pressures will be measured with inclined, fluid manometers. Effluent gas temperatures will be measured with Type K thermocouples equipped with digital readouts.

A cyclonic flow check, using directional pitots and an angle finder, will be performed by XXXXXXX on all "non-tested" stacks to verify that airflow is not cyclonic. In most stationary sources, the direction of stack gas flow is within cyclonic specifications of the method. The following techniques are acceptable for this determination.

Level and zero the manometer. Connect a Type S pitot tube to the manometer to the manometer and leak-check system. Position the Type S pitot tube at each traverse point, in succession, so that the planes of the face openings of the pitot tube are perpendicular to the

stack cross-sectional plane; when the Type S pitot tube is in this position, it is at "O° reference." Note the differential pressure (Δp) reading at each traverse point. If a null (zero) pitot reading is obtained at O° reference at a given traverse point, an acceptable flow condition exists at that point. If the pitot reading is not zero at O° reference, rotate the pitot tube (up to ±9O° yaw angle), until a null reading is obtained. Carefully determine and record the value of the rotation angle (α) to the nearest degree. After the null technique has been applied at each traverse point, calculate the average of the absolute values of α; assign α values of O° to those points for which no rotation was required, and include these in the overall average. If the average value of α is greater than 2O°, the overall flow condition in the stack is unacceptable, and alternative methodology, subject to the approval of the Administrator, must be used to perform accurate sample and velocity traverses.

Oxygen and Carbon Dioxide – EPA Method 3

The oxygen (O_2) and carbon dioxide (CO_2) will be determined at the test locations following Method 3 procedures. An integrated sample will be extracted during each isokinetic test run. The sampling system consists of a stainless steel probe, followed by a Teflon sample line attached to a condenser system, which is attached to a leak free pump with rotameter. The pump will be coupled with a leak free Tedlar bag. The concentration of oxygen and carbon dioxide in the sample will be determined by using a Bacharach "Fyrite" Gas Analyzer. Fyrite analysis provides for the selective absorption of oxygen in Burrell Oxysorbent and carbon dioxide in potassium hydroxide solutions. The difference in gas volume before and after the absorption represents the amount of constituent gas in the sample. Each sample will be analyzed three (3) times, and the average of the readings for each run will be used in calculating the emission rate for the respective test run.

Gas Moisture Content - EPA Method 4

The flue gas moisture content will be determined in conjunction with each isokinetic sampling train and in accordance the sampling and analytical procedures outlined in EPA Method 4. The impingers will be connected in series and will contain reagents as listed in the following method descriptions. The impingers will be contained in an ice bath to ensure condensation of the flue gas stream moisture. Any moisture that is not condensed in the impingers is captured in the silica gel; therefore, all moisture can be weighed and entered into moisture content calculations.

Particulate Matter - EPA Method 5

Sample Collection. Samples will be withdrawn at an isokinetic rate from the source using an EPA Method 5 sampling train. The sampling train will consist of a glass or stainless nozzle, a heated glass-lined or stainless-lined probe with a Type S Pitot tube attached, a tarred glass fiber or Teflon filter, four chilled impingers and a metering console. The first and second impingers will each contain 100 mL of impinger liquor, the third impinger will remain empty, and the fourth will contain pre-weighed silica gel. Each test run will be approximately 2.5 hours in duration.

Sample Recovery. Following the completion of each test run, the impingers will be weighed on an electronic balance to determine the amount of moisture gained during the run. Samples will be recovered in a dust free environment in XXXXXXX's mobile laboratory. Impinger cases will be used to transport the samples from the field to the mobile laboratory. A stainless steel spatula and tweezers will be used to remove the filter from the filter holder and place it in a labeled Petri dish. The probe and nozzle acetone rinses will be collected in glass sample containers, and the liquid levels will be marked.

Sample Analyses. The filter and front-half acetone rinse will be desiccated and weighed to a constant weight using Method 5 analytical procedures. An acetone blank will be taken, analyzed and interpreted as described in Method 5.

Dioxin/Furan - EPA Method 23

All glass components of the Method 23 sample train upstream of the adsorbent module, will be cleaned in accordance with section 3A of the "Manual of Analytical Methods for the Analysis of Pesticides in Human and Environmental Samples". No silicone grease sealants will be used for this sampling method. Glass-fiber filters will be pre-cleaned in the laboratory in a Soxhlet apparatus. Adsorbent modules will be cleaned as the filters and treated with the appropriate amount of the surrogate solution.

Samples will be withdrawn at an isokinetic rate from the source using an EPA Method 23 sampling train. The sample train is assembled and operated as a Method 5 with the following exception – immediately following the heated filter will be a non-contact, recirculating cold water condenser leading to the XAD-2 adsorbent trap which is attached to an empty modified Greenburg-Smith impinger. The next two impingers will contain 100 ml of HPLC water, the next impinger will be empty, and the last impinger will contain approximately 200 g silica gel. Each test run will be approximately 2.5 hours in duration.

Following the completion of each test run, the impingers will be weighed on an electronic balance to determine the amount of moisture gained during the run. The impinger contents will be discarded after determining the moisture gain. The filter will be removed from the filter holder and placed in Sample Container 1. The XAD sorbent module will be sealed on both ends, labeled, and stored on ice until transported to the laboratory. The nozzle, probe, front and back half of the filter holder, filter support, condenser coil, and connecting glassware will be rinsed with acetone and placed in Sample Container 2. All glassware cleaned for Sample Container 2 will be rinsed lastly with toluene and placed in Sample Container 3. Sample containers 3 and 4 will be amber glass containers.

All samples will be analyzed by Analytical Perspectives in Wilmington, North Carolina in accordance with the requirements listed in Method 23, Section 5.

Total Hydrocarbons- EPA Method 25A

Instrument Calibration. The system is allowed to stabilize to operating temperatures. Gases, certified by EPA Protocol Method 1, of propane in nitrogen are used to calibrate the instrument to a given data recorder span. The concentrations of propane in the gases are 25-35% of the span, 45-55% of the span, and 80-90% of the span. Zero gas is provided as ambient air. Calibration of the system is conducted immediately before the sampling program and linearity checks are conducted after each test run. Certificates of calibration will be furnished on-site for the appropriate gases.

Sample Procedures. A sample is drawn through a heated sample line to a Flame Ionization Detector. The sample is analyzed and a concentration of Total Hydrocarbons or VOCs is displayed in parts per million (ppm) on a dry basis. Each sample run will be three (3) hours in duration

Sample Analyses. The ppms arrived at are entered into a series of formulas that will in turn yield a pounds per hour of VOCs emitted.

Hydrogen Chloride – EPA Method 26A

Sampling Equipment Preparation. All glass components of the Method 26A sample train will be cleaned according to Code of Federal Regulations 40, Part 60, Appendix A. The Method 26A sample will be collected utilizing the impingers from the Method 5 train.

Sample Collection. Samples will be withdrawn at an isokinetic rate from the source using an EPA Method 5/26A sampling train. The sample train is assembled and operated as a Method 5 with the following exception – the first and second impinger solution will be 100 ml of 0.1 N H_2SO_4. Each test run will be approximately 2.5 hours in duration.

Sample Recovery. Following the completion of each test run, the impingers will be weighed on an electronic balance to determine the amount of moisture gained during the run. The 1st and 2nd impinger contents will be collected in a polyethylene sample container. All glassware, from the back-half of the filter holder to the outlet of the 2nd impinger, will be rinsed with DI water ,and these rinses added to the sample container.

Appendix B
Sample Calculations

Meter Pressure (Pm), in. Hg

$$Pm = Pb + \frac{\Delta H}{13.6}$$

where,

Pb = barometric pressure, in. Hg
ΔH = pressure differential of orifice in. H_2O

Absolute Stack Gas Pressure (Ps), in. Hg

$$Ps = Pb + \frac{Pg}{13.6}$$

where,

Pb = barometric pressure, in. Hg
Pg = static pressure, in. H_2O

Standard Meter Volume (Vmstd), dscf

$$Vmstd = \frac{17.647 \ x \ Y \ x \ Vm \ x \ Pm}{Tm}$$

where,

Y = meter correction factor
Vm = meter volume, cf
Pm = meter pressure, in. Hg
Tm = meter temperature, ^{o}R

Standard Wet Volume (Vwstd), scf

$$Vwstd = 0.04707x\ Vlc$$

where,

Vlc = volume of H_2O collected, ml

Moisture Fraction (BWS)

$$BWS = \frac{Vwstd}{(Vwstd + Vmstd)}$$

where,
Vwstd = standard wet volume, scf
Vmstd = standard meter volume, dscf

Moisture Content (MC), %

$$MC = BWS \ x \ 100$$

where,
BWS = moisture fraction, dimensionless

Molecular Weight (DRY) (Md), lb/lb-mole

$$Md = (0.44 \times CO_2) + (0.32 \times O_2) + (0.28 \ (100 - CO_2 - O_2))$$

where,
CO_2 = carbon dioxide concentration, %
O_2 = oxygen concentration, %

Molecular Weight (WET) (Ms), lb/lb-mole

$$Ms = Md \ (1 - BWS) + 18\,(BWS)$$

where,
Md = molecular weight (DRY), lb/lb-mole
BWS = moisture fraction, dimensionless

Average Velocity (Vs), ft/sec

$$Vs = 85.49 \ x \ Cp \ x \ \sqrt{\Delta P} \ avg. \ x \ \sqrt{\frac{Ts}{Ps \ x \ Ms}}$$

where,
Cp = pitot tube coefficient
ΔP = velocity head of stack gas, in. H_2O
Ts = absolute stack temperature, ^{o}R
Ps = absolute stack gas pressure, in. Hg
Ms = molecular weight of stack gas, lb/lb-mole

Average Stack Gas Flow at Stack Conditions (Qa), acfm

$$Qa = 60\ x\ Vs\ \ x\ \ As$$

where,

Vs = stack gas velocity, ft/sec
As = cross-sectional area of stack, ft^2

Average Stack Gas Flow at Standard Conditions (Qs), dscfm

$$Qs = 17.647\ \ x\ \ Qa\ \ x\ \ (1 - BWS)\ \ x\ \ \frac{Ps}{Ts}$$

where,

Qa = average stack gas flow at stack conditions, ft^3/min
BWS = moisture fraction, dimensionless
Ps = absolute stack gas pressure, in. Hg
Ts = absolute stack temperature, ^oR

Dioxin/Furan Concentration ($c_{D/F}$), ng/ft^3 – using 1989 D/F TEF's

$$c_{D/F} = \frac{m_{D/F}}{Vmstd \times 1.0E + 03}$$

where,

$m_{D/F}$ = D/F mass, pg
Vmstd = standard meter volume, dscf

D/F Emission Rate (ER_{DF}), lb/hr – using 1989 D/F TEF's

$$ER_{DF} = \frac{c_{D/F} \times Q_s \times 60}{454\,E + 09}$$

where,

$c_{D/F}$ = D/F concentration, ng/ft^3
Qs = stack gas flow at standard conditions, dscfm

D/F Emission Factor (EF_{DF}), grains /ton – using 1989 D/F TEF's

$$EF_{DF} = \frac{ER_{DF} \times 7.0E+03 \times 2.0E+03}{FR}$$

where,

ER_{DF} = D/F emission rate, lbs/hr
FR = feed rate, lbs/hr

D/F Emission Factor (EF_{DF}), ug/MG – using 1989 D/F TEF's

$$EF_{DF} = \frac{ER_{DF} \times 1.0E+12}{FR}$$

where,

ER_{DF} = D/F emission rate, lbs/hr
FR = feed rate, lbs/hr

Particulate Concentration (c_s), grains/dscf

$$c_S = \frac{M_n \times 0.0154}{Vmstd}$$

where,

Mn = particulate mass, mg
Vmstd = standard meter volume, dscf

Particulate Emission Rate (PMR), lbs/hr

$$PMR = \frac{c_s \times Qs \times 60}{7.0E+03}$$

where,

c_s = particulate concentration, grains/dscf
Qs = stack gas flow rate at standard conditions, dscfm

Particulate Emission Factor (EF_{PM}), lbs/ton

$$EF_{PM} = \frac{PMR \times 2.0E+03}{FR}$$

where,

PMR = particulate emission rate, lbs/hr
FR = feed rate, lbs/hr

Hydrogen Chloride Concentration (c_{HCl}) mg/dscm

$$c_{HCl} = \frac{M_{HCl} \times 35.313}{Vmstd}$$

where,

M_{HCl} = hydrogen chloride mass, mg
Vmstd = standard meter volume, dscf

Hydrogen Chloride Emission Rate (ER_{HCl}), lbs/hr

$$ER_{HCl} = \frac{M_{HCl} \times Qs \times 60}{Vmstd \times 4.54x10^{5}}$$

where,

M_{HCl} = hydrogen chloride mass, mg
Qs = stack gas flow rate at standard conditions, dscfm
Vmstd = standard meter volume, dscf

Hydrogen Chloride Emission Factor (EF_{HCl}), lbs/ton

$$EF_{HCl} = \frac{ER_{HCl} \times 2.0E + 03}{FR}$$

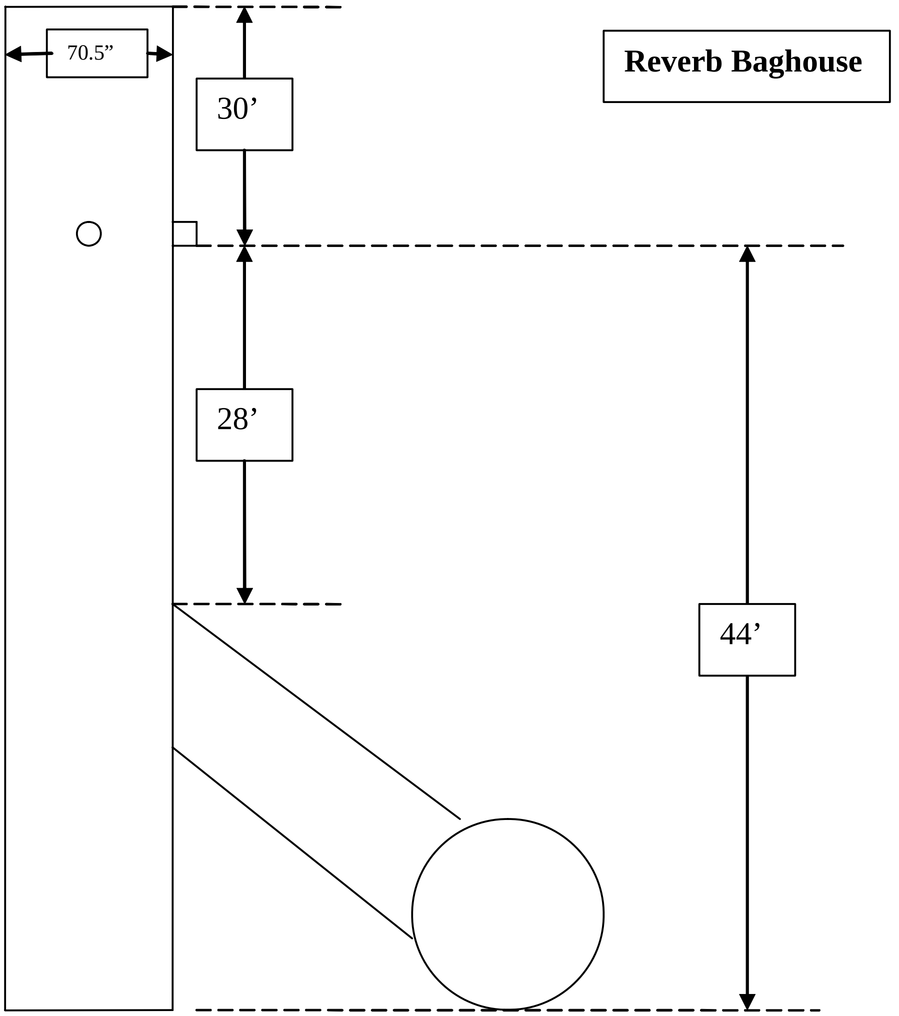
where,

ER_{HCl} = hydrogen chloride emission rate, lbs/hr
FR = feed rate, lbs/hr

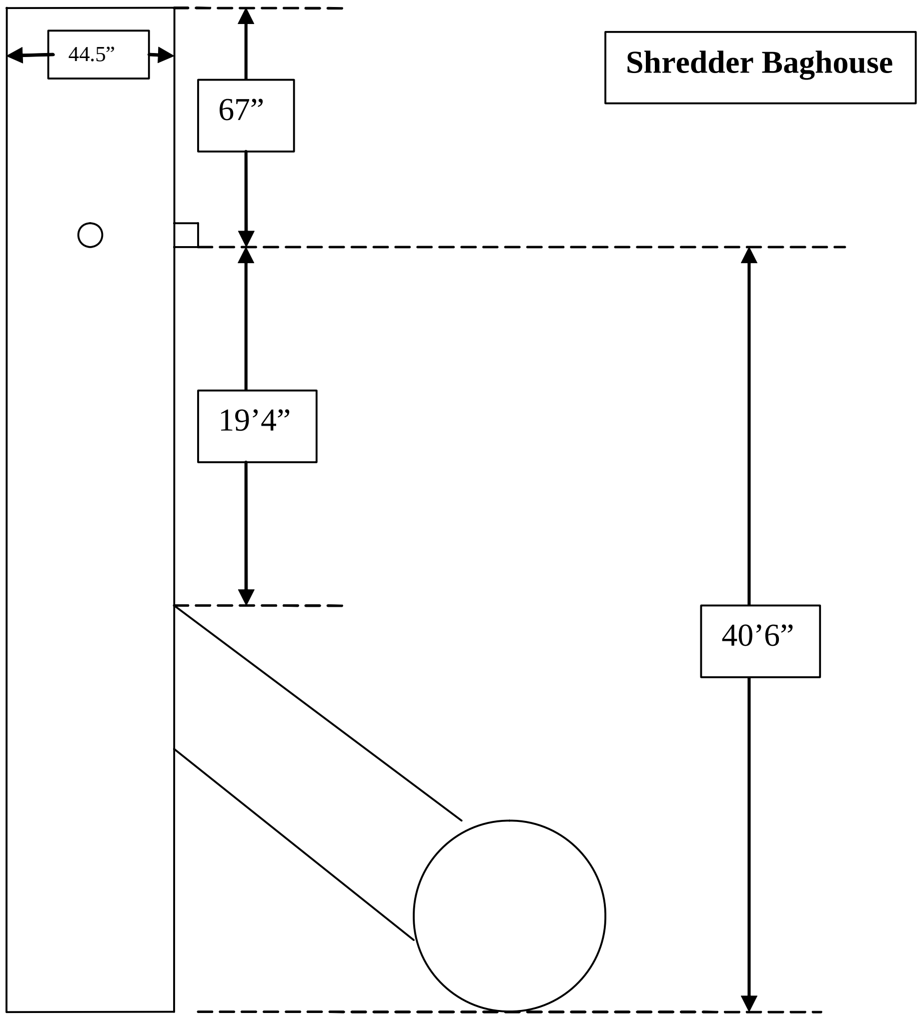
Appendix C
Production Record

Appendix D
Production Record

Appendix E
Reverberatory Furnace and Delacquering Kiln Baghouse Sample Port Diagram



Appendix F
Aluminum Scrap Shredder Baghouse Sample Port Diagram



Appendix G
Reverberatory Furnace & Delacquering Kiln Exit Sample Port Diagram

APPENDIX G
Lewisport Uncontrolled Reverberatory Furnace Test Protocol

SITE-SPECIFIC TEST PLAN
FOR THE

SECONDARY ALUMINUM
PRODUCTION FACILITY

LOCATED IN

Table of Contents

List of Tables

List of Appendices

Section 1

Introduction

Section 2
Source Information

Plant Name and Address

Source Identification

Source Contact

Section 3
Testing Firm Information

Testing Firm Name and Address

Contacts

Field Team Leader

Section 4
Test Program Description

To satisfy the requirements of the secondary aluminum NESHAP regulations, the facility will conduct a performance test to determine the compliance status of fifteen group 1 reverberatory furnace. As will be explained below, none of the furnaces have add on pollution control systems. There are xxxxx removable top reverberatory melting furnaces and xxxxxx reverberatory holding furnaces. XXX melting furnaces and XXX holding furnaces will be tested. The furnaces to be tested and the groups they represent are shown in the following table.

The furnace groups as portrayed meet the requirements of 40 CFR 63.1511(f).

1. The same feed/charge materials are used and melt rates are the same in the melting furnaces within their groupings.
2. The same reactive flux materials in the same proportions are used in the holding furnaces.
3. The same work practices are used within each group.

4. Design is the same within each group.

Furnace No.	Manufacturer	Capacity	Burner Maximum	
			1	2

5. Melter production rates will be near the maximum rates for the scrap blend selected.
6. Holder production rates are fixed by the reactive fluxing time required.

This site specific test plan has been developed to address the federal requirements of the secondary aluminum NESHAP regulations.

General Description

A sampling and analytical program will be conducted on the outlet stack from each source being tested. All of the required operating and monitoring conditions for this program will be discussed in the Process Parameters and Operation Information section of this Plan.

All testing will be performed in strict conformance with specifications stipulated in EPA Reference Method 1, Method 2, Method 3, Method 4, Method 5, Method 23, and Method 26A (40 CFR 60 Appendix A). The regulated pollutants will be measured to demonstrate compliance with the Secondary Aluminum Production NESHAP Standard, 40 CFR Part 63, Subpart RRR. **Table 4-1** presents an outline and tentative schedule for the emissions testing program. The following is a summary of the proposed testing and the planned schedule.

- Testing is being performed to satisfy requirements of the 40 CFR Part 63, Subpart RRR (Secondary Aluminum Production NESHAP).
- Materials to be processed will be identified and targeted production rates provided in a separate communication prior to the test.
- Each of the four furnaces will be tested on separate days.
- Melter #x and Melter #y
  - Each melting furnace is tested separately but the procedure is the same
  - The basis of this proposal is to design the test such that the furnace top is only removed once so that all emissions can be measured at the exhaust stack.
    - The melter cycle will begin with the furnace tapped down and end with the furnace tapped down. The cycle will include charging, melting, alloying if required, simulated skimming as described below, and tapping.

    - The test run will begin with the furnace tapped down and only residual molten metal present. At this stage in the process, the furnace contains only clean charge (residual molten metal) and no reactive flux.
    - The furnace top will be removed and one clamshell containing 15,000 – 20,000 pounds of scrap will be charged. This charge will contain all the normal scrap types used in correct proportions.
    - The furnace top will be placed back on the furnace.
    - The melter cycle will proceed normally. With a 20,000 pound charge, the molten metal heel in the melter will be too low to skim the furnace into dross pans. It is proposed a "simulated" skimming operation be performed. The molten heel will be skimmed without removing any dross from the furnace. The operation will take the same amount of time as a normal skimming operation. Any particulate generated will go up the furnace flue where it can be measured.
    - Once the melter cycle is complete, the molten aluminum will be transferred to the holder. No work will be performed in the holder until three (3) complete test runs are performed on the melter.
  - ✓ Three (3) test runs will be completed measuring HCl, D/F and PM.
  - ✓ All charged materials will be weighed using certified scales that are calibrated at least every six (6) months and capable of ± 1% accuracy.
  - ✓ The average of the runs will be calculated to be compared to the emission limits in 3.1505(i).
  - ✓ The emission calculation will be based on feed/charge pounds.

- ■ Holder #a and Holder #b
  - ✓ Each holding furnace (holder) is tested separately but the procedure is the same.
  - ✓ The holder is a reverberatory single chamber design.
  - ✓ Melter 2 will be idle while Holder 1 is being tested.
  - ✓ The first test run on the holder will begin with the transfer of the melter into the holder.
    - The holder cycle will proceed normally. A temporary collection hood will be placed in front of the skim door front door) to collect emissions during skimming.
    - The test run will begin with the holder tapped down and include the transfer from the melter.
    - During transfer, the back door to the holder is kept open to allow the operator to gauge metal height, add alloy materials if needed, and to push the dross to the front for removal if needed. This process takes approximately 30 minutes. Visual observation for any fugitive emissions is planned.
    - The holder will be skimmed.
    - Each test run will end when the cast begins.
  - ✓ The holder will be refilled from one of the melters. The second and third holder test will begin with the transfer of the melter.
    - The holder cycle will proceed normally. A temporary collection hood will be placed in front of the skim door (front door) to collect emissions during skimming.
    - The test run will begin with the holder tapped down and include the transfer from the melter.

        - During transfer, the back door to the holder is kept open to allow the operator to gauge metal height, add alloy materials if needed, and to push the dross to the front for removal if needed. This process takes approximately 30 minutes. Visual observation for any fugitive emissions is planned.
        - The holder will be skimmed.
        - Each test run will end when the cast begins.
    - ✓ Three (3) test runs will be completed measuring HCl and PM (40 CFR 63.1512(e)(2)).
    - ✓ The HCl test will be used to establish a maximum flux limit (% flux) to be used as an internal measure. The flux chemistry and weight will be recorded. From the test, the lb Cl/ton charged will be calculated. The allowable flux % will be calculated from this value using the chemical makeup of the flux and the molar weight of the compounds. This test will consist of three runs, each being one furnace cycle (beginning of feed to end of tap) in length. The test material will be representative of those materials which require the maximum flux percent and thus are likely to generate the highest HCl emissions.
    - ✓ The average of the runs will be calculated to be compared to the emission limits in 63.1505(i).
    - ✓ The emissions calculation will be based on aluminum produced (pounds cast) in the DC casting pit. Pounds cast are determined by calculating the volume of the total number of ingots cast and multiplying this volume by the density of the aluminum alloy cast.

- Velocity and volumetric flow measurements will be taken using EPA Method 2.
- This testing program is proposed to be conducted during XXXXXX.

Process Parameters and Operation Information

Plant personnel or their designated consultant will collect parametric data from the furnaces. The following identifies the measurements, observations, and records that will be collected during the testing events. A worksheet will be developed for the collection of the required operating records as described within this Plan.

All Sources and Associated Control Devices

The furnace systems operations are further described in **Section 5** of this Plan. The methods that will be used to demonstrate compliance rely on the operating data collected during the performance test runs. To properly evaluate the emissions from the sources, a sampling plan is being proposed to monitor emissions during near maximum production. The following parameters are to be identified in the facility's OM&M plan and will be maintained during the testing event.

- The usage rate of the solid reactive flux material in the furnace will be monitored by tracking the weight of the solid reactive flux charged to the furnace.
- The usage rate of the gaseous Cl_2 will be monitored by the meters previously approved by USEPA for this purpose …

- Pounds of aluminum produced will be used to demonstrate compliance of the holding furnaces. Pounds produced will be determined by Commonwealth's standard spreadsheet based on metal density and ingot size.
- Pounds of feed/charge will be used to demonstrate compliance of the melting furnaces. The process feed rate to the reverberatory furnace system will be calculated by recording the weights of the individual loads of metal charged using the production tracking system (FMS). The total weight of all charged material will be calculated for the production period monitored during the performance test. This total production weight will be used to calculate the feed rate for the melting furnace.
- All feed/charge materials will be weighed using certified scales that are calibrated at least every six (6) months to ensure continued compliance with the process rate limits standard.

Table 4-1

Program Outline and Tentative Test Schedule

SOURCE	PARAMETER	SAMPLING METHOD	NUMBER OF RUNS	RUN DURATION	ESTIMATED ONSITE TIME

Section 5

Sources and Sampling Location Descriptions

Test Source Description - XXXXX Group 1 Furnaces

Sampling Locations

All samples will be collected from the relevant exhaust stacks. All exhaust stacks and sample port locations are designed to meet minimum EPA Reference Method 1 requirements (i.e. two and one-half diameters). All stack diameters or depths and widths, upstream and downstream disturbance distances and nipple lengths will be measured on site, with a verification measurement provided by the Field Team Leader.

Section 6
Quality Assurance Program

Internal Quality Assurance

Specific quality control (QC) procedures will be followed to ensure the continuous production of useful and valid data throughout the course of this test program. The QC checks and procedures described in this section represent an integral part of the overall sampling and analytical scheme. Strict adherence to prescribed procedures is quite often the most applicable QC check. A discussion of both the sampling and analytical QC checks that will be utilized during this program is presented below.

Equipment Inspection and Maintenance

Each item of calibrated field test equipment purchased by XXXXXXX is assigned a unique, permanent identification number. An effective preventive maintenance program is necessary to ensure data quality. Each item of equipment returning from the field is inspected before it is returned to storage. During the course of these inspections, items are cleaned, repaired, reconditioned, and recalibrated where necessary. Each item of equipment transported to the field for this test program is inspected again before being packed to detect equipment problems which may originate during periods of storage. This minimizes lost time on the job site due to equipment failure. Occasional equipment failure in the field is unavoidable despite the most rigorous inspection and maintenance procedures. For this reason, XXXXXXX routinely transports to the job site replacement equipment for all critical sampling train components.

Equipment Calibration

New items for which calibration is required are calibrated before initial field use. Equipment whose calibration status may change with use or time is inspected in the field before testing begins and again upon return from each field use. When an item of equipment is found to be out of calibration, it is repaired and recalibrated or retired from service. All equipment is periodically recalibrated in full, regardless of the outcome of these regular inspections.

Calibrations are conducted in a manner, and at a frequency, which meets or exceeds U. S. EPA specifications. XXXXXXX follows the calibration procedures outlined in the EPA Methods, and those recommended within the Quality Assurance Handbook for Air Pollution Measurement Systems: Volume III (EPA-600/4-77-027b, August, 1977). When these methods are inapplicable,

XXXXXXX uses methods such as those prescribed by the American Society for Testing and Materials (ASTM).

Data obtained during calibrations are recorded on standardized forms, which are checked for completeness and accuracy by the quality assurance manager. Data reduction and subsequent calculations are performed using XXXXXXX's own computer facilities. Calculations are checked at least twice for accuracy. Copies of calibration forms are included in the test or project reports.

Emissions sampling equipment requiring calibration includes pitot tubes, pressure gauges, thermometers, dry gas meters, and barometers. The following sections elaborate on the calibration procedures followed by XXXXXXX for these items of equipment.

A: <u>Pitot Tubes.</u> All Type S pitot tubes used by XXXXXXX, whether separate or attached to a sampling probe, are constructed by Apex Instruments or Environmental Supply. Each new pitot is calibrated in accordance with the geometry standards contained in EPA Method 2. A Type S pitot tube, constructed and positioned according to these standards, will have a coefficient of 0.84 ± 0.02. This coefficient will not change as long as the pitot tube is not damaged. Each pitot tube is inspected visually upon return from the field. If a cursory inspection indicates damage or raises doubt that the pitot remains in accordance with the EPA geometry standards, the pitot tube is refurbished as needed and recalibrated.

B: <u>Differential Pressure Gauges.</u> All meter consoles used by XXXXXXX are equipped with 10-in. water column (W.C.) inclined manometers. Fluid manometers do not require calibration other than leak checks. Manometers are leak checked in the field prior to each test series and again upon return from the field.

C: <u>Impinger Thermometer.</u> Prior to the start of testing, the thermometer used to monitor the temperature of the gas leaving the last impinger is compared with a mercury-in-glass thermometer which meets ASTM E-1 No. 63F specifications. The impinger thermometer is adjusted if necessary until it agrees within 2°F of the reference thermometer. If the thermometer is not adjustable, it is labeled with a correction factor.

D: <u>Dry Gas Meter Thermometer.</u> The thermometer used to measure the temperature of the metered gas sample is checked prior to each field trip against an ASTM mercury-in-glass thermometer. The dry gas meter thermometer is acceptable if the values agree within ± 1.5

percent absolute. Thermometers not meeting this requirement are adjusted or labeled with a correction factor.

E: Flue Gas Temperature Sensor. All thermocouples employed by XXXXXXX for the measurement of flue gas temperatures are calibrated upon receipt. Initial calibrations are performed at three points (ice bath, boiling water and hot oil). An ASTM mercury-in-glass thermometer is used as a reference. The thermocouple is acceptable if the agreement is within 1.5 percent (absolute) at each of the three calibration points.

On-site, prior to the start of testing and after testing, the reading from the flue gas thermocouple-potentiometer combination is compared with an ASTM mercury-in-glass reference thermometer. If the two agree within ± 1.5 percent (absolute), the thermocouple and potentiometer are considered to be in proper working order for the test series.

F: Dry Gas Meter and Orifice. Two procedures are used to calibrate the dry gas meter and orifice simultaneously. The full calibration is a complete laboratory procedure used to obtain the calibration factor of the dry gas meter. Full calibrations are performed over a wide range of orifice settings. A simpler procedure, the posttest calibration, is designed to check whether the calibration factor has changed. Posttest calibrations are performed after each field test series by calculating the Y_{qa} using data from each test run.

G: Dry Gas Meter. Each metering system receives a full calibration at the time of purchase. If the calibration factor, Y_{qa}, deviates by less than five percent from the last calibrated value, the test data is acceptable. If Y_{qa} deviates by more than 5 percent, the meter is recalibrated and the meter coefficient (initial or recalibrated) that yields the lowest sample volume for the test runs is used.

EPA Method 5 requires another full calibration anytime the posttest calibration check indicates that Y_{qa} has changed by more than 5 percent. Standard practice at XXXXXXX is to recalibrate the dry gas meter anytime Y_{qa} is found to be greater than 5 percent different or every six months.

H: Orifice. An orifice calibration factor is calculated for each flow setting during a full calibration. If the range of values does not vary by more than 0.20 in. H_2O over the range of 0.4 to 4.0 in. H_2O, the arithmetic average of the values obtained during the calibration is used.

I: Barometer. Each field barometer is adjusted before each test series to agree within ± 0.1 inches of a reference aneroid barometer. The reference barometer (mercury/glass) is checked weekly against the station pressure value (corrected for elevation difference) which is located at the local weather office.

Sampling Quality Control Procedures

The following pretest QC checks will be conducted:

- All sampling equipment will be thoroughly checked to ensure clean and operable components.
- Equipment will be inspected for possible damage from shipment.
- The oil manometer gauge used to measure pressure across the Type S pitot tube will be leveled and zeroed.
- The number and location of the sampling traverse points will be checked before taking measurements.
- The temperature measurement system will be visually checked for damage and operability by measuring the ambient temperature prior to each traverse.

In addition to the general QC procedures listed above, QC procedures specific to each sampling method will also be incorporated into the sampling scheme. These method specific procedures are discussed below.

A: Sampling Train QC Checks. The following QC procedures will be emphasized:

Prior to Start of Tests

- Keep all cleaned glassware and sample train components sealed until train assembly.
- Keep prepared sorbent traps sealed and cool until sample train assembly.
- Store all filters in filter holders or in individual Petri dishes.
- Assemble the sampling trains in an environment free from uncontrolled dust.
- Visually inspect each sampling train for proper assembly.
- Perform pretest calculations to determine the proper sampling nozzle size.

Prior to Testing Each Day

- Visually inspect the sampling nozzle.
- Visually inspect the Type S pitot tube.
- Leak check each leg of the Type S pitot tube.
- Leak check the entire sampling train.

During Testing Each Day

- Readings of temperature and differential pressure will be taken at each traverse point at 10-minute maximum intervals.
- All sampling data and calculations will be recorded on pre-formatted data sheets.
- All calibration data forms will be reviewed for completeness and accuracy.
- Any unusual occurrences will be noted during each run on the appropriate data form.
- The Field Team Leader will review sampling data sheets daily during testing.
- Properly maintain the roll and pitch axis of the Type S pitot tube and the sampling nozzle.
- Leak check the train before and after each test run or if a filter change takes place during the test run.
- Conduct additional leak checks if the sampling time exceeds 4 hours.
- Maintain the probe, filter and impingers at proper temperatures.
- Make proper readings of the dry gas meter, delta P and delta H, temperature, and pump vacuum during sampling at each traverse point.
- Maintain isokinetic sampling within ± 10% of 100%.

After Testing Each Day

- Visually inspect the sampling nozzle.
- Visually inspect the Type S pitot tube.
- Leak check each leg of the Type S pitot tube.
- Leak check the entire sampling train.

QC for Volumetric Air Flow Rate Determinations

A: Flue Gas Velocity. Data required to determine the flue gas velocity will be collected using the methodology specified in EPA Method 2. Quality control procedures are as follows:

- Visually inspect the Type S pitot tube before and after sampling.
- Leak check both legs of the pitot tube before and after sampling.
- Check the number and location of the sampling traverse points before taking measurements.

B: Flue Gas Molecular Weight. Samples to be used for determination of flue gas molecular weight will be collected using the integrated sampling technique specified in EPA Method 3. Quality control will focus on the following procedures:

- The sampling train will be leak checked before and after each run.
- A constant sampling rate will be used in withdrawing a sample.
- The sampling train will be purged prior to sample collection.
- The sampling port will be properly sealed to prevent air from leaking in.

C: Moisture Content. The moisture content of the gas stream will be determined using the technique specified in EPA Method 4. The following QC checks will be performed:

- The sampling train will be leak checked before and after each run.
- Ice will be maintained in the ice bath throughout each run.

Analytical Quality Control Procedures

All analyses for this program will be performed using accepted laboratory procedures in accordance with the specified analytical protocols. Adherence to prescribed QC procedures will ensure data of consistent and measurable quality. Analytical QC will focus upon the use of control standards to provide a measure of analytical precision and accuracy. Also, specific acceptance criteria are defined for various analytical operations including calibrations, control standard analyses, drift checks, blanks, etc. The following general QC procedures will be incorporated into the analytical effort:

- The onsite Field Team Leader will review all analytical data and QC data on a daily basis for completeness and acceptability.
- Analytical QC data will be tabulated using the appropriate charts and forms on a daily basis.
- Copies of the QC data tabulation will be submitted to the quality assurance manager following the completion of the test program.
- All hard-copy raw data (i.e., chromatograms, computer printouts, etc.) will be maintained in organized files.

Specific analytical QC procedures for the Baccarach "Fyrite" analyzer are listed below:

- The analyzer will be leveled and the fluid levels zeroed prior to use.
- The analyzer will be leak checked prior to use.
- The analyzer will be thoroughly purged with sample prior to analysis.
- The analyzer will be checked by analyzing an ambient air sample.

Appendix A
Description of Source Testing Methodology

General

This section contains a brief description of the sampling and analytical procedures for each method that will be employed during the test program. All equipment, procedures, and quality assurance measures necessary for the completion of the test program meet or exceed the specifications of the appropriate methods specified in the EPA Reference Methods. Deviations from the methods to ensure quality and representative nature of the results are also discussed.

Sampling Point/Traverse Points Determination - EPA Method 1

The number and locations of the sampling or traverse points will be determined according to the procedures outlined in EPA Method 1. Method 1 requires the accurate measurement of stack diameters, upstream and downstream distances, and location of the sample points. To determine the amount of sample points, the upstream and downstream distances are equated into equivalent diameters. The number of sample points are then determined using charts listed in EPA Method 1.

Gas Velocity and Volumetric Flow Rate - EPA Method 2

The flue gas velocity and volumetric flow rate will be determined according to the procedures outlined in EPA Method 2. Velocity measurements will be made using Type S pitot tubes conforming to the geometric specifications outlined in EPA Method 2. Accordingly, each has been assigned a coefficient of 0.84. Differential pressures will be measured with inclined, fluid manometers. Effluent gas temperatures will be measured with Type K thermocouples equipped with digital readouts.

A cyclonic flow check, using directional pitots and an angle finder, will be performed by XXXXXXX on all “non-tested” stacks to verify that airflow is not cyclonic. In most stationary sources, the direction of stack gas flow is within cyclonic specifications of the method. The following techniques are acceptable for this determination.

Level and zero the manometer. Connect a Type S pitot tube to the manometer to the manometer and leak-check system. Position the Type S pitot tube at each traverse point, in succession, so that the planes of the face openings of the pitot tube are perpendicular to the

stack cross-sectional plane; when the Type S pitot tube is in this position, it is at "O° reference." Note the differential pressure (Δp) reading at each traverse point. If a null (zero) pitot reading is obtained at O° reference at a given traverse point, an acceptable flow condition exists at that point. If the pitot reading is not zero at O° reference, rotate the pitot tube (up to ±9O° yaw angle), until a null reading is obtained. Carefully determine and record the value of the rotation angle (α) to the nearest degree. After the null technique has been applied at each traverse point, calculate the average of the absolute values of α; assign α values of O° to those points for which no rotation was required, and include these in the overall average. If the average value of α is greater than 2O°, the overall flow condition in the stack is unacceptable, and alternative methodology, subject to the approval of the Administrator, must be used to perform accurate sample and velocity traverses.

Oxygen and Carbon Dioxide – EPA Method 3

The oxygen (O_2) and carbon dioxide (CO_2) will be determined at the test locations following Method 3 procedures. An integrated sample will be extracted during each isokinetic test run. The sampling system consists of a stainless steel probe, followed by a Teflon sample line attached to a condenser system, which is attached to a leak free pump with rotameter. The pump will be coupled with a leak free Tedlar bag. The concentration of oxygen and carbon dioxide in the sample will be determined by using a Bacharach "Fyrite" Gas Analyzer. Fyrite analysis provides for the selective absorption of oxygen in Burrell Oxysorbent and carbon dioxide in potassium hydroxide solutions. The difference in gas volume before and after the absorption represents the amount of constituent gas in the sample. Each sample will be analyzed three (3) times, and the average of the readings for each run will be used in calculating the emission rate for the respective test run.

Gas Moisture Content - EPA Method 4

The flue gas moisture content will be determined in conjunction with each isokinetic sampling train and in accordance the sampling and analytical procedures outlined in EPA Method 4. The impingers will be connected in series and will contain reagents as listed in the following method descriptions. The impingers will be contained in an ice bath to ensure condensation of the flue gas stream moisture. Any moisture that is not condensed in the impingers is captured in the silica gel; therefore, all moisture can be weighed and entered into moisture content calculations.

Particulate Matter - EPA Method 5

Sample Collection. Samples will be withdrawn at an isokinetic rate from the source using an EPA Method 5 sampling train. The sampling train will consist of a glass or stainless nozzle, a heated glass-lined or stainless-lined probe with a Type S Pitot tube attached, a tarred glass fiber or Teflon filter, four chilled impingers and a metering console. The first and second impingers will each contain 100 mL of impinger liquor, the third impinger will remain empty, and the fourth will contain pre-weighed silica gel. Each test run will be approximately 2.5 hours in duration.

Sample Recovery. Following the completion of each test run, the impingers will be weighed on an electronic balance to determine the amount of moisture gained during the run. Samples will be recovered in a dust free environment in XXXXXXX's mobile laboratory. Impinger cases will be used to transport the samples from the field to the mobile laboratory. A stainless steel spatula and tweezers will be used to remove the filter from the filter holder and place it in a labeled Petri dish. The probe and nozzle acetone rinses will be collected in glass sample containers, and the liquid levels will be marked.

Sample Analyses. The filter and front-half acetone rinse will be desiccated and weighed to a constant weight using Method 5 analytical procedures. An acetone blank will be taken, analyzed and interpreted as described in Method 5.

Dioxin/Furan - EPA Method 23

All glass components of the Method 23 sample train upstream of the adsorbent module, will be cleaned in accordance with section 3A of the "Manual of Analytical Methods for the Analysis of Pesticides in Human and Environmental Samples". No silicone grease sealants will be used for this sampling method. Glass-fiber filters will be pre-cleaned in the laboratory in a Soxhlet apparatus. Adsorbent modules will be cleaned as the filters and treated with the appropriate amount of the surrogate solution.

Samples will be withdrawn at an isokinetic rate from the source using an EPA Method 23 sampling train. The sample train is assembled and operated as a Method 5 with the following exception – immediately following the heated filter will be a non-contact, recirculating cold water condenser leading to the XAD-2 adsorbent trap which is attached to an empty modified Greenburg-Smith impinger. The next two impingers will contain 100 ml of HPLC water, the next impinger will be empty, and the last impinger will contain approximately 200 g silica gel. Each test run will be approximately 2.5 hours in duration.

Following the completion of each test run, the impingers will be weighed on an electronic balance to determine the amount of moisture gained during the run. The impinger contents will be discarded after determining the moisture gain. The filter will be removed from the filter holder and placed in Sample Container 1. The XAD sorbent module will be sealed on both ends, labeled, and stored on ice until transported to the laboratory. The nozzle, probe, front and back half of the filter holder, filter support, condenser coil, and connecting glassware will be rinsed with acetone and placed in Sample Container 2. All glassware cleaned for Sample Container 2 will be rinsed lastly with toluene and placed in Sample Container 3. Sample containers 3 and 4 will be amber glass containers.

All samples will be analyzed by Analytical Perspectives in Wilmington, North Carolina in accordance with the requirements listed in Method 23, Section 5.

Hydrogen Chloride – EPA Method 26A

Sampling Equipment Preparation. All glass components of the Method 26A sample train will be cleaned according to Code of Federal Regulations 40, Part 60, Appendix A. The Method 26A sample will be collected utilizing the impingers from the Method 5 train.

Sample Collection. Samples will be withdrawn at an isokinetic rate from the source using an EPA Method 5/26A sampling train. The sample train is assembled and operated as a Method 5 with the following exception – the first and second impinger solution will be 100 ml of 0.1 N H_2SO_4. Each test run will be approximately 2.5 hours in duration.

Sample Recovery. Following the completion of each test run, the impingers will be weighed on an electronic balance to determine the amount of moisture gained during the run. The 1st and 2nd impinger contents will be collected in a polyethylene sample container. All glassware, from the back-half of the filter holder to the outlet of the 2nd impinger, will be rinsed with DI water ,and these rinses added to the sample container.

Appendix B
Sample Calculations

Meter Pressure (Pm), in. Hg

$$Pm = Pb + \frac{\Delta H}{13.6}$$

where,

Pb = barometric pressure, in. Hg
ΔH = pressure differential of orifice in. H_2O

Absolute Stack Gas Pressure (Ps), in. Hg

$$Ps = Pb + \frac{Pg}{13.6}$$

where,

Pb = barometric pressure, in. Hg
Pg = static pressure, in. H_2O

Standard Meter Volume (Vmstd), dscf

$$Vmstd = \frac{17.647 \text{ x } Y \text{ x } Vm \text{ x } Pm}{Tm}$$

where,

Y = meter correction factor
Vm = meter volume, cf
Pm = meter pressure, in. Hg
Tm = meter temperature, ^{o}R

Standard Wet Volume (Vwstd), scf

$$Vwstd = 0.04707x\ Vlc$$

where,

Vlc = volume of H_2O collected, ml

Moisture Fraction (BWS)

$$BWS = \frac{Vwstd}{(Vwstd + Vmstd)}$$

where,

Vwstd = standard wet volume, scf
Vmstd = standard meter volume, dscf

Moisture Content (MC), %

$$MC = BWS \ x \ 100$$

where,

BWS = moisture fraction, dimensionless

Molecular Weight (DRY) (Md), lb/lb-mole

$$Md = (0.44 \times CO_2) + (0.32 \times O_2) + (0.28 \ (100 - CO_2 - O_2))$$

where,

CO_2 = carbon dioxide concentration, %
O_2 = oxygen concentration, %

Molecular Weight (WET) (Ms), lb/lb-mole

$$Ms = Md \ (1 - BWS) + 18 \, (BWS)$$

where,

Md = molecular weight (DRY), lb/lb-mole
BWS = moisture fraction, dimensionless

Average Velocity (Vs), ft/sec

$$Vs = 85.49 \ x \ Cp \ x \ \sqrt{\Delta P} \ avg. \ x \ \sqrt{\frac{Ts}{Ps \ x \ Ms}}$$

where,

Cp = pitot tube coefficient
ΔP = velocity head of stack gas, in. H_2O
Ts = absolute stack temperature, ^oR
Ps = absolute stack gas pressure, in. Hg
Ms = molecular weight of stack gas, lb/lb-mole

Average Stack Gas Flow at Stack Conditions (Qa), acfm

$$Qa = 60 \text{ x } Vs \text{ x } As$$

where,

Vs = stack gas velocity, ft/sec
As = cross-sectional area of stack, ft^2

Average Stack Gas Flow at Standard Conditions (Qs), dscfm

$$Qs = 17.647 \text{ x } Qa \text{ x } (1 - BWS) \text{ x } \frac{Ps}{Ts}$$

where,

Qa = average stack gas flow at stack conditions, ft^3/min
BWS = moisture fraction, dimensionless
Ps = absolute stack gas pressure, in. Hg
Ts = absolute stack temperature, °R

Dioxin/Furan Concentration ($c_{D/F}$), ng/ft^3 – using 1989 D/F TEF's

$$c_{D/F} = \frac{m_{D/F}}{Vmstd \times 1.0E + 03}$$

where,

$m_{D/F}$ = D/F mass, pg
Vmstd = standard meter volume, dscf

D/F Emission Rate (ER_{DF}), lb/hr – using 1989 D/F TEF's

$$ER_{DF} = \frac{c_{D/F} \times Q_s \times 60}{454\,E + 09}$$

where,

$c_{D/F}$ = D/F concentration, ng/ft^3
Qs = stack gas flow at standard conditions, dscfm

D/F Emission Factor (EF_{DF}), grains /ton – using 1989 D/F TEF's

$$EF_{DF} = \frac{ER_{DF} \times 7.0E+03 \times 2.0E+03}{FR}$$

where,

ER_{DF} = D/F emission rate, lbs/hr
FR = feed rate, lbs/hr

D/F Emission Factor (EF_{DF}), ug/MG – using 1989 D/F TEF's

$$EF_{DF} = \frac{ER_{DF} \times 1.0E+12}{FR}$$

where,

ER_{DF} = D/F emission rate, lbs/hr
FR = feed rate, lbs/hr

Particulate Concentration (c_s), grains/dscf

$$c_S = \frac{M_n \times 0.0154}{Vmstd}$$

where,

Mn = particulate mass, mg
Vmstd = standard meter volume, dscf

Particulate Emission Rate (PMR), lbs/hr

$$PMR = \frac{c_s \times Qs \times 60}{7.0E+03}$$

where,

c_s = particulate concentration, grains/dscf
Qs = stack gas flow rate at standard conditions, dscfm

Particulate Emission Factor (EF_{PM}), lbs/ton

$$EF_{PM} = \frac{PMR \times 2.0E+03}{FR}$$

where,

PMR = particulate emission rate, lbs/hr
FR = feed rate, lbs/hr

Hydrogen Chloride Concentration (c_{HCl}) mg/dscm

$$c_{HCl} = \frac{M_{HCl} \times 35.313}{Vmstd}$$

where,

M_{HCl} = hydrogen chloride mass, mg
Vmstd = standard meter volume, dscf

Hydrogen Chloride Emission Rate (ER_{HCl}), lbs/hr

$$ER_{HCl} = \frac{M_{HCl} \times Qs \times 60}{Vmstd \times 4.54x10^5}$$

where,

M_{HCl} = hydrogen chloride mass, mg
Qs = stack gas flow rate at standard conditions, dscfm
Vmstd = standard meter volume, dscf

Hydrogen Chloride Emission Factor (EF_{HCl}), lbs/ton

$$EF_{HCl} = \frac{ER_{HCl} \times 2.0E+03}{FR}$$

where,

ER_{HCl} = hydrogen chloride emission rate, lbs/hr
FR = feed rate, lbs/hr

Appendix C
Production Record

Appendix D
Reverberatory Furnace Sample Port Diagram

Appendix E
Reverberatory Furnace Sample Port Diagram

Appendix F
Reverberatory Furnace Sample Port Diagram

Appendix G
Reverberatory Furnace Sample Port Diagram

APPENDIX H
Model Charge Material Report

25825 Science Park Drive, Suite 400
Beachwood, Ohio 44122-7392
Tel: 216-910-3400
Fax: 216-910-3650
www.aleris.com

Aleris
International, Inc.

August 6, 2008

Ms. Karen Kajiya-Mills
Michigan Department of Environmental Quality
525 W. Allegan Street
Lansing, MI 48909

Re: Reverberatory Furnace/Thermal Chip Dryer/Shredder Stack Test Photolog – Alchem Aluminum Inc. – Coldwater, MI

Dear Ms. Kajiya-Mills:

As specified in the Site Specific Test Plan dated July 9, 2008 attached are the raw materials planned for use in the stack tests scheduled for August 21 through August 28.

The approximate planned production rate for each piece of equipment follows.

Reverberatory Furnace #1	[redacted] pounds/hour
Reverberatory Furnace #7	[redacted] pounds/hour
Reverberatory Furnace #8	[redacted] pounds/hour
Thermal Chip Dryer	[redacted] pounds/hour
Aluminum Scrap Shredder	[redacted] pounds/hour

The materials were selected because it is our belief that they represent those materials most likely to have the greatest emissions of D/F, HCl, particulate and THC of the scrap types commonly used in this equipment.

Sincerely,

GC Barnett

Gary C. Barnett

Copies: Ms. Mary Douglas, Michigan Department of Environmental Quality, electronically
Charmagne Ackerman, US EPA Region 5, electronically
Ty Brown, IMCO Recycling of Michigan LLC, electronically
Brady Myers, Aleris International Inc., electronically
Ken Willings, Aleris International Inc., electronically
Roy Harsch, Drinker, Biddle & Reath LLP, electronically

Stack Test Photographic Log

Company Name:	Site Location:	Test:
Alchem Aluminum Inc.	Coldwater, MI	August 2008

Photo No.
1

Description

380 Turnings

Photo No.
2

Description

Baled Extrusions

Stack Test Photographic Log

Company Name:	Site Location:	Test:
Alchem Aluminum Inc.	Coldwater, MI	August 2008

Photo No.

3

Description

Crushed Extrusions

Photo No.

4

Description

Baled MLC

Stack Test Photographic Log

Company Name:	Site Location:	Test:
Alchem Aluminum Inc.	Coldwater, MI	August 2008

Photo No.

5

Description

Crushed MLC

Photo No.

6

Description

Crushed Radiators

Stack Test Photographic Log

Company Name:	Site Location:	Test:
Alchem Aluminum Inc.	Coldwater, MI	August 2008

Photo No.
7

Description

319 Turnings

Photo No.
8

Description

Old Cast

Stack Test Photographic Log

Company Name:	Site Location:	Test:
Alchem Aluminum Inc.	Coldwater, MI	August 2008

Photo No.	
9	
Description	
Mixed Solids	

Photo No.	
10	
Description	
Old Sheet	

Stack Test Photographic Log

Company Name:	**Site Location:**	**Test:**
Alchem Aluminum Inc.	Coldwater, MI	August 2008

Photo No.

11

Description

Twitch