AP42 Section: 11.23

Title: Comments on Taconite Ore section

Note: This material is related to a section in *AP42, Compilation of Air Pollutant Emission Factors, Volume I Stationary Point and Area Sources.* AP42 is located on the EPA web site at www.epa.gov/ttn/chief/ap42/

The file name refers to the file number, the AP42 chapter and then the section. The file name "rel01_c01s02.pdf" would mean the file relates to AP42 chapter 1 section 2. The document may be out of date and related to a previous version of the section. The document has been saved for archival and historical purposes. The primary source should always be checked. If current related information is available, it will be posted on the AP42 webpage with the current version of the section.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Office of Air Quality Planning and Standards
Research Triangle Park, North Carolina 27711

DRAFT

JAN 8 1993

Mr. Keith Knoblock
American Mining Congress
1920 North Street, N.W., Suite 300
Washington, D.C. 20036

Dear Mr. Knoblock:

As you may know, the Emission Inventory Branch of the U. S. Environmental Protection Agency (EPA) is in the process of updating the document *Compilation of Air Pollutant Emission Factors, Volume I: Stationary Point and Area Sources* (known more commonly as AP-42). As part of this process, we are now seeking comments on the draft sections that are to be included in this update of AP-42.

Chapter eight of AP-42 addresses the mineral products industry and is one of the chapters being updated. Enclosed is a copy of the draft Section 8.22, Taconite Ore Processing, and the corresponding background report for the section. We would appreciate it if you or one of your associates would review the enclosed draft AP-42 section and background report and would send us your comments. It would also be helpful if you could distribute copies of the enclosed section and background report to members of your association for their review. Unfortunately, we are on a very tight schedule, and it is important that we have all comments by February 15, 1993.

The emission factors presented in AP-42 generally are based upon results from validated tests or other emission evaluations that are similar to EPA reference test methods. As a result, revisions to the emission factors presented in AP-42 sections must be supported by equivalent documentation. If you disagree with any emission factors presented in the enclosed AP-42 section or have additional supporting documentation, we would appreciate your providing either a copy of the documentation or information on how we can obtain copies of the supporting documentation.

We appreciate your cooperation and look forward to receiving your comments. If you have any questions, I can be reached by telephone at (919) 541-5407 or by fax at (919) 541-0684.

Sincerely,

Ronald E. Myers
Emission Factors and Methodologies Section
Emission Inventory Branch

2 Enclosures

OAQPS/TSD/EIB:RMyers, rm 455B, 4201 Bldg., 541-5407, MD-14
(MRI/RMarinshaw/LKaufman/677-0249/01/07/93)

IDENTICAL LETTER SENT TO THE FOLLOWING ADDRESSEES:

Mr. B.J. Pigg
Asbestos Information Association/North America
1745 Jefferson Davis Highway, Suite 509
Arlington, Virginia 22202
Section 8.22, Taconite Ore Processing

Mr. Michael Batts
Florida Phosphate Council
830 First Florida Bank Building
215 South Monroe Street
Tallahassee, Florida 32301
Section 8.18, Phosphate Rock Processing

Mr. Karl Johnson
The Fertilizer Institute
501 Second Street, N.E.
Washington, D.C. 20002
Section 8.18, Phosphate Rock Processing

Mr. John Ries
Expanded Clay and Slate Institute
2225 East Murray Holladay Road, Suite 102
Salt Lake City, Utah 84417
Section 8.25, Lightweight Aggregate Manufacturing

Ms. Nancy Wagner
Gypsum Association
810 First Street N.E., Suite 510
Washington, D.C. 20002
Section 8.14, Gypsum Manufacturing

Mr. Ken Mentzer
North American Insulation Manufacturers Association
401 Canal Center Plaza, Suite 310
Alexandria, Virginia 22314
Section 8.16, Mineral Wool Manufacturing

Mr. Vincent P. Ahearn, Jr.
National Aggregates Association
900 Silver Spring Street
Silver Spring, Maryland 20910
Section 8.25, Lightweight Aggregate Manufacturing

Mr. David Bernard
National Coal Association
1130 17th Street, N.W.
Washington, D.C. 20036
Section 8.9, Coal Cleaning

Mr. David Dibb
Potash and Phosphate Institute
2801 Buford Highway, N.E. #401
Atlanta, Georgia 30329
Section 8.18, Phosphate Rock Processing

Mr. Bruce Steiner
American Iron and Steel Institute
1101 17th Street N.W., 13th floor
Washington, D.C. 20036
Section 8.22, Taconite Ore Processing

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Office of Air Quality Planning and Standards
Research Triangle Park, North Carolina 27711

Mr. Douglas C. Schrader
Iron Mining Association of Minnesota
Suite 609
325 South Lake Street
Duluth, Minnesota 55802

Dear Mr. Schrader:

The Emission Factor and Inventory Group of the U. S. Environmental Protection Agency (EPA) is in the process of updating the document *Compilation of Air Pollutant Emission Factors, Volume I: Stationary Point and Area Sources* (known more commonly as AP-42). As part of this process, we are now seeking comments on the draft sections that are to be included in the next update of AP-42.

Enclosed is a copy of the revised draft Section 11.23, Taconite Ore Processing, and the corresponding background report for the section. This section has been revised to incorporate the information provided to us by the American Iron Ore Association in April 1993. We would appreciate your organization reviewing the enclosed draft AP-42 section and background report and sending us your comments. In addition, please feel free to distribute copies of these documents to other interested persons. We would appreciate a response to this request by April 10, 1995.

The emission factors presented in AP-42 generally are based upon results from validated tests or other emission evaluations that are similar to EPA reference test methods. As a result, revisions to the emission factors presented in AP-42 must be supported by equivalent documentation. If you disagree with any emission factors presented in the enclosed AP-42 section or have additional supporting documentation, we would appreciate your providing either a copy of the documentation or information on how we can obtain copies of the supporting documentation. We would also appreciate specific comments on the process description, the process flow diagram, and the table of emission sources (Table 11.23-1) presented in the enclosed draft AP-42 section.

We look forward to receiving your comments. If you have questions or need additional time to respond, I can be reached by telephone at (919) 541-5407 or by fax at (919) 541-0684.

Sincerely,

Ronald E. Myers
Emission Factor and Inventory Group
Emissions, Monitoring, and
Analysis Division

2 Enclosures

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Office of Air Quality Planning and Standards
Research Triangle Park, North Carolina 27711

DRAFT

NOV 17 1994

Mr. George J. Ryan
Executive Director
American Iron Ore Association
614 Superior Avenue, West
915 Rockerfeller Building
Cleveland, Ohio 44113-1383

Dear Mr. Ryan:

The Emission Inventory Branch of the U. S. Environmental Protection Agency (EPA) is in the process of updating the document *Compilation of Air Pollutant Emission Factors, Volume I: Stationary Point and Area Sources* (known more commonly as AP-42). As part of this process, we are now seeking comments on the draft sections that are to be included in the next update of AP-42.

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The emission factors presented in AP-42 generally are based upon results from validated tests or other emission evaluations that are similar to EPA reference test methods. As a result, revisions to the emission factors presented in AP-42 must be supported by equivalent documentation. If you disagree with any emission factors presented in the enclosed AP-42 section or have additional supporting documentation, we would appreciate your providing either a copy of the documentation or information on how we can obtain copies of the supporting documentation. We would also appreciate specific comments on the process description, the process flow diagram, and the table of emission sources (Table 11.23-1) presented in the enclosed draft AP-42 section.

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Sincerely,

Ronald E. Myers
Emission Factors and Methodologies Section
Emission Inventory Branch

2 Enclosures

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Office of Air Quality Planning and Standards
Research Triangle Park, North Carolina 27711

NOV 23 1994

Mr. George J. Ryan
Executive Director
American Iron Ore Association
614 Superior Avenue, West
915 Rockerfeller Building
Cleveland, Ohio 44113-1383

Dear Mr. Ryan:

The Emission Factor and Inventory Group of the U. S. Environmental Protection Agency (EPA) is in the process of updating the document *Compilation of Air Pollutant Emission Factors, Volume I: Stationary Point and Area Sources* (known more commonly as AP-42). As part of this process, we are now seeking comments on the draft sections that are to be included in the next update of AP-42.

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We look forward to receiving your comments. If you have questions or need additional time to respond, I can be reached by telephone at (919) 541-5407 or by fax at (919) 541-0684.

Sincerely,

Ronald E. Myers
Emission Factor and Inventory Group
Emissions, Monitoring, and
Analysis Division

2 Enclosures

IDENTICAL LETTER SENT TO THE FOLLOWING ADDRESSEES:

Mr. J. Duncan Shorey
Oglebay Norton Company
1100 Superior Avenue
Cleveland, Ohio 44114-2598
Mr. Shorey

Mr. Keith Knoblock
American Mining Congress
1920 North Street, N.W., Suite 300
Washington, D.C. 20036
Mr. Knoblock

Mr. W. Gale Biggs
W. Gale Biggs Associates
Post Office Box 3344
Boulder, Colorado 80307-3344
Mr. Biggs

Mr. Bruce Steiner
American Iron and Steel Institute
1101 17th Street N.W., 13th Floor
Washington, D.C. 20036
Mr. Steiner

Mr. William S. Kirk
Branch of Industrial Minerals
Division of Mineral Commodities
U.S. Bureau of Mines
810 Seventh St. NW MS 5209
Washington, DC 20241-0001
Mr. Kirk

Mr. Dennis M. Drake
Chief, Air Quality Division
Michigan Department of Natural Resources
Post Office Box 30028
Lansing, Michigan 48909
Mr. Drake

Ms. Lisa J. Thorvig
Manager, Air Quality Division
Minnesota Air Pollution Control Agency
520 Lafayette Road
St. Paul, Minnesota 55155
Ms. Thorvig

Mr. S. William Becker
Executive Director
State & Territory Air Pollution Program Administrators
444 North Capitol Street, NW, Suite 307
Washington, DC 20001-1514
Mr. Becker

Ms. Jane Kingston
Environmental Control Engineer
U.S. Steel Minntac
Post Office Box 417
Mountain Iron, Minnesota 55768
Ms. Kingston

IDENTICAL LETTER SENT TO THE FOLLOWING ADDRESSEES:

Mr. J. Duncan Shorey
Oglebay Norton Company
1100 Superior Avenue
Cleveland, Ohio 44114-2598
Mr. Shorey

Mr. Keith Knoblock
American Mining Congress
1920 North Street, N.W., Suite 300
Washington, D.C. 20036
Mr. Knoblock

Mr. W. Gale Biggs
W. Gale Biggs Associates
Post Office Box 3344
Boulder, Colorado 80307-3344
Mr. Biggs

Mr. Bruce Steiner
American Iron and Steel Institute
1101 17th Street N.W., 13th Floor
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810 Seventh St. NW MS 5209
Washington, DC 20241-0001
Mr. Kirk

Mr. Dennis M. Drake
Chief, Air Quality Division
Michigan Department of Natural Resources
Post Office Box 30028
Lansing, Michigan 48909
Mr. Drake

Ms. Lisa J. Thorvig
Manager, Air Quality Division
Minnesota Air Pollution Control Agency
520 Lafayette Road
St. Paul, Minnesota 55155
Ms. Thorvig

Mr. S. William Becker
Executive Director
State & Territory Air Pollution Program Administrators
444 North Capitol Street, NW, Suite 307
Washington, DC 20001-1514
Mr. Becker

Ms. Jane Kingston
Environmental Control Engineer
U.S. Steel Minntac
Post Office Box 417
Mountain Iron, Minnesota 55768
Ms. Kingston

DRAFT

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
RESEARCH TRIANGLE PARK, NC 27711

MAR 6 1996

OFFICE OF
AIR QUALITY PLANNING
AND STANDARDS

Mr. George J. Ryan
Executive Director
American Iron Ore Association
614 Superior Avenue, West
915 Rockefeller Building
Cleveland, Ohio 44133-1383

Dear Mr. Ryan:

The Emission Factor and Inventory Group of the U. S. Environmental Protection Agency (EPA) is in the process of updating the document *Compilation of Air Pollutant Emission Factors, Volume I: Stationary Point and Area Sources* (known more commonly as AP-42). As part of this process, we are now seeking comments on the draft sections that are to be included in the next update of AP-42.

Enclosed is a copy of the revised draft Section 11.23, Taconite Ore Processing, and the corresponding background report for the section. These documents have been revised to incorporate the comments and additional information provided to us by the Minnesota Pollution Control Agency in their January 10, 1995 letter and from the American Iron Ore Association in your January 12, 1995 letter. We also have incorporated into the draft documents additional test data and other information provided by several taconite ore processing facilities over the past year. We would appreciate your organization reviewing the enclosed draft documents and contacting other interested parties, including the Minnesota Pollution Control Agency and the Iron Mining Association of Minnesota, to discuss any further changes to the background report and AP-42 section. After you have agreed on the final changes, please submit your comments to us so that we can finalize these documents. We would appreciate your providing the documentation for any changes to the emission factors in the documents in a format and level of detail similar to the documentation provided in Chapter 4 of the enclosed draft background report. We are particularly interested in your recommendations for aggregating or disaggregating the emission data for indurating furnaces by furnace, fuel, and pellet (acid or flux) types.

The enclosed documents also include a list of the Source Classification Codes (SCC's) currently assigned to taconite ore processing. However, SCC's have not yet been assigned to many of the taconite ore processing sources for which we have emission data. The unassigned SCC's are indicated in the documents with a single or double letter in place of the last two digits of the SCC (e.g., 3-03-023-a). We also request your recommendations on assigning new SCC's to specific taconite ore processing sources.

We would appreciate a response to this request by April 19, 1996. We look forward to receiving your comments. If you have questions or need additional time to respond, I can be reached by telephone at (919) 541-5407 or by fax at (919) 541-0684.

Sincerely,

Ronald E. Myers
Emission Factor and Inventory Group
Emissions, Monitoring, and
Analysis Division

2 Enclosures

IDENTICAL LETTER SENT TO THE FOLLOWING ADDRESSEES:

Ms. Lisa J. Thorvig
Manager, Air Quality Division
Minnesota Air Pollution Control Agency
520 Lafayette Road
St. Paul, Minnesota 55155
Ms. Thorvig
your
their
American Iron Ore Association and the Iron Mining Association of Minnesota

Mr. Wayne E. Brandt
Iron Mining Association of Minnesota
325 South Lake Avenue, Suite 609
Duluth, Minnesota 55802
Mr. Brandt
their
their
Minnesota Pollution Control Agency and the American Iron Ore Association

AMERICAN IRON ORE ASSOCIATION

SERVING THE IRON ORE INDUSTRY OF THE UNITED STATES AND CANADA

April 15, 1993

Mr. Ronald E. Myers
Emission Factors and Methodologies Section
U.S. Environmental Protection Agency
Office of Air Quality Planning and Standards
Research Triangle Park, North Carolina 27711

Re: AP-42, Section 8.22
Taconite Ore Processing

Dear Mr.Myers:

(216) 861-2866

Please accept our comments on the above referenced topic, pursuant to the letter you received from the Chairman of the Environmental Committee, J. Duncan Shorey. We thank you for your consideration in agreeing to accept these comments after the deadline, and hope that they are of great use to you and your staff in establishing a valid reference standard.

As you may recall, the American Iron Ore Association is a trade association that has represented iron ore interests in the United States and Canada since 1882. AIOA member companies account for approximately 98 percent of the iron ore produced in the United States. The companies operate state-of-the-art iron ore pellet plants in North America, which competitively meet the stringent quality standards of steel producers. The plants have an effective annual capacity of more than 68 million tons of ore.

We have appreciated the opportunity to review the proposed standard, and welcome the opportunity to continue working together in an effort to develop a standard which both protects the environment and protects our industry.

Very truly yours,
American Iron Ore Association

George J. Ryan
Executive Director

att.

Telephone
(216) 241-8261

614 Superior Avenue, West
915 Rockefeller Building
Cleveland, Ohio 44113-1383

Facsimile
(216) 241-8262

COMMENTS ON PROPOSED AP-42 FACTORS

FOR THE

TACONITE ORE PROCESSING INDUSTRY

Prepared for:

Emission Factors & Methodologies Section
U.S. Environmental Protection Agency
Office of Air Quality Planning and Standards
Research Triangle Park, North Carolina 27711

Prepared by:

American Iron Ore Association
Suite 915
614 Superior Avenue West
Cleveland, Ohio 44113-1383

April 16, 1993

TABLE OF CONTENTS

INTRODUCTION

The American Iron Ore Association (AIOA) reviewed[1] the draft document generated by the U.S. EPA to modify Section 8.22 of AP-42 - taconite ore processing emission factors. As a result of this review, AIOA would like to comment on five issues which it feels need modification and/or clarification. These issues are:

1. The use of old data in the preparation of the emission factors.

2. A failure to incorporate recent advances in pollution control technology.

3. The presentation of asbestos as an issue in the taconite mining and processing industry.

4. The misrepresentation of fugitive emission factors.

5. The changes from old emission values to new ones.

USE OF OLD DATA

The proposed emission factor modifications in AP-42 will become the official method for calculating emissions from taconite mines and processing plants; thus the values should, hopefully, represent the latest in technology and control. The proposed modification to the emission factors do not reflect studies based upon the latest available data. For instance, the database used

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[1]This review was coordinated by the team of W. Gale Biggs Associates, P.O. Box 3344, Boulder, Colorado 80307 and Applied Environmental Sciences, Inc., 511 11th Avenue South, Minneapolis, Minnesota 55415. Members of the AIOA Environmental Committee provided much of the information presented herein.

for deriving the presented values is quite old. Three of the four references cited were dated in the mid 1970s (one was dated 1983). The revised emission values, therefore, reflect conditions that are 20 years out of date.

The use of these data will have many detrimental side effects negatively impacting both the industry and regulatory agencies. The Clean Air Act Amendments of 1990 (CAAA) will be imposing stricter conditions on the taconite industry leading to additional controls and/or modifications to the current processes. Many of these strategies are current and known and, as such, should be reflected in AP-42.

These emission factors will be used by both industry and regulatory agencies for several different purposes including permitting, taking inventories, setting of fee structures, and fee assessment. As fees become more important in the operations of the regulatory agency, any changes or errors in these emission factors will directly impact the budget and performance of these agencies. The same can be said for industry since their operating budgets, and hence their competitive position, also depend on these emission factors.

CONTROL TECHNOLOGY

Using old data does not reflect the advances in control technology of the past 15 to 20 years. Although several control techniques have changed only slightly, cost shifts have allowed, in some cases, for different more cost effective controls to be used. The EPA write-up, using the aged database, misses this aspect of the issue. There are more recent stack test data than that used in EPA's study which could provide a more realistic, updated emissions estimate for AP-42. It is imperative that values to be used currently are based on control technology grounded in the here and now.

As a means of assisting EPA in obtaining access to the latest information, AIOA has mounted a substantial effort to obtain from the taconite companies copies of their stack test data. These are attached for your use and reference. Most of these documents have all been submitted to the Minnesota Pollution Control Agency (MPCA) and should have been used by EPA for the first study. AIOA was surprised and disappointed that this valuable reference source was apparently overlooked in the preparation of the proposed AP-42 revision.

In this light, the members of this industry would like to see an open dialogue begun between the companies and those responsible for revisions to EPA documents such as AP-42. Stack testing is an ongoing process, constantly supplying new measurements; indeed, with the Clean Air Act Amendments of 1990, these new requirements will lead to an increase in testing. With all this information readily available, it should be possible to keep emission factors accurate and up to date.

ASBESTOS

The concern over asbestos in taconite ore reached its peak in the mid-1970s. However, studies since then have shown this not to be a health issue, and yet, the AP-42 rewrite treats it as if it were a real concern. AIOA believes the inclusion of asbestos into AP-42 places an unwarranted burden on the taconite industry, one which is clearly not justified by the available evidence. Therefore, for reasons explained below, we are requesting that all references to asbestos be removed from Section 8.22 of AP-42.

EPA has published a background report updating emission factors related to taconite ore processing. EPA's Emission Factor Documentation for AP-42 Section 8.22 Taconite Ore Processing for the first time designates asbestos as a possible emissions source. EPA has included asbestos emissions because, as stated in the document, "some taconite reserves are associated with asbestos".

The perceived association of asbestos with taconite ore deposits dates back to the early 1970's, the era of the Reserve Mining federal environmental trial (Reserve Mining vs. EPA). Prior to the trial, it was known that the ore mined by Reserve Mining contained the amphibole mineral cummingtonite-grunerite. This mineral is typically found only in ore mined at the eastern end of the Biwabik iron formation. The asbestiform variety of cummingtonite-grunerite is also known as amosite asbestos. Cummingtonite-grunerite, like all the asbestos minerals, also occurs in non-asbestos forms. The cleavage fragments of non-asbestiform cummingtonite-grunerite found in Reserve Mining's taconite tailings were considered to be "asbestos" by the federal court. They were determined to be asbestos because the particles met the then current definition for fibers (over three times longer than wide) and were chemically the same as amosite asbestos. This classification of cummingtonite-grunerite cleavage fragments as asbestos is not current[2] and yet has persisted in the EPA emissions data for taconite ore processing.

Fibers meeting the then current definition of asbestos were discharged into Lake Superior as part of Reserve Mining's taconite tailings. These taconite tailings were deemed by the federal courts to be creating a potential health hazard. The result of this court determination was to create a problem which impacted a large segment of the population. The perception that this was a major asbestos problem was propagated nation-wide and received wide press coverage. This conclusion has not endured the test of time. Studies in Duluth, where residents drank unfiltered water from Lake Superior containing taconite tailings, showed no excess levels of cancer (Levy et al., 1976; Mason et al., 1974; Sigurdson et al., 1981). The result was a major local scare and a nation-wide concern for a problem that did not exist.

Current definitions of asbestos recognize significant

[2]The sole background study which documented asbestos emissions was done at Reserve Mining and published in 1974.

differences between asbestiform particles and non-asbestiform cleavage fragments. These differences are based on the shape and form of the particles. Long, thin, flexible, strong fibers, with parallel smooth sides and splayed ends, which may also occur in bundles, are characteristics which comprise the currently accepted definition of asbestiform fibers (Campbell et al 1977; Zoltai and Wylie, 1979; Walton, 1982; National Research Council, 1984, Virta, 1983; Kelse and Thompson, 1989). The non-asbestiform cummingtonite-grunerite cleavage fragments are typically stubbier prismatic or acicular particles with nonparallel sides which are created by crushing the ore.

In a report prepared for the MPCA, Dr. Tibor Zoltai concluded that the cleavage fragments of cummingtonite-grunerite found in the Peter Mitchell mine (Reserve's ore body) should not be referred to as asbestiform (Zoltai, 1976). Dr. Jack Zussman and Dr. Cornelius Hurlbut, two of the world's most respected mineralogists, testified during the Reserve Mining trial that they did not believe that Reserve Mining's mine contained any asbestos. Dr. James Gunderson, author of Geology of the Biwabik Formation, also testified that he had never seen any asbestiform cummingtonite-grunerite (amosite) in the Biwabik formation.

Many studies have supported the conclusion that true asbestos fibers are rarely associated with taconite and that most of the particles previously called asbestos were actually cleavage fragments (Bonnichsen, 1969,1975; Gundersen and Shwartz, 1962; Campbell et al, 1977, 1979; Harlow et al, 1984; Zoltai and Stout, 1976; Zoltai and Wylie, 1979; Zoltai, 1979; West, 1982; Virta et al, 1983; Ring, 1981; Sheehy, 1986; Sheehy et al, 1987; Wylie et al, 1985, 1987).

The mineralogical definition of asbestos is important because exposure to true asbestos has been shown to cause cancer. Numerous animal tests have shown that amphibole fibers which are long and thin (asbestiform) have a high potential to cause cancer. Similar tests with non-asbestiform amphiboles show little, if any,

carcinogenic response (Stanton, 1981; Smith, 1979; Wagner, 1982; Addison, 1989; Pott et al, 1987). A summary of asbestiform vs. non-asbestiform cancer studies is attached.

The ultimate concern is whether the cleavage fragments generated in some taconite ore beneficiation processes increase the occurrences of cancer in human beings. Two major health studies have followed Minnesota taconite miners and millers who have been exposed to cleavage fragments of cummingtonite-grunerite. The studies outlined below showed no increased deaths due to the cancers which would be expected with asbestos exposure.

One of the studies followed 3,444 taconite miners and millers who had worked at Erie Mining or U.S. Steel's Minntac operation. This study, published in the Journal of Occupational Medicine, stated that there was no association between taconite operations and any asbestos-like health effects. A recent update of the study followed the population through 1988, with a minimum observation period of 30 years, and found no increase in lung cancer (Cooper et al, 1992).

The other study followed a group of 5,751 men who worked for Reserve Mining; it was published in the American Journal of Epidemiology and concluded that "this study does not suggest any increase in cancer mortality from taconite exposure" (Higgins et al, 1983).

Evidence related to mineralogy, animal testing, and human health effects, all point to the conclusion that the fibers generated from ore mined at the east end of the Biwabik iron formation are not the same, in form or carcinogenicity, as true asbestos.

In a similar situation, in which the non-asbestiform amphiboles actinolite, tremolite, and anthophyllite (ATA) were lumped together with asbestiform varieties, OSHA decided that current evidence no longer supported regulating the two materials

in the same way. The OSHA Final Rule on Occupational Exposure to Asbestos, Tremolite, Anthophyllite and Actinolite stated that "OSHA believes the health effects evidence does not support treating non-asbestiform ATA as presenting a risk equivalent in kind or extent to asbestos" (OSHA, Federal Register, June 8, 1992).

EPA should carefully review the "asbestiform fiber versus cleavage fragment" health evidence before imposing unnecessary asbestos regulations on taconite ore processing emissions. Current attitudes regarding the health risks related to non-asbestiform cleavage fragments clearly indicate that these particulates should not be regulated as asbestos. **Until evidence to the contrary becomes available - and current findings suggest that it will not - the taconite emissions section (Section 8.22) should not make any reference to asbestos as a concern or include any emission factors for asbestos.**

FUGITIVE EMISSION SOURCES

Another problem is the mention of fugitive emissions for such things as haul roads, tailing basins, wind erosion, and blasting. The proposed revision references Chapter 11 of AP-42 for these emission factors. There are, however, no emission factors given in Chapter 11 (or anywhere in AP-42 for that matter) for blasting; this is, therefore, a meaningless reference. Of greater concern is the implication of using Chapter 11 emission factors for calculating short-term PM_{10} concentrations. The emission factors given in Chapter 11 were developed as annual averages. Recent studies have shown that these annual values cannot be used for calculating 24-hour averages; this should be clearly stated in Section 8.22 of AP-42 as well.

AP-42 specifies that fugitive emissions presented are valid for annual calculations. Section 11.2.7.3 of AP-42 states: "Calculated emissions represent intermittent events and should not be input directly into dispersion models that assume steady state

emission rates." The emission factor used in a permit application submittal are based on an annual evaluation which generates a steady state emission rate. Experience has shown that these values overestimate short-term calculations.

The most common air quality model preferred by the regulatory agencies is the ISCST model. Two factors are important in this consideration: 1) there are problems associated with area sources in ISCST, and 2) AP-42 annual emission factors when used in the short-term ISCST model over-predict the short-term concentrations.

The argument is sometimes made that the annual value does not represent the potentially high emissions from "event" conditions and that these short-term conditions are averaged out of the annual values. This would therefore under-predict the short-term calculations. However, experience has shown that this is not the case. In cases where fugitive emissions are the dominant sources the short-term calculations using annual values not only over-predict but are not representative values for short-term calculations. This was dramatically shown in a recent study conducted for the Wyoming Air Quality Division[3]; a copy is attached for your review and use. This document states in the Executive Summary as a final conclusion: "All short-term model/annual average emission factor scenarios compared poorly with measured 24-hour concentrations . . . (w)hen maximum 24-hour emission rates were used in the models, **over-predictions were as much as 50 times.** None of the short-term models/emission factor combinations can be recommended for use." (boldface added)

The Wyoming study "used the annual average emission rates in all calculations. It should be recognized that emission rates vary on a daily basis and no attempt has been made here to adjust the emission rates on each day . . ." As a result of these assumptions

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[3]POWDER RIVER BASIN MODEL VALIDATION ANALYSIS. TRC Environmental Consultants. August 2, 1991. Prepared for Wyoming Department of Environmental Quality, Air Quality Division, Cheyenne, Wyoming 82002.

the following was observed: "the ISC does not under-predict the concentrations, and in fact even over-predicts the concentrations . . . when used with the AP-42 emission factors". It further stated that: "the ISCST model always over-predicts concentrations" when used with either the AP-42 emission factors or the reduced emission factors used by Wyoming.

Since maximum predicted concentrations are used in regulatory decisions the use of the ISCST model with AP-42 emission factors should be used with extreme caution. In fact, the report recommends that the short-term model results be used for indicating trends instead of for regulatory purposes.

In addition, many of the fugitive emission factors are based on old references from the 1970s. For instance, for pellet handling and material transfer operations, EPA used an average moisture content of 0.96% and an average silt content of 5.9%. Taconite mining companies have consistently reduced emissions by producing pellets with moisture contents of 2 - 2½%. During the 1980s and up to the present time the pellets are sampled and water added as necessary to increase the moisture content to the desired levels. Old EPA data does not reflect this increased moisture content.

CHANGES FROM OLD TO NEW EMISSION VALUES

The existing AP-42 presents separately uncontrolled emissions and factors for different control combinations. The revised section presents an emission factor for each control type. This is a fundamental change in the approach used to calculate emissions. The old approach allows for new control technology to be incorporated with a minimum of effort. The new approach would require a modification to the published emission factors with each new piece of equipment. How is EPA going to maintain AP-42 in an

updated format? Will this information be disseminated to the users? The timeliness of information flow appears to be a major problem; what are EPA's plans to keep the user aware of the latest factors? None of these considerations were included in the proposed amendments. A much more detailed discussion of this problem and its resolution needs to be included so that industry may comment and assist in the form and strategy for the information flow.

The question must be asked as to the reasons for the proposed change. The ratings for the "new" emission factors are all in the D and E category while the "existing" emission factors are all rated in the B or C category. Why is EPA proposing emission factors with a poorer rating to replace the better rated emission factors in use now?

On page 27 (Table 4-4) of the AP-42 Section Development the SO_2 emission factor for "Grate/kiln (natural gas)" is listed as 0.045 kg/Mg. In the proposed rewrite section (page 8.22-16, Table 8.22-5) the value is listed as 0.45. Which is correct?

For those values that were readily comparable, a comparison of the "old" versus "new" emission factors was done. There were some large differences as well as some that varied only slightly. An explanation for all of the "new" values, whether they represent a change or not, should be included in the discussion section of the proposed modification.

CONCLUSION

There are five points which need to be addressed before any revisions become permanent in AP-42, Chapter 8. Below is a summary of these concerns:

- The use of old data from the 1970's does not accurately reflect the status of the taconite industry in the 1990's.

- Old data also does not adequately address the issue of control technologies and their advances in the last 20 years. A substantial amount of up-to-date stack test data has been included with this document to assist in a re-evaluation of new emission values.

- Asbestos is not a concern in the taconite industry and the revised sections of AP-42 should not go final until all references to asbestos are struck out.

- There seems to be a misconception about the use of fugitive source emissions. References must be cleaned up and clarified.

- Changes in emission factors must be justified and more fully explained.

The AIOA appreciates your efforts to incorporate our concerns in developing a better AP-42. Keeping in mind that we view this as a joint and collaborative effort, we look forward to an on-going dialogue whereby information is shared with the goal of attaining the best emission factor possible, both for the environment and for industry. Therefore, please accept these comments as a beginning in an effort to continue to work together. We look forward to hearing from you as you incorporate our latest data into the revised AP-42, particularly as new sampling required under the new provisions of the CAAA generate more recent data. Please let us know how we might act to facilitate this continuing exchange of data and ideas.

AIOA looks forward to reviewing the next draft of AP-42, Section 8.22 when it becomes available.

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AMERICAN IRON ORE ASSOCIATION

SERVING THE IRON ORE INDUSTRY OF THE UNITED STATES AND CANADA

February 9, 1993

Mr. Ronald E. Myers
Emission Factors and Methodologies Section
U.S. Environmental Protection Agency
Office of Air Quality Planning and Standards
Research Triangle Park, NC 27711

RE: AP-42, Section 8.22 Taconite Ore Processing

Dear Mr. Myers:

American Iron Ore Association (AIOA) is a trade association that has represented iron ore interests in the United States and Canada since 1882. AIOA member companies account for approximately 98 percent of the iron ore produced in the United States. The companies operate state-of-the-art iron ore pellet plants in North America, which competitively meet the stringent quality standards of steel producers. The plants have an effective annual capacity of over 68 million tons of pellets.

We are in receipt of the above referenced section of the **Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources**. In deference to the magnitude of the work you have done, coupled with the importance of the subject matter to our members, we respectfully request that you agree to accept our comments until March 26, 1993.

In an attempt to compile a meaningful response, we have circulated the draft to the various engineering staffs of companies which operate taconite plants on the Mesabi Range. It is our intent to provide U.S. EPA with our best and most complete response by the time indicated.

I thank you in advance for your cooperation and attention to this matter. Should you have any questions, please do not hesitate to contact me at (216) 241-8261.

Sincerely,

George J. Ryan
Executive Director

GJR:cal

Telephone
(216) 241-8261

614 Superior Avenue, West
915 Rockefeller Building
Cleveland, Ohio 44113-1383

Facsimile
(216) 241-8262

United States Department of the Interior

U.S. BUREAU OF MINES
WASHINGTON, DC 20241-0002

December 14, 1994

Mr. Ronald E. Myers
U.S. Environmental Protection Agency
Emissions Factor and Inventory Group
Emissions, Monitoring, and Analysis Division
Research Triangle Park, North Carolina 27711

Dear Mr. Myers:

As you requested, we have reviewed the report on taconite processing, including the characterization of the industry, the process description, the process flow diagram and the table of emission sources. Dr. John Nigro at the Twin Cities Research Center in Minneapolis, MN, reviewed the latter two. Our comments are enclosed. If you have any questions, I can be reached at 202-501-9430.

Sincerely,

W S Kirk

William S. Kirk
Iron Ore Specialist
Branch of Metals

Enclosure

Review of EPA Revised Draft Report "

Taconite Ore Processing"

The term "taconite ore" is redundant, taconite is a type of iron ore.

Industry Description

Page 2-1, par. 2.
I think you need a better definition of taconite. Here's mine:

Taconite is a hard, dense low-grade iron ore that, in this country, is only mined in Minnesota and Michigan. Most of the iron ore mined in the rest of the world is relatively friable and has an iron content of about 60%. This ore is ready for the blast furnace after minimal processing as opposed to taconite, which requires extensive processing. Taconite has an iron content of about 30% to 35%. About 20% to 25% of the iron is in the form of magnetite, which is generally the only iron that is recovered from taconite. So, for all practical purposes, the iron content of taconite is 20% to 25%. Also, the magnetite in taconite is very fine-grained. Taconite must be crushed and ground to about 325 mesh before it can be concentrated.

Page 2-1, Par. 4.
This paragraph should read as follows:

Combined U.S. and Canadian production represents only 9 percent of the world output of iron ore. (I don't know why the authors use the term "usable ore" in speaking of world production. The term "usable ore" means ore that has been processed and is ready for the blast furnace. Iron ore producers mine crude ore and ship usable ore. In speaking of production as in world production, it is generally understood that the reference is to usable ore unless crude ore is specified.) Fifty-seven mine ore, which is almost invariably of a higher grade than taconite. The leading producer is Brazil, which accounts for about 19 percent of world output in terms of metal content. Other large producers include Australia, China, and the former Soviet Union.

Page 2-1, Par. 5.
This paragraph should read as follows:

Domestic steel companies own 68.5 percent of iron ore production capacity in the United States. Canadian steel companies own 11.6 percent. Due in large part to the location of iron mines, close ownership ties exist between U.S. and Canadian steel companies.

Page 2-4, Par. 1.
This paragraph should read as follows:

There are 17 iron mines nationwide, nine of them, located in Minnesota and Michigan, are taconite mines. The taconite mines account for 99 percent of output.

Note: See attached sheet for Table 2-2.

Page 2-6, Par. 1.

The first complete sentence states that the rod and ball mills are in closed circuit with classification systems such as cyclones. Classification occurs after secondary grinding, but usually, not after primary grinding.

This paragraph contains the following sentence: An alternative to crushing is to feed some coarse ores directly to wet or dry semiautogenous or autogenous grinding mills (using larger pieces of the ore to grind/mill the smaller pieces), then to pebble or ball mills.

I don't think this is an alternative to crushing. I think it is just another grinding method.

Page 2-6, Par. 5.
The first sentence in this paragraph refers to maghemite as an iron mineral that is part of the ores that are concentrated. I don't think that maghemite is found in the taconites of Minnesota or Michigan.

Concerning the flow diagram, there are two items:

The diagram shows classification after the primary grinding step. To the best of our knowledge, this is not the case in Minnesota or Michigan. There is cyclone classification after secondary grinding.

Also, the classification step shown after the primary grinding is labelled "N". According to Table 11.23-1, this step should be labelled "M".

Otherwise, the flow diagram seems to be correct.

Table 2-2. Number and Production Rate of Taconite Mines by State a

State	No. of mines	No. of pellet Plants	Crude ore produced b	Usable ore produced b
Minnesota	7	7	141,453	42,033
Michigan	2	2	38,810	12,780
Total	9	9	180,263	54,814

a Reference 1
b Thousand metric tons per year in 1992.

1 Kirk, W.S., 1992 Iron Ore Minerals Yearbook, U.S. Government Printing Office

AMERICAN IRON ORE ASSOCIATION

SERVING THE IRON ORE INDUSTRY OF THE UNITED STATES AND CANADA

January 12, 1995

Mr. Ronald E. Myers
Emission Factors and Methodologies Section
U.S. Environmental Protection Agency
Office of Air Quality Planning and Standards
Research Triangle Park, NC 27711

Dear Mr. Myers:

AP-42, SECTION 8.22 (11.23)
TACONITE ORE PROCESSING

Through our consultant, W. Gale Biggs Associates, American Iron Ore Association has reviewed the most recent draft of the proposed AP-42 Section 8.22 (to be renumbered 11.23). We appreciate the opportunity to present our comments and hope that they are of use to you and your staff in establishing new emission factors for taconite processing.

American Iron Ore Association (AIOA) is a trade association that has represented iron ore interests in the United States and Canada since 1882. AIOA member companies account for approximately 98 percent of the iron ore produced in the United States. The companies operate state-of-the-art iron ore pellet plants in North America which competitively meet the stringent quality standards of steel producers. The plans have an effective annual capacity of more than 68 million tons of ore.

We recognize that the existing section number in the AP-42 document is 8.22, but that within the next few months an extensive reorganization of AP-42 will be taking place, renumbering this section as 11.23 in the review document.

In our earlier review (letter dated April 15, 1993) of this section — taconite ore processing emission factors — five issues were raised which we felt needed modification and/or classification. These issues are:

1) The use of old data in the preparation of the emission factors.

2) A failure to incorporate recent advances in pollution control technology.

Continued . . . /

Telephone
(216) 241-8261

614 Superior Avenue, West
915 Rockefeller Building
Cleveland, Ohio 44113-1383

Facsimile
(216) 241-8262

3) The presentation of asbestos as an issue in the taconite mining and processing industry.

4) The misrepresentation of fugitive emission factors.

5) The changes from old emission values to new ones.

Each of these issue are discussed separately below.

1) **THE USE OF OLD DATA IN THE PREPARATION OF THE EMISSION FACTORS**

AIOA mounted a substantial effort to assemble and provide to EPA recent stack test data collected form its member companies. These were provided to EPA in AIOA's April 15, 1993, submittal. We are happy to note that in the new draft, the number of documents used in the emission determination increased from 4 to 31. These data should provide emission factors which are much more representative for use in the taconite industry.

2) **A FAILURE TO INCORPORATE RECENT ADVANCES IN POLLUTION CONTROL TECHNOLOGY**

This draft of section 11.23 eliminated the table of control device efficiencies and included emission factors for both controlled and uncontrolled emissions. While this is still a compromise, it is a definite improvement in the presentation. AIOA expects that facilities would be able to argue for any case-by-case stack efficiencies that can be justified by appropriate data.

3) **THE PRESENTATION OF ASBESTOS AS AN ISSUE IN THE TACONITE MINING AND PROCESSING INDUSTRY**

AIOA presented as best an argument as possible in the time frame available for the last review of section 11.23 that the issue of asbestos was not a problem in the taconite ore processing industry. We were pleased to note that EPA was responsive to these arguments and that 1) asbestos was not mentioned in the descriptive portions of the section, and 2) emission factors were not included in the tables. We again request that the final presentation in AP-42 should not mention asbestos.

4) **THE MISREPRESENTATION OF FUGITIVE EMISSION FACTORS**

The elimination of the haul road traffic emissions from this section was a positive step. We agree that the section on haul road emissions (the future section 13.2) is far more refined for conducting these calculations.

Continued . . . /

AMERICAN IRON ORE ASSOCIATION

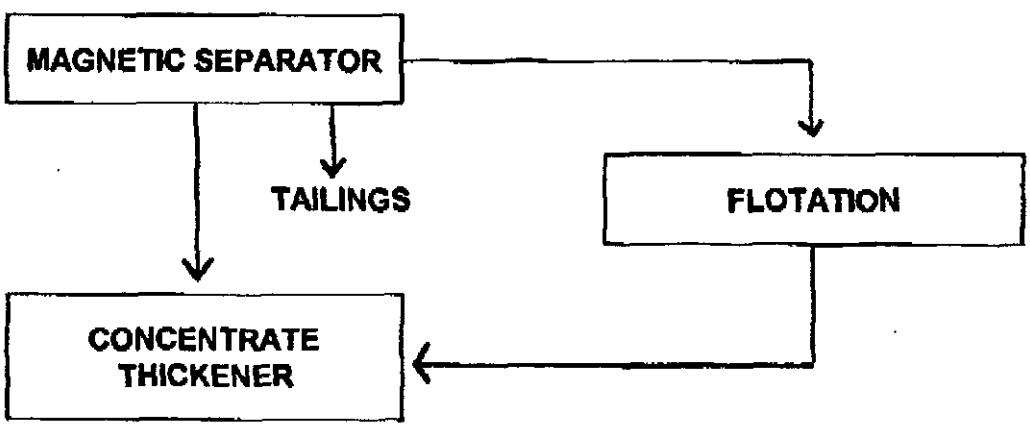
Unless additional information becomes available, all references to blasting on page 11.23-8 must be eliminated. Blasting is a short-term, albeit large, emission source with almost all of the particles in the very large sizes; only a very small fraction are in the size ranges of concern, i.e., PM_{10} or smaller. These emissions, therefore, settle quickly. This intermittent emission source occurs within the range of seconds and yet the standard is a 24-hour average. Since EPA has not produced any reliable measurements of blasting emissions, mention of blasting as a major particulate matter source needs to be deleted. An emission factor for blasting was eliminated from AP-42 many years ago because there was no technical justification to substantiate a value.

5) **THE CHANGES FROM OLD EMISSION VALUES TO NEW ONES**

Many of the concerns expressed on this topic have been answered with the changes as described above. The inclusion of almost eight times as many sources in the analysis of the emissions lends far more credibility to the proposed emission values. With the Clean Air Act Amendments of 1990, far more testing will be required and additional information should lead to further refinements in the emission values.

EDITORIAL COMMENTS

1) The flow diagram in Figure 11.23.1 (page 11.23-4) should include the possibility of flotation. Some plants have this included in their processing techniques. Below is a suggested inclusion of this process into the flow diagram. The spelling of "thicker" should be "thickener".



Continued . . . /

AMERICAN IRON ORE ASSOCIATION

Mr. Ronald E. Myers
Emission Factors and Methodologies Section
U.S. Environmental Protection Agency

2) An appropriate addition to show the flotation option must be made on page 11.23-5, six lines down from the top of the page, with the inclusion of **and/** as follows:

"After crushing, the size of the material is further reduced by wet grinding in rod mills **and/**or ball mills."

3) In table 11.23-2 on page 11.23-11, we request changing the name from "Unspecified conveyor:" to "Ore transfer". Conveyors produce almost no emissions; the vast bulk of emissions come from the transfer points.

4) For tables 11.23-4 and 11.23-5, in footnotes b & c, the word "that" should be changed to "than". This would be a total of four edits — two in each table.

* * *

We appreciate the opportunity to review the proposed emission section. We welcome working together in an effort to develop a section which both protects the environment and our industry.

Sincerely,

George J. Ryan
Executive Director

GJR:cal

Minnesota Pollution Control Agency

Air Quality Division
520 Lafayette Road North
St. Paul, Minnesota 55155-3898

FACSIMILE TRANSMITTAL SHEET

To: Joseph Cleccesi

Company or Agency: U.S. EPA

Facsimile Number: 919/541-0684

Subject: URGENT
Comments on Revised Draft
AP-42 Section 11.23

From: Lisa Thorvig

Company or Agency: Minnesota Pollution Control Agency/Air Quality Division

Telephone Number:

Facsimile Number: 297-7709

Date: 1/10/95

Pages to Follow: 9

(Please Number All Pages)

If you have questions regarding this transmittal, please call (612) 282-9882

vmm(8/93)

Minnesota Pollution Control Agency

January 10, 1995

Mr. Ronald E. Myers
Emission Factor and Inventory Group (MD-14)
Emissions, Monitoring, and Analysis Division
Office of Air Quality Planning and Standards
U.S. Environmental Protection Agency
Research Triangle Park, North Carolina 27711

RE: Comments on Revised Draft AP-42 Section 11.23

Dear Mr. Myers:

I received an undated letter from you with two enclosures on December 2, 1994. In the letter, you requested that the Minnesota Pollution Control Agency (MPCA) Air Quality Division review the enclosed draft AP-42 Section 11.23, Taconite Ore Processing, and the accompanying background report; and that the MPCA respond to your request by January 13, 1995.

The MPCA appreciates the efforts of the U.S. Environmental Protection Agency on revising the emission factors for taconite ore processing in AP-42. Emission factors compiled in the current AP-42 Section 8.22, Taconite Ore Processing, are very limited. There are still some problems in the draft AP-42 Section 11.23. The MPCA staff has discovered that more recent test reports (see an enclosed list for some of the more recent test reports) are not used in preparing the draft AP-42 Section 11.23. Another list is also enclosed to provide contacts of the seven taconite plants in Minnesota and the MPCA contact for test report duplication.

More recent test reports are more representative of the current production mode. This is very important to the emission units associated with the induration process. Prior to the early 1980s, acid pellet was the product in taconite ore processing. Then, various amounts of fluxstone (limestone and/or dolomite), approximately from one to ten percent by weight of the pellet product, were added to the pelletizing process, with the resultant product being called semi-flux or flux pellet. The change of pellet production occurred at different times for different companies; while some companies ceased acid pellet production, others maintain the capability of making either pellet. In the current taconite pellet market, both flux and acid pellets are in demand.

Different production modes result in different emissions of air pollutants in the induration process. The MPCA has found that the flux pellet production increased emissions of some air pollutants greatly in the induration process, e.g., sulfur dioxide (SO_2), even if the amount of fluxstone was as low as approximately one percent by weight of the pellet product *(fluxstone contains sulfur naturally). (The MPCA often suggests that stationary sources in taconite ore processing use the mass balance principle to calculate SO_2 emission, whether acid or flux pellet*

is processed.) With more fluxstone added, the induration process becomes much more complex thermochemically -- more heat is required to bind the solid materials together and local hot spots appear in the bed of pellets. A significant increase in the emission of NO_x has been consistently reported.

The MPCA strongly recommends adding a categorical variable to the sets of the emission data to indicate whether acid pellet or flux pellet was being processed while the samples were collected (*companies need to be contacted individually to ensure the assignment to this categorical variable is correct*). Subsequent data analysis may be performed using a linear regression model to test the validity of null hypothesis on the categorical variable. National Steel Pellet Company recently conducted performance test for both acid and semi-flux pellet productions, as required by a recent permit action. Finally, the MPCA staff raised a question on the statistical method used in the data analysis (see the enclosed spreadsheet in Microsoft Excel 5.0a).

We understand that no matter how complete an emission factor compilation, such as the revised AP-42, becomes, there are always needs for source-specific determination of some emission factors. The MPCA recommends that the emission factors be updated to include the more recent tests and to take into consideration what type of pellet is being produced. Due to the significant number of taconite producers located in Minnesota, the MPCA would like to review the updated draft before it is made final. If you have any question on this letter, you may contact me at (612)296-7331 for specific comments, please contact Mr. Hongming Jiang, of my staff, at (612)296-7670, via FAX at (612)297-7709 or Internet at **hongming.jiang@pca.state.mn.us**.

Sincerely,

Lisa J. Thorvig
Division Manager
Air Quality Division

LJT:vat

Enclosures

cc: Rodney Massey, Air Quality Division
Carolina Espejel-Schutt, Air Quality Division
Hongming Jiang, Air Quality Division
Patrick O'Neill, Air Quality Division
Stuart Arkley, Air Quality Division

RECENT PERFORMANCE/ENGINEERING TESTSAT TACONITE PLANTS IN MINNESOTA[1]

Source	AQD No.	Emission Unit	Parameter	Test Date
Northshore Mining	27A	6 sources	PM	(to be submitted)
Northshore Mining	*27A*	*4 sources*	*TSP, Opacity*	*04/17/90*[2]
Northshore Mining	*27A*	*11,12 pelletizers,2 boil*	*TSP, Opacity,NO_x,SO_2*	*07/24/90*[3]
Northshore Mining	27A	No. 2 fine crusher	TSP	10/03/90
Northshore Mining	27A	power boiler #2 (EP#2)	PM,SO_2,Opacity,(NO_x)	05/24/94
Northshore Mining	27A	fine crusher (EP#11)	PM,Opacity	05/24/94
Northshore Mining	27A	dry cobber (EP#22)	PM, Opacity	05/24/94
Northshore Mining	27A	bin storage (EP#48)	PM, Opacity	05/24/94
Northshore Mining	27A	pellatizing furnace dis.	PM, Opacity	05/24/94
Northshore Mining	27A	Furnace 12 waste gas	PM, Opacity, SO_2, NO_x	05/24/94
Northshore Mining	27A	Furnace 11 waste gas	PM, Opacity, SO_2, NO_x	05/24/94
Northshore Mining	27A	Furnace 12 hood exhaust	PM, Opacity (SO_2, NO_x)	05/24/94
Northshore Mining	27A	Furnace 11 waste gas	PM, Opacity, SO_2, NO_x	05/24/94
Eveleth Mines	869B	primary crusher	PM10, Opacity	07/28/94
Eveleth Mines	869B	secondary crusher	PM10, Opacity	07/28/94
Eveleth Mines	869B	primary crusher	PM10	11/03/94
Eveleth Mines	869B	primary crusher	PM10,Opacity	04/08/93
Eveleth Mines	869B	secondary crusher	PM10,Opacity	04/08/93
Inland Steel Mining	257	flux pellet induration furnace	NO_x	07/31/90
Hibbing Taconite	541	pellatizing furnace no.1	Opacity,PM,NO_x,CO	05/10/94
Hibbing Taconite	541	pellatizing furnace no.2	Opacity,PM,NO_x,CO	05/10/94
Hibbing Taconite	541	several		06/22/94
Hibbing Taconite	541	pellatizing furnace no.3	PM, Opacity,NO_x,SO_2,Pb,VOC	09/27/94
LTV Steel Mining	48B	Furnace, etc.	PM,NO_x,SO_2,VOC	(to be submitted)

1 The information listed is obtained from a computerized database maintained by the MPCA Air Quality Division Compliance Determination Unit. The database is not complete, for some test reports submitted by companies prior to 1992 have not been included. Unless indicated otherwise, a copy of the listed reports can be requested at a fee from Ms. Lori Tabor of MPCA at 612/297-5367, FAX: 612/297-7709.

2 This report may have been used as reference 10 in the draft report Section 4.

3 This report may have been used as reference 37 in the draft report Section 4.

RECENT PERFORMANCE/ENGINEERING TESTSAT TACONITE PLANTS IN MINNESOTA

Source	AQD No.	Emission Unit	Parameter	Test Date
National Steel Pellet	62B	2B	TSP	09/11/86
National Steel Pellet	62B	2	TSP, Opacity	04/14/87
National Steel Pellet	62B	kiln; waste gas stack 2A	PM, Opacity	06/22/93
National Steel Pellet	62B	No. 31	TSP, Opacity	(to be submitted)
National Steel Pellet	*62B*	*6 sources*	*TSP, Opacity*	*07/24/88*[4]
National Steel Pellet	*62B*	*waste gas stack 2A*	*TSP, Opacity*	*06/05/91*[5]
National Steel Pellet	62B	primary crusher	PM	(to be submitted)
National Steel Pellet	62B	No. 1 drive tower	PM	(to be submitted)
National Steel Pellet	*62B*	*waste gas stack EP#31*	*TSP, Opacity*	*06/17/92*[6]
National Steel Pellet	62B	waste gas stack 2B /EP31	PM10,CO,NO_x,SO_2,VOC	09/12/94
National Steel Pellet	62B	waste gas stack 2B /EP31	PM10,CO,NO_x,SO_2,VOC	09/16/94
National Steel Pellet	62B	waste gas stack 2B /EP31	PM10,CO,NO_x,SO_2,VOC	09/23/94
National Steel Pellet	62B	waste gas stack 2B /EP31	PM10,CO,NO_x,SO_2,VOC	10/12/94
National Steel Pellet	62B	waste gas stack 2B /EP31	PM	10/13/94
US Steel Minntac	26A	course crusher EP#4.3	PM,PM10, Opacity	03/30/93
US Steel Minntac	26A	course crusher EP#4.4	PM,PM10, Opacity	03/30/93
US Steel Minntac	26A	course crusher EP#4.7	PM,PM10, Opacity	03/30/93
US Steel Minntac	26A	pellatizer 4 EP#8.21	PM,PM10, Opacity	04/28/93
US Steel Minntac	26A	pellatizer 5 EP#8.22	PM,PM10, Opacity	04/28/93
US Steel Minntac	26A	pellatizers 4 and 6	sulfur balance; SO_2	report 6/21/94[7]

4 This report may have been used as reference 36 in the draft report Section 4.

5 This report may have been used as reference 33 in the draft report Section 4.

6 This report may have been used as reference 32 in the draft report Section 4.

7 University of Minnesota Natural Resources Research Institute Coleraine Minerals Research Laboratory (CMRL) conducted this agglomerator sufur balance study for U.S. Steel Minnesota Ore Operations (Minntac). Based on this study, the MPCA staff determined that the control efficiency for sulfur removal of a wet scrubber designed primarily to reduce particulate emission could be taken as 50% by weight (MPCA letter, 8/11/94). For a copy of the CMRL report, please contact Mr. Larry Salmela of U.S. Steel Minntac (telephone: 218/749-7569; FAX: 218/749-7360), or Hongming Jiang, Ph.D., P.E., Senior Engineer, MPCA (telephone: 612/296-7670; FAX: 612/297-7709; Internet: hongming.jiang@pca.state.mn.us).

TACONITE PLANTS IN MINNESOTA

(1) **U.S. Steel Minnesota Ore Operations** (AQD File No. 26A)

Mr. Larry Salmela
Department Manager, Environmental Control
U.S. Steel Minnesota Ore Operations
P.O. Box 417
County Highway 102
Mount Iron, Minnesota 55768

Telephone: (218)749-7569
FAX: (218)749-7360

(2) **LTV Steel Mining Company** (AQD File No. 48B)

Mr. Dennis Koschak
Area Manager, Technical Services
LTV Steel Mining Company
P.O. Box 847
Hoyt Lakes, Minnesota 55750

Telephone: (218)225-4219
FAX: (218)225-4230

(3) **National Steel Pellet Company** (AQD File No. 62B)

Mr. Donald E. Healy
Superintendent, Panning and Technical Services
National Steel Pellet Company
P.O. Box 217
Keewatin, Minnesota 55753

Telephone: (218)778-6521
FAX: (218)778-6112

(4) **Northshore Mining Company** (AQD File No. 27A)

Mr. Dennis M. Wagner
Senior Environmental Engineer
Northshore Mining Company
10 Outer Drive
Silver Bay, Minnesota 55614

Telephone: (218)226-6056
FAX: (218)226-3657

(5) Inland Steel Mining Company (AQD File No. 257)

Mr. Gustav R. Josephson
Staff Engineer
Inland Steel Mining Company
P.O. Box 1 (U.S. 53 North)
Virginia, Minnesota 55792

Telephone: (218)749-5910 Ext. 283
FAX: (218)749-5256

(6) Hibbing Taconite Company (AQD File No. 541)

Mr. Steven G. Rogers
Senior Environmental Engineer
Hibbing Taconite Company
P.O. Box 589
Hibbing, Minnesota 55746

Telephone: (218)262-6800
FAX: (218)262-6877

(7) Eveleth Mines (AQD File Nos. 869A, 869B)

Mr. David P. Johnson
Director -- Environmental, Safety & Health
Eveleth Mines
P.O. BOX 180
Eveleth, Minnesota 55734

Telephone: (218)744-7804
FAX: (218)744-7874

For file document duplication at a fee, the following staff may be contacted:

Ms. Lori Tabor
Compliance and Enforcement Section
Air Quality Division
Minnesota Pollution Control Agency

Telephone: (612)297-5367
FAX: (612)297-7709

What Type of t-Test Is Used for the Analysis in the Draft Report for AP-42 Section 11.23?

File: **TAC_T8**

X	Y
1.1	0.28
1.2	0.3
1.2	0.26
0.9	0.61
0.9	0.57
1.2	0.62
1.5	
1.3	
1.7	

It is unclear from the spreadsheets in the draft report which type of t-test is used there. For file TAC_T8, the draft provides an analysis similar to the one assuming equal variance here. Is it proper from the perspectives of statistics, although the end results do not differ much? The analyses done here make use of Microsoft Excel 5.0a.

t-Test: Two-Sample Assuming Unequal Variances

	X	*Y*
Mean	1.2222222	0.44
Variance	0.0669444	0.03116
Observations	9	6
Hypothesized Mean Difference	0	
df	13	
t Stat	6.9598661	
P(T<=t) one-tail	4.96E-06	
t Critical one-tail	1.7709317	
P(T<=t) two-tail	9.919E-06	
t Critical two-tail	2.1603682	

t-Test: Two-Sample Assuming Equal Variances

	X	*Y*
Mean	1.2222222	0.44
Variance	0.0669444	0.03116
Observations	9	6
Pooled Variance	0.0531812	
Hypothesized Mean Difference	0	
df	13	
t Stat	6.4357972	
P(T<=t) one-tail	1.108E-05	
t Critical one-tail	1.7709317	
P(T<=t) two-tail	2.215E-05	
t Critical two-tail	2.1603682	

$$D = \frac{1.22 - 0.44}{\sqrt{\frac{0.067}{9} + \frac{0.031}{6}}} = 6.9457 \qquad s_D^2 = 0.0178$$

$$k = \left(\frac{\left(\frac{0.067}{9(0.0178)}\right)^2}{8} + \frac{(1-0)^2}{5} \right)^{-1}$$

$$= \left(\frac{(0.4182)^2}{8} + \frac{(1-0.4182)^2}{5} \right)^{-1}$$

$$= 0.02186^{-1} = 11.2$$

AQ410-003

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Office of Air Quality Planning and Standards
Research Triangle Park, North Carolina 27711

DEC 02

Ms. Lisa J. Thorvig
Manager, Air Quality Division
Minnesota Air Pollution Control Agency
520 Lafayette Road
St. Paul, Minnesota 55155

Dear Ms. Thorvig:

The Emission Factor and Inventory Group of the U. S. Environmental Protection Agency (EPA) is in the process of updating the document *Compilation of Air Pollutant Emission Factors, Volume I: Stationary Point and Area Sources* (known more commonly as AP-42). As part of this process, we are now seeking comments on the draft sections that are to be included in the next update of AP-42.

Enclosed is a copy of the revised draft Section 11.23, Taconite Ore Processing, and the corresponding background report for the section. This section has been revised to incorporate the information provided to us by the American Iron Ore Association in April 1993. We would appreciate your organization reviewing the enclosed draft AP-42 section and background report and sending us your comments. In addition, please feel free to distribute copies of these documents to other interested persons. We would appreciate a response to this request by January 13, 1995.

The emission factors presented in AP-42 generally are based upon results from validated tests or other emission evaluations that are similar to EPA reference test methods. As a result, revisions to the emission factors presented in AP-42 must be supported by equivalent documentation. If you disagree with any emission factors presented in the enclosed AP-42 section or have additional supporting documentation, we would appreciate your providing either a copy of the documentation or information on how we can obtain copies of the supporting documentation. We would also appreciate specific comments on the process description, the process flow diagram, and the table of emission sources (Table 11.23-1) presented in the enclosed draft AP-42 section.

We look forward to receiving your comments. If you have questions or need additional time to respond, I can be reached by telephone at (919) 541-5407 or by fax at (919) 541-0684.

Sincerely,

Ronald E. Myers
Emission Factor and Inventory Group
Emissions, Monitoring, and
Analysis Division

2 Enclosures

FAX TRANSMISSION

TO: Phil Brick
AIOA/Cleveland Cliffs

FROM: Richard Marinshaw
Midwest Research Institute
401 Harrison Oaks Boulevard, Suite 350
Cary, North Carolina 27513
(919) 677-0249, Ext. 5359
FAX: 919-677-0065

DATE: August 5, 1996

RECEIVING FAX NUMBER: 216-694-6707

SENDING FAX NUMBER: 919-677-0065

THIS FAX CONSISTS OF 11 PAGES (INCLUDING THIS PAGE)

As we discussed, I am faxing to you a copy of the comments received from the Minnesota Pollution Control Agency on the latest draft AP-42 section and background report for taconite ore processing. Please let me know if you have any questions. We will contact you later this week or early next to set up a conference call.

MIDWEST RESEARCH INSTITUTE
Suite 350
401 Harrison Oaks Boulevard
Cary, North Carolina 27513-2412
Telephone (919) 677-0249
FAX (919) 677-0065

Date: February 13, 1997

Subject: Taconite Ore Processing--Responses to Comments Submitted by the Minnesota Pollution Control Agency Review and Update of AP-42 Sections in Chapters 11, 12 and 13, Covering Mineral Products Industries, Metallurgical Industries, and Miscellaneous Sources
EPA Contract 68-D2-0159, Work Assignment 4-02
MRI Project 4604-02

From: Richard Marinshaw

To: Ron Myers
EPA/EFIG/EMAD (MD-14)
U. S. Environmental Protection Agency
Research Triangle Park, N.C. 27711

This memorandum summarizes the responses to comments submitted by the Minnesota Pollution Control Agency (MPCA) regarding the February 26, 1996 draft background report and AP-42 Section 11.23, Taconite Ore Processing. The comments were contained in the June 20, 1996 letter from Patrick O'Neill, MPCA, to you.

Comment: Page 11.23-5: We would include language in the 5th paragraph that clarifies the incipient fusion temperature for acid pellets falls in the lower region of the specified temperature range and flux pellet incipient infusion temperature falls in the upper end of the specified temperature range of 2350° to 2550°F.

Response: Suggested change made to both Section 2.2 of the background report and the AP-42 section.

Comment: Page 11.23-6: We disagree with your statement that indurating furnaces generate low levels of Sulfur Dioxide (SO_2) emissions in the 4th paragraph of section 11.23.3. We also disagree with the 0.10 lb/ton emission factor for SO_2. During our review of a Title V application for one of the taconite plants in Minnesota we found that SO_2 emissions were 0.187 lb/ton of SO_2 when firing with natural gas and 0.339 lb/ton when firing with fuel oil. While the lb/ton figure may seem low, when you take note that some large induration furnaces like those in Minnesota with a production rate of 700+ tons per hour have actual emissions ranging from 450 to 830 tons per year (tons/yr) of SO_2 per furnace. We suggest the paragraph be rewritten as follows.

"Induration furnaces generate Sulfur Dioxide (SO_2). SO_2 emissions have a fuel component and a raw material component (concentrate, binder, limestone). Induration furnaces also emit combustion products such as Nitrogen Oxides (NO_x) and Carbon Monoxide (CO). Because of the additional heating requirements, emissions of NO_x and SO_2 generally are higher when flux pellets are produced than when acid pellets are produced."

Response: Suggested change made to both Section 2.3 of the background report and the AP-42 section.

Comment: We would also change the 6th paragraph of Section 11.23.3 in the following manner.

"Annular coolers normally operate in stages. The exhaust of the first stage is vented to the induration furnaces as preheated combustion gas. The second and third stages are generally left uncontrolled".

We would stay away from stating the emissions are small. While reviewing a Title V permit for a taconite plant in Minnesota, the uncontrolled emission rate was determined to be 0.09 lb/ton.

Response: Suggested change made to both Section 2.3 of the background report and the AP-42 section.

Comment: Table 11.23.-2 Emission Factors for Taconite Ore Induration Furnaces--Acid Pellet Production

1. Natural gas fired grate/kiln uncontrolled. For this source type, you reference three test reports. Reference 4 is for an U. S. Environmental Protection Agency (EPA) test of Eveleth Mines in Minnesota from November 1975. We could not find a copy of this report in our files. Which pelletizing plant was tested during this test? There are two pelletizing plants at the Eveleth facility. The original plant, simply identified as pelletizing plant No. 2, has only one waste gas stack. The expansion plant has two waste gas stacks and they are identified as waste gas stacks 2A and 2B.

It is important that if the expansion plant was the one tested in reference 4 that both stacks were tested. In order to come up with a valid lb/ton emission factor, the emissions from both stacks must be taken into account. If only one of the two stacks was tested, then the tested emission rate should be doubled to approximate the emissions from the other stack and the emission factor rating should be reduced one grade due to this approximation.

Response: The test was performed prior to the expansion. The source tested was Furnace No. 2. Therefore, no changes are needed.

Comment: Reference 36 is cited for this unit. However, on page 4-1 of the final draft report it states that References 32 to 44 were not used to develop the emission factor due to the lack of process data. We contacted the plant where the testing was done in Reference 36 and obtained the process data. Attachment 1 contains the missing process data and our spreadsheet calculations of the following average emission factors from this furnace.

	PM	PM_{10}
Average emission	Filterable	Filterable
lb/ton fired pellets	5.11	0.63

The above values should be included in the average emission factor along with the values obtained from References 4 and 5. Section 4 should be updated to summarize Reference 36 to make it consistent with the table that will be included in the final AP-42 section.

Response: The reference numbers for Chapter 4 of the background report generally do not correspond to the reference numbers in the AP-42 section. Reference 36 of the AP-42 section corresponds to Reference 52 of the background report, Chapter 4. To avoid further such misunderstandings, a new Chapter 4 table (Table 4-7) has been added that cross-references the corresponding references in the background report and AP-42 section.

However, it does appear that incorrect production rates were used to develop the emission factors from Reference 4-52 (Reference 36 in AP-42). Therefore, the emission factors were revised to incorporate the factors calculated by MPCA.

Comment: 2. Natural gas fired grate/kiln with multiclone. Reference 35 was used to develop the particulate matter (PM) and particulate matter less than 10 μm in size (PM_{10}) emission factors for this source category. The plant tested in Reference 35 is located in Minnesota. The pelletizing furnace that was tested in this reference has two waste gas stacks. The testing was only conducted on one of the two stacks. The test results should be doubled to account for all of the emissions from the untested stack. The PM_{10} emission factor of 0.14 lb/ton of fired pellets appears to account for both stacks.

Response: Emission rates were doubled; no changes needed.

Comment: The testing involved in this reference used Methods 201A and 202 for PM_{10}. The testing done in this reference did not include Method 5 for PM. The taconite plant

that the testing was done at in Reference 35 has conducted PM compliance testing each year for one of the two stacks on an alternating basis. Included in Attachment 2 to this letter are the copies of the summaries of stack testing using method 5. Using these test results, we come up with an emission factor of 0.59 lb/ton of PM/ton of fired pellets. The spreadsheets containing our calculations are also included in Attachment 2. The emission factor for this source type should be changed to 0.59 lb of PM/ton of fired pellets.

Response: The Reference 35 Method 201A data were used to estimate the filterable PM emission factor of 0.32 lb/ton. The additional data provided by MPCA in Attachment 2 of their letter also have now been incorporated into the revised emission factor. In addition, the emission factor for semi-flux pellet production (Reference 49 from the previous draft background report) was included in the emission factor calculation, as suggested by MPCA (pg 9 of MPCA letter). The resulting emission factor is 0.44 lb/ton for natural gas-fired, multiclone-controlled grate/kilns.

It should be noted that four of the five tests for which MPCA provided summaries correspond to References 32 to 35 in Chapter 4 of the February 26, 1996 background report. Those references were not used previously due the lack of production data. In the revised draft background report and AP-42 section, References 32 to 35 are used to develop emission factors.

Comment: 3. Natural gas and oil fired grate kiln with ESP. The emission factor seems rather low. We would like a copy of this report to review.

Response: We agree that the emission factor seems low, but the test report for this factor provides no reason for discarding the data. A copy of the test report will be forwarded to MPCA.

Comment: 4. Coal fired grate/kiln with wet scrubber. The fuel used in Reference 29 during the subject stack test was pet coke not coal. Appendix J of Reference 29 contains the proximate analysis of the fuel used and it is listed as pet coke. Pet Coke is a coal by-product and as such may have different emission characteristics. This may warrant assigning an emission factor rating of E. Attachment 3 to this letter contains our review of Reference 29. We calculated an emission rate of 0.10 lb/ton based only on the information from Reference 29. We recommend the average filterable PM emission rate be kept at 0.15 lb/ton.

Response: The emission factor (0.10 lb/ton) has been corrected to indicate coke-fired grate/kilns. In the absence of other information, this value of 0.10 lb/ton is presented in the revised AP-42 section.

Comment: We were unable to locate Reference 18. Page 4-14 and 4-15 of the Emission Factor Documentation for this section appears to have accounted for all of the emissions from both stacks.

Response: No changes needed; the emission rates were doubled to account for emissions from both stacks.

Comment: 5. Grate/kiln unspecified fuel type. References 35 and 36 are cited in footnote (j) for this source type. Neither of these references are contained in Section 4 of the draft final report. Section 4 should contain a summary of all the references footnoted in this table. We suggest EPA either eliminate this source category or revise it to include data from Attachments 1 and 2 of this letter and conduct a sensitivity analysis to see if the condensable PM is independent of fuel type.

Response: As explained previously, the references numbers for Chapter 4 of the background report generally do not correspond to the reference numbers in the AP-42 section. References 35 and 36 of the February 26, 1996 draft AP-42 section correspond to References 49 and 52 of the background report, Chapter 4. To avoid further such misunderstandings, a new Chapter 4 table (Table 4-7) has been added that cross-references the corresponding references in the background report and AP-42 section.

As suggested, the category of unspecified fuels has been eliminated; fuel type now is indicated for all emission factors in the revised draft AP-42 section.

Comment: 6. Gas-Fired Vertical Shaft. References 12-14 and 24 are used for this type of furnace. We no longer have copies of these reports in our files. We were unable to verify if emissions from both the bottom gas and top gas stacks were used to develop the emission factor. In order to find the total emissions from these furnaces you need to add the emissions from the top gas and bottom gas stacks together.

Response: References 12 to 14 and 24 report emissions from vertical shaft furnace top gas stacks only; no data are provided on bottom gas stack emissions. In the revised AP-42 section, the emission factors developed from these references are specified as pertaining to top gas stacks only. Furthermore, the emission factors developed from these references were calculated based on feed rather than production rates. In the revised AP-42 section and background document, these emission factors were revised based on the feed-to-production ratio provided in References 56 and 57 for the same facility.

Comment: 7. Gas Fired Vertical Shaft with Multiclone. References 12-13 and 24 are used for this type of furnace. We no

longer have copies of this report in our files. We were unable to verify if emissions from both the bottom gas and top gas stacks were used to develop the emission factor. In order to find the total emissions from these furnaces you need to add the emissions from the top gas and bottom gas stacks together. Please see our comments in the following section on how EPA should change the way it classifies vertical shaft furnaces.

Response: See previous response.

Comment: 8. Gas Fired Vertical Shaft with Multiclone and Wet Scrubber. Reference 14 is used for this type of furnace. We no longer have copies of this report in our files. We do have two stack tests for vertical shaft furnaces in Minnesota that are more recent. Copies of summaries and operating conditions are included in Attachment 4 to this letter. It is important to remember that the furnaces tested in Attachment 4 have two stacks. In order to find the total emissions from these furnaces, you need to add the emissions from the top gas and bottom gas stacks together. Also take note that the bottom gas emissions are controlled by a wet scrubber (roto-clone) and the top gas emissions are controlled by a heat recuperation unit and centrifugal precleaner.

The heat recuperation units act as a wet scrubber since the slurry comes into contact with the air stream. There are vertical shaft furnaces that have multiclone collectors on the top gas stack but do not have the heat recuperation units and as such have higher emissions. The EPA should make a distinction for the vertical shaft furnace on the type of control equipment used on both the top gas and bottom gas stacks. Attachment 4 also contains our spreadsheet calculations which indicate that a vertical shaft furnace firing natural gas with a rotoclone wet scrubber on the bottom stack and centrifugal precleaner and heat recuperation units on the top gas stack have the following average PM emission rates in lb/ton fired pellets.

Filterable PM	0.12
Filterable + Condensable PM	0.17
Condensable PM	0.05

Response: The data presented in Attachment 4 of the MPCA letter were incorporated into the revised AP-42 section as recommended.

Comment: 9. Straight Grate, Unspecified Fuel with Wet Scrubber. After reviewing Reference 30, we come up with a 0.12 lb/ton of filterable PM from this source. The fuel type used was natural gas and petroleum coke. The fuel input information was contained in Appendix G of the stack test report along with the production estimates. In Attachment 5 you will

find our spreadsheet calculations and a copy of Appendix G of Reference 30. This category should be split into two categories as defined below.

There are four stacks for the induration furnace at this source and they are labeled A to D. In Reference 30, stack D had a filterable PM emission rate of 6.23 lb/hr. Another test on stack D was conducted in May 1985, and the filterable PM emission rate was 11.2 lb/hr. The fuel input information was contained in Appendix I of the stack test report and the fuel type was natural gas only. In the May 1985 stack test, only stack D was tested. However, if fuel type played an important role in determining the emissions of filterable PM then you would expect the emissions from burning natural gas and pet coke to be greater than that from only burning natural gas. It appears the May 1985 test report is contradictory to the test performed in Reference 30.

It also appears that other parameters relating to the pellet feed (green balls), such as compression strength, may play a more important role in determining the emissions of filterable PM than the fuel type. It will not be possible to determine this until further testing is done. Also, looking at the flux pellet table, it appears that the testing done so far does not indicate a significant variation in PM or PM_{10} based on the type of pellet being made. The values for the flux pellet PM and PM_{10} emissions are well within the average values obtained for the acid pellets. This may not be surprising when you look at how an induration furnace works. Large quantities of hot combustion gas and excess air (200,000 to 400,000 acfm) pass through the bed of pellets as they move through the induration furnace. As the green balls dry, some of the fines are entrained in the air stream and are emitted. In time, more tests will be conducted that will allow us to do more statistically significant comparisons.

We also looked at Reference 31 that covers stack tests at Hibbing Taconite. Two complete sets of tests were conducted at Hibbing Taconite. One set of tests was conducted when the furnace burned only natural gas and another set of tests was conducted when the furnace burned at least 80 percent pet coke with the remainder natural gas. On page 6 of Reference 31, the average filterable PM emissions from the furnace was 41.2 lb/hr on natural gas and 46 lb/hr on pet coke. In Attachment 6 to this letter, you will find our spreadsheet calculations for each of the cases.

We recommend that EPA delete the source type "Straight Grate, unspecified fuel with wet scrubber" and replace it with two source types as listed below.

	Average emission factor, lb/ton	References
Straight grate - pet coke/ natural gas with wet scrubber	0.12	30, 31
Straight grate - natural gas with wet scrubber	0.10	31

Response: The unspecified fuels category was eliminated, and separate emission factors now are presented for coke-/gas-fired straight grates and gas-fired straight grates, as recommended by MPCA.

Comment: Table 11.23-3. Emission Factors for Taconite Ore Induration Furnaces - Flux Pellet Production. We recommend the elimination of the Grate/Kiln unspecified fuel category. Based on our review of the available tests, PM and PM_{10} emissions are less sensitive to fuel types and the type of pellet made than variations in the feed material quality. The bulk of the emissions comes from the pellets as they are dried by updraft and downdraft air currents in the furnaces. It would be a worthwhile endeavor to investigate PM and PM_{10} emissions as a function of pellet quality parameters such as pellet compression strength. It may be best to eliminate Table 11.23-3 and average the data with that in Table 11.2-2 and have only one table for PM and PM_{10} emissions from the furnaces that would be used for all pellet types.

Response: The data for filterable PM, filterable PM-10, and condensible PM for both pellet types have been combined as recommended by MPCA.

Comment: Table 11.23-4. Emission Factors for Taconite Ore Processing - Other Sources. We have no comment on this table.

Response: No response necessary.

Comment: Table 11.23-5. Emission Factors for Taconite Ore Indurating Furnaces - Acid Pellet Production. In acid pellet production, the primary sources of sulfur are the concentrate and the fuel (coal, fuel oil, pet coke). As can be seen by the following emission factors for natural gas combustion, the SO_2 emissions from the concentrate is significant. We strongly agree with footnote (b) of this table, and, in fact, SO_2 sulfur mass balances may be the best method of determining emissions from furnaces with multiple stacks instead of nonsimultaneous stack testing of all stacks at the furnace.

Response: No response necessary.

Comment: 1. Natural Gas Fired Grate/Kiln. The SO_2 emission factor was derived from References 4, 35, and 36.

However, on Page 4-1 of the emission factor documentation, it states that References 35 and 36 were not used to develop the emission factor due to the lack of process data. The Minnesota Pollution Control Agency obtained the process data for Reference 36 and it is located in Attachment 1 of this letter. Using the process information, we obtain the following: (193 lb/hr)/(270 tons/hr of fired pellets)=0.71 lb/ton of fired pellets. The average SO_2 emission factor should be replaced with the above value used in the average.

Response: As explained previously, the reference numbers in the draft AP-42 section do not correspond in all cases to the reference numbers in Chapter 4 of the background report. The SO_2 emission factor for Reference 36 of the February 26, 1996 draft AP-42 section has been revised using the correct production rate provided in Attachment 1 of the MPCA letter.

Comment: The NO_x emission factor was derived from References 19 and 35. Looking at Table 2 from Reference 35, the NO_x average emission factor is 1.92 lb/ton of fired pellets taking into account the fact that the tests in Reference 35 were for only one of the two stacks at the subject furnace. The 1.92 lb/ton emission factor was obtained by multiplying the date for one stack by two to account for the other stack. When making approximation such as this, a low emission factor rating should be assigned.

In order to obtain a NO_x emission factor of 1.4 lb/ton of fired pellets contained in this table, the average emission factor derived from Reference 19 would have to be approximately 1.0 lb/ton. That is extremely low and we have not seen such a low emission rate in any recent testing. We do not have Reference 19 in our files. The furnace in Reference 19 has two stacks. EPA should verify that the NO_x emissions from both stacks were added together to get the total NO_x emissions from the furnace.

Response: At the time of the emission test documented in Reference 19, the furnace had only one stack. However, the NO_x emission factor for this reference presented in the February 26, 1996 draft background report was based incorrectly on feed rather than production rates. The emission factor now has been corrected using a feed-to-production ratio of 1.19, as indicated in Reference 29 for this source.

Comment: 2. Natural Gas Fired Grate/Kiln with Wet Scrubber. We do not have a copy of Reference 4 in our files, so we can not comment on this entry.

Response: No response necessary.

Comment: 3. Coal/Coke Fired Grate/Kiln. The references given in footnote (h) for this category are references for units

with wet scrubbers. References 15 and 29 should not be used to support an emission factor for this source type. We are unable to verify the 2.0 lb/hr emission rate for SO_2 since we do not know which references were actually used to develop this emission factor.

Response: References 15 and 19 provide both inlet and outlet test results; the inlet results were used to develop the emission factor for uncontrolled SO_2 emissions.

Comment: 4. Coal/Coke-fired Grate/Kiln with Wet Scrubber. From Reference 29, we calculate the SO_2 emission rate to be a total of 719 lb/hr from both stacks of the subject furnace. From Appendix I of Reference 29, we calculate the average production rate to be 492 long tons/hour that equals 551.2 tons/hr. We come up with the average SO_2 emission factor of 1.30 lb/ton of fired pellets.

Response: The emission factor for Reference 29 was correctly reported as 1.3 lb/ton as indicated by MPCA.

Comment: The test contained in Reference 15 was on only one of the two stacks for the subject furnace. We calculated the SO_2 emission rate to be 425.5 lb/hr for one stack based on the two valid test runs. The production rate average was 477.4 long tons/hour that corresponds to 534.6 tons/hr. Multiplying the SO_2 emission rate by two to account for the stack that was not tested, we come up with the average SO_2 emission rate of 1.59 lb/ton of fired pellets. We come up with an average SO_2 emission rate of 1.45 lb/ton of fired pellets that is slightly higher than the 1.4 lb/hr value found in Table 11.23-5. We believe the value should be corrected.

Response: The production rate specified in our copy of Reference 15 was 492 long tons/hr. However, the factor based on this reference has been revised using the production rate of 477.4 long ton/hr, as specified in the MPCA letter.

Comment: 5. Gas Fired Straight Grate with Wet Scrubber. Reference 31 does support the SO_2 emission factor. Reference 31 Line No. 1 was fired with natural gas only and Line No. 2 was fired with natural gas and pet coke. Reference 31 does contain information on NO_x emissions from Line No. 1. Using this information we come up with an NO_x emission factor of 0.60 lb/ton, although we would assign an emission factor rating of E.

Response: In the February 26, 1996 draft, the NO_x emission data for Reference 31 inadvertently were excluded from the calculation of the candidate emission factor for gas-fired straight grates with wet scrubber. The oversight now has been corrected.

Comment: 6. Coke Fired Straight Grate with Wet Scrubber. Reference 31 also has information on NO_x from this type of unit. In Reference 31, Line No. 2 was fired with natural gas and pet coke. Reference 31 does contain information on NO_x emissions from Line No. 2. Using this information, we come up with an NO_x emission factor of 0.28 lb/ton, although we would assign an emission factor rating of E.

Response: In the February 26, 1996 draft, the NO_x emission data for Reference 31 inadvertently were excluded from the calculation of the candidate emission factor for a coke-fired straight grate with wet scrubber. The oversight now has been corrected.

Comment: 7. Straight Grate, Unspecified Fuel with Wet Scrubber. An emission factor of 0.44 lb/ton of NO_x is given for this unit and the emission factor was developed from Reference 31. As noted in items 5 and 6 above, Reference 31 contains two complete tests. One test on Line No. 1 with only natural gas being fired and the other test on Line No. 2 when a combination of natural gas and pet coke was fired. This information is contained in Appendix 1 of Reference 31. This category, Straight Grate, Unspecified Fuel with Wet Scrubber, should be deleted and the NO_x values in items 5 and 6 above should be added.

Response: The unspecified fuel category has been eliminated, and the data now are presented separately by fuel type, as recommended by MPCA.

Comment: The CO and Carbon Dioxide (CO_2) values should be recalculated for Line No.1 in Reference 31 and those should be inserted in the Gas Fired Straight Grate with Wet Scrubber category. The CO and CO_2 values should be recalculated for Line No. 2 in Reference 31 and should be inserted into the Coke-Fired Straight Grate with Wet Scrubber Category.

Response: The recommended changes have been made.

Comment: Table 11.23-6. Emission Factors for Taconite Ore Indurating Furnaces - Flux Pellet Production.

1. Natural Gas Fired Grate/Kiln. Reference 27 and 35 were used to develop the emission factors for this category. The test in Reference 35 was for what the company calls a semi-flux pellet. The semi-flux pellet contains only about 1% limestone. The typical flux pellet contains about 10% limestone. At the 10% limestone content, the SO_2 emissions are higher due to the sulfur in the limestone and the increase in fuel consumption needed per ton of pellets. The higher limestone content, the more fuel and higher temperatures are needed to calcine the limestone. Reference 35 should be averaged with the acid pellet values and included in Table 11.23-5 for acid pellets. A foot note that the

acid pellet table includes semi-flux pellets with 1% or less limestone content should then be added to Table 11.23-5.

Response: The Reference 35 data now are identified as pertaining to semi-flux pellet, and the data have been grouped with the acid pellet emission data as suggested.

Comment: Reference 27 only should be used for the NO_x emission factor for flux pellets. The total NO_x emissions from the four stacks was 487 lb/hr with an average green ball feed rate of 423.5 LT/hr. Applying conversion factor 1.12 standard ton per long ton and 0.75 long ton of fired pellets per long ton of green balls the average NO_x emission factor is 1.37 lb/ton of fired pellets.

Response: The emission factors for Reference 27 in the February 26, 1996 draft were based incorrectly on feed rates. The factors now have been recalculated using the suggested feed-to-production conversion factor.

Comment: Our review of the revised AP-42 Section 11.23 has been completed. We agree with the approach of segregating emission factors based on fuel type and furnace type for PM and PM_{10}. For the time being, it may also be reasonable to segregate PM and PM_{10} emissions by pellet type until further testing can be done to verify our hypothesis that other factors related to the feed material quality are more dominant in the determination of PM and PM_{10} emissions. It has been our experience with our seven taconite plants that there are significant variations in emission of SO_2, NO_x and CO between fuel types, furnace types and pellet types. We appreciate the cooperation EPA has shown in allowing us the needed time to complete our review of the important industry in Minnesota. Please feel free to contact me if you have any questions about our recommended changes at (612) 297-4518.

Response: The factors for PM have been segregated by fuel and furnace type as suggested. However, based on previous comments by MPCA, the PM factors have not been segregated by pellet type. The emission data appear to support this decision.

460402\5313

RefS BL 4-32 to 4-36

W. GALE BIGGS ASSOCIATES

May 10, 1993

Mr. Ronald E. Myers
Emission Factors and Methodologies Section
U.S. Environmental Protection Agency
Office of Air Quality Planning and Standards
Research Triangle Park, North Carolina 27711

Dear Mr. Myers:

Enclosed please find additional materials regarding industry comments on the proposed AP-42 Section 8.22 revisions. This document contains summary sheets for permit compliance stack tests at the National Steel Pellet Company (NSP). If you would like the complete documentation, please contact me at (303) 494-4288 or George Krouse (with NSP) at (218) 778-6521. Thank you for your consideration in this matter.

Sincerely yours,

W. GALE BIGGS ASSOCIATES

W. Gale Biggs

W. Gale Biggs, Ph.D.

enc.
cc: Rick Marimshaw w/enc.

Post Office Box 3344 ○ Boulder, Colorado 80307-3344 ○ (303) 494-4288

National Steel Pellet Company

PO Box 217
Keewatin MN 55753-0217
(218) 778-6521

April 19, 1993

W. Gale Biggs
W. Gale Biggs Associates
P.O. Box 3344
Boulder, Colorado 80307

Dear Mr. Biggs:

Enclosed are summary sheets for stack tests at National Steel Pellet Company for permit compliance for the last five (5) years.

Please call me at (218) 778-6521 if you have questions regarding the test data or if you need additional information.

Sincerely,

George F. Krouse

George F. Krouse
Environmental Control Engineer

GFK:dd

cc: D. E. Healy

Enc.

2-B STACK

PARTICULATE EMISSIONS TESTING

FOR

NATIONAL STEEL PELLET COMPANY

JUNE 17, 1992

Shell Engineering & Associates, Inc.
2403 West Ash
Columbia, Missouri 65203
July 17, 1992

1992

TABLE I

SUMMARY OF PARTICULATE EMISSIONS TESTS FOR
NATIONAL STEEL PELLET COMPANY
June 17, 1992

RUN NO.	T_s, °F	ACFM	DRY SCFM	EMISSIONS GR/DSCF	EMISSIONS LBS/HR	OPACITY %	COLLECTION EFFICIENCY %	% ISOKINETIC
Waste Gas Stack #2B, Source No. 31								
1	240	355,620	231,216	0.062	123.34		90.93	97.2
2	250	355,448	225,815	0.057	110.17		93.00	96.8
3	251	358,032	226,838	0.039	75.27		94.21	98.9
AVGS	247	356,367	227,956	0.053	102.93	5.2	92.71	97.6

1992

Total Source Analysis, Inc.
Particulate Test Analysis

SHELL
NATIONAL STEEL

92-148

Run Number		1	2	3
Data set		(01)	(02)	(03)
Date		6-17-92	6-17-92	6-17-92
Location		#2 WASTE STACK	#2 WASTE STACK	#2 WASTE STACK
Start time		08:10	10:00	11:40
End time		09:21	12:06	12:48
Barometric Pressure	In. Hg	29.16	29.16	29.16
Static Pressure	In. H2O	-0.52	-0.52	-0.52
Volume of Condensate	Mls	149	156	162
Volume Sampled	DCF	57.948	56.551	58.240
Meter Correction Factor		0.97	0.97	0.97
Square Root of Delta P		0.709	0.703	0.707
Orifice Pressure	In. H2O	3.28	3.26	3.31
Meter Temperature	Deg. F	76	78	80
Flue Temperature	Deg. F	240	250	251
Percent CO2	%	1.00	1.20	1.00
Percent O2	%	18.00	18.20	18.00
Diameter of Nozzle	In	0.313	0.313	0.313
Area of Flue	Sq Ft	132.73	132.73	132.73
Sample Time	Min	60	60	60
Weight Gain	Grams	0.2193	0.1960	0.1361
Absolute Flue Pressure	In. Hg	29.12	29.12	29.12
Corrected Sample Volume	DSCF	54.39	52.88	54.26
Moisture in Flue Gas	%	11.4	12.2	12.3
Molecular Weight	Lb/LbMole	27.64	27.59	27.54
Velocity of Flue Gas	FpS	44.65	44.63	44.96
Volume of Flue Gas	ACFM	355,620	355,448	358,032
Volume of Flue Gas	DSCFM	231,216	225,815	226,838
Dust Concentration	Lb/DSCF	8.89E-06	8.17E-06	5.53E-06
Dust Concentration	Lbs/Hour	123.34	110.73	75.27
Dust Concentration	Grs/ACF	4.10E-02	3.68E-02	2.49E-02
Dust Concentration	Grs/DSCF	6.22E-02	5.72E-02	3.87E-02
Isokinetic Rate	%	97.2	96.8	98.9

Averages:

Stack Temperature		247.0	Percent O2		18.1
Vol Flue Gas	ACFM	356,367		DSCFM	227,956
Part Emis	Lb/DSCF	7.53E-06		Lb/Hour	103.11
	Grs/ACF	3.42E-02		Grs/DSCF	5.27E-02
	Lbs/MBtu	0			

PARTICULATE EMISSIONS TESTING

FOR

NATIONAL STEEL PELLET COMPANY

JUNE, 1991

Shell Engineering & Associates, Inc.
2403 West Ash
Columbia, Missouri 65203
June 28, 1991

1991

TABLE I

SUMMARY OF PARTICULATE EMISSIONS TESTS FOR
NATIONAL STEEL PELLET COMPANY
June 5, 1991

2A

RUN NO.	T_S, °F	ACFM	DRY SCFM	EMISSIONS GR/DSCF	EMISSIONS LBS/HR	OPACITY %	COLLECTION EFFICIENCY %	% ISOKINETIC
Waste Gas Stack #2A, Source No. 30								
1	264	381,735	243,967	0.0544	113.91		92.79	97.1
2	266	377,402	241,529	0.0689	142.80		91.96	98.3
3	254	371,548	243,045	0.0608	126.78		92.58	99.3
AVGS	261	376,895	242,847	0.0614	127.83	4.4	92.44	98.2

1991

Total Source Analysis, Inc.
Particulate Test Analysis

NATIONAL STEEL
WASTE GAS
2A
91-099

Run Number		1	2	3
Data set		(01)	(02)	(03)
Date		6-5-91	6-5-91	6-5-91
Location		WASTE GAS 2A	WASTE GAS 2A	WASTE GAS 2A
Start time		09:15	11:55	14:25
End time		10:33	13:15	15:40
Barometric Pressure	In. Hg	28.48	28.48	28.48
Static Pressure	In. H2O	-0.42	-0.42	-0.42
Volume of Condensate	Mls	60	57	53
Volume Sampled	DCF	35.465	36.947	36.676
Meter Correction Factor		0.99	0.99	0.99
Square Root of Delta P		0.744	0.745	0.731
Orifice Pressure	In. H2O	1.06	1.13	1.15
Meter Temperature	Deg. F	74	95	82
Flue Temperature	Deg. F	264	266	254
Percent CO2	%	0.60	0.90	0.90
Percent O2	%	17.80	17.60	17.80
Diameter of Nozzle	In	0.238	0.238	0.238
Area of Flue	Sq Ft	132.73	132.73	132.73
Sample Time	Min	60	60	60
Weight Gain	Grams	0.1169	0.1484	0.1331
Absolute Flue Pressure	In. Hg	28.45	28.45	28.45
Corrected Sample Volume	DSCF	33.12	33.21	33.76
Moisture in Flue Gas	%	7.8	7.4	6.9
Molecular Weight	Lb/LbMole	27.97	28.04	28.10
Velocity of Flue Gas	FpS	47.93	47.39	46.65
Volume of Flue Gas	ACFM	381,735	377,402	371,548
Volume of Flue Gas	DSCFM	243,967	241,529	243,045
Dust Concentration	Lb/DSCF	7.78E-06	9.85E-06	8.69E-06
Dust Concentration	Lbs/Hour	113.91	142.80	126.78
Dust Concentration	Grs/ACF	3.51E-02	4.45E-02	4.01E-02
Dust Concentration	Grs/DSCF	5.44E-02	6.89E-02	6.08E-02
Isokinetic Rate	%	97.1	98.3	99.3

2-B

PARTICULATE EMISSIONS TESTING

FOR

NATIONAL STEEL PELLET COMPANY

MAY, 1990

Shell Engineering & Associates, Inc.
2503 West Ash
Columbia, Missouri 65203
May 30, 1990

1990

TABLE I

SUMMARY OF PARTICULATE EMISSIONS TESTS FOR
NATIONAL STEEL PELLET COMPANY
May 16, 1990

2B

RUN NO.	T_s, °F	ACFM	DRY SCFM	EMISSIONS GR/DSCF	EMISSIONS LBS/HR	OPACITY %	COLLECTION EFFICIENCY %	% ISOKINETIC
Waste Gas Stack #2B, Source No. 31				Pellet Induration - Gas Fired				
1	241	415,175	260,322	0.175	389.51		83.43	99.5
2	241	408,098	256,219	0.106	232.12		89.61	100.0
3	241	406,901	256,196	0.143	314.06		84.90	98.9
AVGS	241	410,058	257,579	0.141	311.90	6.29	85.98	99.5

1990

Total Source Analysis, Inc.
Particulate Test Analysis

NSPC
KEEWATIN, MN
2B WASTE GAS - Pellet Induration - Gas Fired
90-074
COMPLIANCE TEST

Run Number		1	2	3
Data set		(01)	(02)	(03)
Date		5-16-90	5-16-90	5-16-90
Location		STACK METHOD 5	STACK METHOD 5	STACK METHOD 5
Start time		08:45	10:40	12:37
End time		09:53	11:51	13:49
Barometric Pressure	In. Hg	28.19	28.19	28.19
Static Pressure	In. H2O	-0.52	-0.52	-0.52
Volume of Condensate	Mls	167	164	158
Volume Sampled	DCF	63.393	63.082	62.372
Meter Correction Factor		0.98	0.98	0.98
Square Root of Delta P		0.814	0.800	0.798
Orifice Pressure	In. H2O	3.58	3.50	3.47
Meter Temperature	Deg. F	54	57	57
Flue Temperature	Deg. F	241	241	241
Percent CO2	%	1.20	1.20	1.10
Percent O2	%	18.90	18.30	18.60
Diameter of Nozzle	In	0.308	0.308	0.308
Area of Flue	Sq Ft	132.73	132.73	132.73
Sample Time	Min	60	60	60
Weight Gain	Grams	0.6861	0.4109	0.5497
Absolute Flue Pressure	In. Hg	28.15	28.15	28.15
Corrected Sample Volume	DSCF	60.66	60.00	59.32
Moisture in Flue Gas	%	11.5	11.4	11.1
Molecular Weight	Lb/LbMole	27.69	27.68	27.71
Velocity of Flue Gas	FpS	52.13	51.24	51.09
Volume of Flue Gas	ACFM	415,175	408,098	406,901
Volume of Flue Gas	DSCFM	260,322	256,219	256,196
Dust Concentration	Lb/DSCF	2.49E-05	1.50E-05	2.04E-05
Dust Concentration	Lbs/Hour	389.51	232.12	314.06
Dust Concentration	Grs/ACF	.10	6.65E-02	9.01E-02
Dust Concentration	Grs/DSCF	.17	.10	.14
Isokinetic Rate	%	99.5	100.0	98.9

Averages:

Stack Temperature		: 241.0	Percent O2	:	18.6
Vol Flue Gas	ACFM	: 410,058	DSCFM	:	257,579
Part Emis	Lb/DSCF	: 2.01E-05	Lb/Hour	:	311.90
	Grs/ACF	: 8.87E-02	Grs/DSCF	:	.14
	Lbs/MBtu	: 0			

PARTICULATE EMISSIONS TESTING

FOR

NATIONAL STEEL PELLET COMPANY

JUNE, 1989

Shell Engineering & Associates, Inc.
2503 West Ash
Columbia, Missouri 65203
June 14, 1989

1989

TABLE I

SUMMARY OF PARTICULATE EMISSIONS TESTS FOR
NATIONAL STEEL PELLET COMPANY
June 7, 1989

RUN NO.	T_S, °F	ACFM	DRY SCFM	EMISSIONS GR/DSCF	EMISSIONS LBS/HR	OPACITY %	COLLECTION EFFICIENCY %	% ISOKINETIC
Waste Gas Stack #2A, Source No. 30 — Pellet Induration - Gas Fired								
1	267	409,477	243,398	0.11	243.06		90.77	99.3
2	264	412,812	246,372	0.10	224.84		91.40	98.0
3	267	416,534	246,747	0.10	214.95		90.99	98.3
AVGS	267	412,941	245,506	0.108	227.62	8.46	91.05	98.5

1989

Total Source Analysis, Inc.
Particulate Test Analysis

NATIONAL STEEL
KEEWATIN
2A WASTE GAS - Pellet Induration - Gas Fired
89-053

Run Number		1	2	3
Data set		[01]	[02]	[03]
Date		6-7-89	6-7-89	6-7-89
Location		2A	2A	2A
Start time		8:00	9:45	11:15
End time		9:19	10:49	12:18
Barometric Pressure	In. Hg	27.90	27.90	27.90
Static Pressure	In. H2O	-0.47	-0.45	-0.48
Volume of Condensate	Mls	160	160	165
Volume Sampled	DCF	58.012	58.597	59.071
Meter Correction Factor		1.01	1.01	1.01
Square Root of Delta P		0.782	0.790	0.795
Orifice Pressure	In. H2O	0.52	0.53	0.54
Meter Temperature	Deg. F	67	73	75
Flue Temperature	Deg. F	267	264	267
Percent CO2	%	0.00	0.00	0.00
Percent O2	%	20.90	20.90	20.90
Diameter of Nozzle	In	0.303	0.303	0.303
Area of Flue	Sq Ft	132.73	132.73	132.73
Sample Time	Min	60	60	60
Weight Gain	Grams	0.4136	0.3775	0.3619
Absolute Flue Pressure	In. Hg	27.87	27.87	27.86
Corrected Sample Volume	DSCF	54.79	54.72	54.96
Moisture in Flue Gas	%	12.1	12.1	12.4
Molecular Weight	Lb/LbMole	27.53	27.52	27.49
Velocity of Flue Gas	FpS	51.42	51.84	52.30
Volume of Flue Gas	ACFM	409,477	412,812	416,534
Volume of Flue Gas	DSCFM	243,398	246,372	246,747
Dust Concentration	Lb/DSCF	1.66E-05	1.52E-05	1.45E-05
Dust Concentration	Lbs/Hour	243.06	224.84	214.95
Dust Concentration	Grs/ACF	7.03E-02	6.45E-02	6.13E-02
Dust Concentration	Grs/DSCF	.11	.10	.10
Isokinetic Rate	%	99.3	98.0	98.3

PARTICULATE EMISSIONS TESTING

FOR

NATIONAL STEEL PELLET COMPANY

July and August, 1988

1988

TABLE I

SUMMARY OF PARTICULATE EMISSIONS TESTS FOR
NATIONAL STEEL PELLET COMPANY

RUN NO.	T_s, °F	ACFM	DRY SCFM	EMISSIONS GR/DSCF	EMISSIONS LBS/HR	OPACITY %	COLLECTION EFFICIENCY %	% ISOKINETIC
Drive House Dust Collector, Source No. 4, July 26, 1988						Ore Transfer 0		
1	80	15458	14931	.0284	3.63		N.A.	98.5
2	81	15309	14713	.0198	2.50		N.A.	100.1
3	81	15325	14713	.0109	1.37		N.A.	100.0
AVG	80.7	15364	14786	.0197	2.50			99.5
Allowable Emissions*				.080				
Reclaim Tunnel Dust Collector, Source No. 14, July 27, 1988						Ore Transfer 0		
1	80	10014	9569	.0074	0.61		N.A.	99.3
2	81	10275	9760	.0068	0.57		N.A.	98.3
3	81	9954	9542	.0068	0.56		N.A.	95.4
AVG	80.7	10081	9624	.0070	0.58			97.7
Allowable Emissions*				.090				
Additive Blending Dust Collector, Source No. 16, July 24, 1988						Concentrate (9% H_2O) Transfer + Bentonite Addition. 0		
1	77	15853	15114	.0088	1.14		N.A.	102.0
2	75	16519	15746	.0096	1.30		N.A	99.9
3	74	16362	15703	.0062	0.83		N.A.	99.6
AVG	75.3	16245	15521	.0082	1.09			100.5
Allowable Emissions*				.080				

* From Table 2 (Source Gas-Volume Table) of the Minnesota Rules.

1988

TABLE I

SUMMARY OF PARTICULATE EMISSIONS TESTS FOR
NATIONAL STEEL PELLET COMPANY
(Cont.)

RUN NO.	T_s, °F	ACFM	DRY SCFM	EMISSIONS GR/DSCF	EMISSIONS LBS/HR	OPACITY %	COLLECTION EFFICIENCY %	% ISOKINETIC
Vibrating Feeders Dust Collector, Fired Pellet Transfer.								
Source No. 24, July 24, 1988						0		
1	79	55605	53313	.0032	1.46		N.A.	100.8
2	80	49176	46943	.0032	1.29		N.A.	101.8
3	79	48698	46684	.0031	1.24		N.A.	101.1
AVG	79.3	51160	48980	.0032	1.34			101.2
Allowable Emissions*				.053				
Cooler Stack Pellet Cooling								
Source No. 26, August 19, 1988						0		
1	592	386334	179549	.0303	46.63		N.A.	98.8
2	591	390864	183038	.0374	58.68***		N.A.	98.0
3	584	389213	184368	.0265	41.88		N.A.	97.6
AVG	589	388804	182318	.0314	49.06			
Allowable Emissions*				.0349				
Waste Gas Stack #2B Pellet Induration - Waste Gas - Gas Fired								
Source No. 31, July 25, 1988						12.65		
1	277	338488	227925	.1636	319.62		90.26	97.4
2	278	339140	225964	.1340	259.54		91.54	98.1
3	279	345698	231392	.1386	274.89		90.13	97.9
AVG	278	341109	228760	.1452	284.68		90.64	97.8
Allowable Emissions*				.033**				

* From Table 2 (Source Gas-Volume Table) of the Minnesota Rules.
** 0.3 Allowable if collection efficiency exceeds 85%.

1988

TOTAL SOURCE ANALYSIS
PARTICULATE TEST RESULTS

NATIONAL STEEL
Keewatin, MN
DRIVE HOUSE(#4) Dust Collector Ore Transfer
88-071 Source #4
7-26-88

RUN NUMBER			1	2	3	
BAROMETRIC PRESSURE	IN. HG		30.02	30.02	30.02	
STATIC PRESSURE	IN. H2O		0.5	0.5	0.5	
VOLUME OF CONDENSATE	MLS		26	31.2	32.8	
VOLUME SAMPLED	DCF		79.583	79.369	79.69	
METER CORRECTION FACTOR			0.98	0.98	0.98	
SQUARE ROOT OF DELTA P			1.168	1.155	1.156	
ORIFICE PRESSURE	IN. H2O		0.657	0.702	0.703	
METER TEMPERATURE	DEG. F		97	94	97	
FLUE TEMPERATURE	DEG. F		80	81	81	
PRECENT CO2	%		0	0	0	
PERCENT O2	%		20.9	20.9	20.9	
DIAMETER OF NOZZLE	IN.		0.251	0.251	0.251	
AREA OF FLUE	SQ. FT.		4.125	4.125	4.125	
SAMPLE TIME	MIN.		60	60	60	
F FACTOR	DSCF/MBTU		0	0	0	
WEIGHT GAIN	GRAMS		0.1367	0.0957	0.0524	
ABSOLUTE FLUE PRESSURE	IN. HG		30.06	30.06	30.06	
CORRECTED SAMPLE VOLUME	DSCF		74.27	74.48	74.38	
MOISTURE IN FLUE GAS	%		1.6	1.9	2	
MOLECULAR WEIGHT	LB/LBMOLE		28.66	28.63	28.62	
VELOCITY OF FLUE GAS	FPS	3725 fpm	62.46	61.85	61.92	62.08 Avg.
VOLUME OF FLUE GAS	ACFM		15458	15309	15325	
VOLUME OF FLUE GAS	DSCFM		14931	14713	14713	
DUST CONCENTRATION	LB/DSCF		4.1E-06	2.8E-06	1.6E-06	
DUST CONCENTRATION	LBS/HOUR		3.6	2.5	1.4	
DUST CONCENTRATION	GRS/ACF		0.0278	0.0193	0.0106	
DUST CONCENTRATION	GRS/DSCF		0.0284	0.0198	0.0109	
ISOKINETIC RATE	%		99.4	101.1	101	
PARTICULATE EMISSIONS	LBS/MBTU		0	0	0	

1988

TOTAL SOURCE ANALYSIS
PARTICULATE TEST RESULTS

NATIONAL STEEL
Keewatin, MN
RECLAIM TUNNEL (#10) Line Dust Collector (Source 14) Ore Transfer
88-071
7-27-88
Source #10

RUN NUMBER			1	2	3	
BAROMETRIC PRESSURE	IN. HG		29.92	29.92	29.92	
STATIC PRESSURE	IN. H2O		-0.4	-0.4	0.4	
VOLUME OF CONDENSATE	MLS		31	37	25	
VOLUME SAMPLED	DCF		69.791	72.017	69.294	
METER CORRECTION FACTOR			0.98	0.97	0.97	
SQUARE ROOT OF DELTA P			1.04	1.065	1.034	
ORIFICE PRESSURE	IN. H2O		0.543	0.578	0.543	
METER TEMPERATURE	DEG. F		81	93	103	
FLUE TEMPERATURE	DEG. F		80	81	81	
PRECENT CO2	%		0	0	0	
PERCENT O2	%		20.9	20.45	20.3	
DIAMETER OF NOZZLE	IN.		0.251	0.251	0.251	
AREA OF FLUE	SQ. FT.		2.99	2.99	2.99	
SAMPLE TIME	MIN.		60	60	60	
F FACTOR	DSCF/MBTU		0	0	0	
WEIGHT GAIN	GRAMS		0.0321	0.0293	0.0277	
ABSOLUTE FLUE PRESSURE	IN. HG		29.89	29.89	29.95	
CORRECTED SAMPLE VOLUME	DSCF		66.81	66.77	63.1	
MOISTURE IN FLUE GAS	%		2.1	2.5	1.8	
MOLECULAR WEIGHT	LB/LBMOLE		28.6	28.54	28.61	
VELOCITY OF FLUE GAS	FPS	3372fpm	55.82	57.28	55.49	56.2
VOLUME OF FLUE GAS	ACFM		10014	10275	9954	
VOLUME OF FLUE GAS	DSCFM		9569	9760	9542	
DUST CONCENTRATION	LB/DSCF		1.1E-06	1E-06	1E-06	
DUST CONCENTRATION	LBS/HOUR		0.6	0.6	0.6	
DUST CONCENTRATION	GRS/ACF		7.2E-03	6.5E-03	6.5E-03	
DUST CONCENTRATION	GRS/DSCF		7.4E-03	6.8E-03	6.8E-03	
ISOKINETIC RATE	%		101.1	99.1	95.7	
PARTICULATE EMISSIONS	LBS/MBTU		0	0	0	

1988

TOTAL SOURCE ANALYSIS
PARTICULATE TEST RESULTS

NATIONAL STEEL
Keewatin, MN
ADDITIVE BLENDER(#16) Dust Collector
88-071
7-24-88

Source #16

Concentrate (9% H_2O) Transfer + Bentonite addition

RUN NUMBER			1	2	3
BAROMETRIC PRESSURE	IN. HG		29.82	29.82	29.82
STATIC PRESSURE	IN. H2O		-0.15	-0.15	-0.15
VOLUME OF CONDENSATE	MLS		23.2	27.2	22.6
VOLUME SAMPLED	DCF		41.363	42.842	43.078
METER CORRECTION FACTOR			0.97	0.97	0.97
SQUARE ROOT OF DELTA P			0.625	0.652	0.647
ORIFICE PRESSURE	IN. H2O		1.82	1.96	1.97
METER TEMPERATURE	DEG. F		65	73	79
FLUE TEMPERATURE	DEG. F		77	75	74
PRECENT CO2	%		0	0	0
PERCENT O2	%		20.9	20.9	20.9
DIAMETER OF NOZZLE	IN.		0.251	0.251	0.251
AREA OF FLUE	SQ. FT.		7.88	7.88	7.88
SAMPLE TIME	MIN.		60	60	60
F FACTOR	DSCF/MBTU		0	0	0
WEIGHT GAIN	GRAMS		0.023	0.0257	0.0164
ABSOLUTE FLUE PRESSURE	IN. HG		29.81	29.81	29.81
CORRECTED SAMPLE VOLUME	DSCF		40.38	41.21	40.98
MOISTURE IN FLUE GAS	%		2.6	3	2.5
MOLECULAR WEIGHT	LB/LBMOLE		28.55	28.51	28.56
VELOCITY OF FLUE GAS	FPS	2062	33.53	34.94	34.61 34.4
VOLUME OF FLUE GAS	ACFM		15853	16519	16362
VOLUME OF FLUE GAS	DSCFM		15114	15746	15703
DUST CONCENTRATION	LB/DSCF		1.3E-06	1.4E-06	9.0E-07
DUST CONCENTRATION	LBS/HOUR		1.1	1.3	0.8
DUST CONCENTRATION	GRS/ACF		8.5E-03	9.3E-03	6.0E-03
DUST CONCENTRATION	GRS/DSCF		8.8E-03	9.6E-03	6.2E-03
ISOKINETIC RATE	%		102	99.9	99.6
PARTICULATE EMISSIONS	LBS/MBTU		0	0	0

1988

TOTAL SOURCE ANALYSIS
PARTICULATE TEST RESULTS

NATIONAL STEEL
Keewatin, MN
STACK #24 (Vibrating Feeders Dust Collector) Fired Pellet Transfer
88-071
Source #24
7-24-88

RUN NUMBER		4	5	6
BAROMETRIC PRESSURE	IN. HG	29.82	29.82	29.82
STATIC PRESSURE	IN. H2O	-0.48	-0.48	-0.48
VOLUME OF CONDENSATE	MLS	18.5	19	16.4
VOLUME SAMPLED	DCF	56.246	49.841	49.175
METER CORRECTION FACTOR		0.97	0.97	0.97
SQUARE ROOT OF DELTA P		0.813	0.718	0.712
ORIFICE PRESSURE	IN. H2O	3.25	2.55	2.49
METER TEMPERATURE	DEG. F	94	91	90
FLUE TEMPERATURE	DEG. F	79	80	79
PRECENT CO2	%	0	0	0
PERCENT O2	%	20.9	20.9	20.9
DIAMETER OF NOZZLE	IN.	0.251	0.251	0.251
AREA OF FLUE	SQ. FT.	21.24	21.24	21.24
SAMPLE TIME	MIN.	60	60	60
F FACTOR	DSCF/MBTU	0	0	0
WEIGHT GAIN	GRAMS	0.0109	9.7E-03	9.2E-03
ABSOLUTE FLUE PRESSURE	IN. HG	29.78	29.78	29.78
CORRECTED SAMPLE VOLUME	DSCF	52.22	46.44	45.9
MOISTURE IN FLUE GAS	%	1.6	1.9	1.7
MOLECULAR WEIGHT	LB/LBMOLE	28.66	28.63	28.66
VELOCITY OF FLUE GAS	FPS	2409 f/m 43.63	38.59	38.21 40.1
VOLUME OF FLUE GAS	ACFM	55605	49176	48698
VOLUME OF FLUE GAS	DSCFM	53313	46943	46684
DUST CONCENTRATION	LB/DSCF	5.0E-07	5.0E-07	4.0E-07
DUST CONCENTRATION	LBS/HOUR	1.5	1.3	1.2
DUST CONCENTRATION	GRS/ACF	3.1E-03	3.1E-03	3.0E-03
DUST CONCENTRATION	GRS/DSCF	3.2E-03	3.2E-03	3.1E-03
ISOKINETIC RATE	%	100.8	101.8	101.1
PARTICULATE EMISSIONS	LBS/MBTU	0	0	0

1988

TOTAL SOURCE ANALYSIS
PARTICULATE TEST RESULTS

NATIONAL STEEL
#26 COOLER EXHAUST
STACK
88-082
8-19-88

Pellet Cooling
Source # 26

RUN NUMBER		1	2	3
BAROMETRIC PRESSURE	IN. HG	28.46	28.46	28.46
STATIC PRESSURE	IN. H2O	-0.3	-0.28	-0.28
VOLUME OF CONDENSATE	MLS	32	24	18
VOLUME SAMPLED	DCF	60.852	62.691	64.135
METER CORRECTION FACTOR		0.99	0.99	0.99
SQUARE ROOT OF DELTA P		0.594	0.602	0.602
ORIFICE PRESSURE	IN. H2O	3.78	4.01	4.2
METER TEMPERATURE	DEG. F	67	77	88
FLUE TEMPERATURE	DEG. F	592	591	584
PRECENT CO2	%	0	0	0
PERCENT O2	%	20.9	20.9	20.9
DIAMETER OF NOZZLE	IN.	0.375	0.375	0.375
AREA OF FLUE	SQ. FT.	141.03	141.03	141.03
SAMPLE TIME	MIN.	60	60	60
F FACTOR	DSCF/MBTU	0	0	0
WEIGHT GAIN	GRAMS	0.1136	0.1421	0.1011
ABSOLUTE FLUE PRESSURE	IN. HG	28.44	28.44	28.44
CORRECTED SAMPLE VOLUME	DSCF	57.95	58.62	58.8
MOISTURE IN FLUE GAS	%	2.5	1.9	1.4
MOLECULAR WEIGHT	LB/LBMOLE	28.56	28.63	28.68
VELOCITY OF FLUE GAS	FPS	27574 45.66	46.19	46 45.95
VOLUME OF FLUE GAS	ACFM	386334	390864	389213 388,500
VOLUME OF FLUE GAS	DSCFM	179549	183038	184368 182,318
DUST CONCENTRATION	LB/DSCF	4.3E-06	5.3E-06	3.8E-06
DUST CONCENTRATION	LBS/HOUR	46.6	58.7	41.9
DUST CONCENTRATION	GRS/ACF	0.0144	0.0178	0.0127
DUST CONCENTRATION	GRS/DSCF	0.0303	0.0374	0.0265
ISOKINETIC RATE	%	98.8	98	97.6
PARTICULATE EMISSIONS	LBS/MBTU	0	0	0

1988

TOTAL SOURCE ANALYSIS
PARTICULATE TEST RESULTS

NATIONAL STEEL
Keewatin, MN
WASTE GAS #31 Waste Gas - Pellet Induration - Gas Fired
88-071
7-25-88 Source #31

RUN NUMBER			4	5	6
BAROMETRIC PRESSURE	IN. HG		30.18	30.18	30.18
STATIC PRESSURE	IN. H2O		-0.3	-0.3	-0.3
VOLUME OF CONDENSATE	MLS		52.8	60	56.5
VOLUME SAMPLED	DCF		37.127	37.41	38.01
METER CORRECTION FACTOR			0.97	0.97	0.97
SQUARE ROOT OF DELTA P			0.674	0.674	0.687
ORIFICE PRESSURE	IN. H2O		1.41	1.41	1.46
METER TEMPERATURE	DEG. F		97	102	99
FLUE TEMPERATURE	DEG. F		277	278	279
PRECENT CO2	%		0.5	0.6	0.45
PERCENT O2	%		16.8	17	16.95
DIAMETER OF NOZZLE	IN.		0.251	0.251	0.251
AREA OF FLUE	SQ. FT.		132.73	132.73	132.73
SAMPLE TIME	MIN.		60	60	60
F FACTOR	DSCF/MBTU		0	0	0
WEIGHT GAIN	GRAMS		0.3662	0.2995	0.3164
ABSOLUTE FLUE PRESSURE	IN. HG		30.16	30.16	30.16
CORRECTED SAMPLE VOLUME	DSCF		34.54	34.49	35.24
MOISTURE IN FLUE GAS	%		6.7	7.6	7
MOLECULAR WEIGHT	LB/LBMOLE		28.03	27.96	28
VELOCITY OF FLUE GAS	FPS	2570 fpm	42.5	42.59	43.41 42.8
VOLUME OF FLUE GAS	ACFM		338488	339140	345698
VOLUME OF FLUE GAS	DSCFM		227925	225964	231392
DUST CONCENTRATION	LB/DSCF		2.34E-05	1.91E-05	1.98E-05
DUST CONCENTRATION	LBS/HOUR		319.7	259.6	274.9
DUST CONCENTRATION	GRS/ACF		0.1113	0.09	0.0935
DUST CONCENTRATION	GRS/DSCF		0.1636	0.134	0.1386
ISOKINETIC RATE	%		97.4	98.1	97.9
PARTICULATE EMISSIONS	LBS/MBTU		0	0	0

Minnesota Pollution Control Agency

January 10, 1995

Mr. Ronald E. Myers
Emission Factor and Inventory Group (MD-14)
Emissions, Monitoring, and Analysis Division
Office of Air Quality Planning and Standards
U.S. Environmental Protection Agency
Research Triangle Park, North Carolina 27711

RE: Comments on Revised Draf

Dear Mr. Myers:

Duplicate
may be lost

I received an undated letter from ecember 2, 1994. In the letter, you requested that the Minnesot IPCA) Air Quality Division review the enclosed draft AP-42 rocessing, and the accompanying background report; and that the M... ... by January 13, 1995.

The MPCA appreciates the efforts of the U.S. Environmental Protection Agency on revising the emission factors for taconite ore processing in AP-42. Emission factors compiled in the current AP-42 Section 8.22, Taconite Ore Processing, are very limited. There are still some problems in the draft AP-42 Section 11.23. The MPCA staff has discovered that more recent test reports (see an enclosed list for some of the more recent test reports) are not used in preparing the draft AP-42 Section 11.23. Another list is also enclosed to provide contacts of the seven taconite plants in Minnesota and the MPCA contact for test report duplication.

More recent test reports are more representative of the current production mode. This is very important to the emission units associated with the induration process. Prior to the early 1980s, acid pellet was the product in taconite ore processing. Then, various amounts of fluxstone (limestone and/or dolomite), approximately from one to ten percent by weight of the pellet product, were added to the pelletizing process, with the resultant product being called semi-flux or flux pellet. The change of pellet production occurred at different times for different companies; while some companies ceased acid pellet production, others maintain the capability of making either pellet. In the current taconite pellet market, both flux and acid pellets are in demand.

Different production modes result in different emissions of air pollutants in the induration process. The MPCA has found that the flux pellet production increased emissions of some air pollutants greatly in the induration process, e.g., sulfur dioxide (SO_2), even if the amount of fluxstone was as low as approximately one percent by weight of the pellet product *(fluxstone contains sulfur naturally). (The MPCA often suggests that stationary sources in taconite ore processing use the mass balance principle to calculate SO_2 emission, whether acid or flux pellet*

is processed.) With more fluxstone added, the induration process becomes much more complex thermochemically -- more heat is required to bind the solid materials together and local hot spots appear in the bed of pellets. A significant increase in the emission of NO_x has been consistently reported.

The MPCA strongly recommends adding a categorical variable to the sets of the emission data to indicate whether acid pellet or flux pellet was being processed while the samples were collected (*companies need to be contacted individually to ensure the assignment to this categorical variable is correct*). Subsequent data analysis may be performed using a linear regression model to test the validity of null hypothesis on the categorical variable. National Steel Pellet Company recently conducted performance test for both acid and semi-flux pellet productions, as required by a recent permit action. Finally, the MPCA staff raised a question on the statistical method used in the data analysis (see the enclosed spreadsheet in Microsoft Excel 5.0a).

We understand that no matter how complete an emission factor compilation, such as the revised AP-42, becomes, there are always needs for source-specific determination of some emission factors. The MPCA recommends that the emission factors be updated to include the more recent tests and to take into consideration what type of pellet is being produced. Due to the significant number of taconite producers located in Minnesota, the MPCA would like to review the updated draft before it is made final. If you have any question on this letter, you may contact me at (612)296-7331 for specific comments, please contact Mr. Hongming Jiang, of my staff, at (612)296-7670, via FAX at (612)297-7709 or Internet at **hongming.jiang@pca.state.mn.us**.

Sincerely,

Lisa J. Thorvig
Division Manager
Air Quality Division

LJT:vat

Enclosures

cc: Rodney Massey, Air Quality Division
Carolina Espejel-Schutt, Air Quality Division
Hongming Jiang, Air Quality Division
Patrick O'Neill, Air Quality Division
Stuart Arkley, Air Quality Division

RECENT PERFORMANCE/ENGINEERING TESTSAT TACONITE PLANTS IN MINNESOTA[1]

	Source	AQD No.	Emission Unit	Parameter	Test Date
	Northshore Mining	27A	6 sources	PM	(to be submitted)
	Northshore Mining	*27A*	*4 sources*	*TSP, Opacity*	*04/17/90*[2]
	Northshore Mining	*27A*	*11,12 pelletizers,2 boil*	*TSP, Opacity,NO_x,SO_2*	*07/24/90*[3]
	Northshore Mining	27A	No. 2 fine crusher	TSP	10/03/90
NA called twice	Northshore Mining	27A	power boiler #2 (EP#2)	PM,SO_2,Opacity,(NO_x)	05/24/94
	Northshore Mining	27A	fine crusher (EP#11)	PM,Opacity	05/24/94
	Northshore Mining	27A	dry cobber (EP#22)	PM, Opacity	05/24/94
	Northshore Mining	27A	bin storage (EP#48)	PM, Opacity	05/24/94
	Northshore Mining	27A	pellatizing furnace dis.	PM, Opacity	05/24/94
	Northshore Mining	27A	Furnace 12 waste gas	PM, Opacity, SO_2, NO_x	05/24/94
	Northshore Mining	27A	Furnace 11 waste gas	PM, Opacity, SO_2, NO_x	05/24/94
	Northshore Mining	27A	Furnace 12 hood exhaust	PM, Opacity (SO_2, NO_x)	05/24/94
	Northshore Mining	27A	Furnace 11 waste gas	PM, Opacity, SO_2, NO_x	05/24/94
	Eveleth Mines	869B	primary crusher	PM10, Opacity	07/28/94
NA	Eveleth Mines	869B	secondary crusher	PM10, Opacity	07/28/94
	Eveleth Mines	869B	primary crusher	PM10	11/03/94
	Eveleth Mines	869B	primary crusher	PM10,Opacity	04/08/93
	Eveleth Mines	869B	secondary crusher	PM10,Opacity	04/08/93
MINN cannot find — F	Inland Steel Mining	257	flux pellet induration furnace	NO_x	07/31/90
A	Hibbing Taconite	541	pellatizing furnace no.1	Opacity,PM,NO_x,CO	05/10/94
A	Hibbing Taconite	541	pellatizing furnace no.2	Opacity,PM,NO_x,CO	05/10/94
A	Hibbing Taconite	541	several		06/22/94
A	Hibbing Taconite	541	pellatizing furnace no.3	PM, Opacity,NO_x,SO_2,Pb,VOC	09/27/94
A	LTV Steel Mining	48B	Furnace, etc.	PM,NO_x,SO_2,VOC	(to be submitted)

1 to 2% flux

call these acid pellets

1 to 2% flux

4-5% is flux

1 The information listed is obtained from a computerized database maintained by the MPCA Air Quality Division Compliance Determination Unit. The database is not complete, for some test reports submitted by companies prior to 1992 have not been included. Unless indicated otherwise, a copy of the listed reports can be requested at a fee from Ms. Lori Tabor of MPCA at 612/297-5367, FAX: 612/297-7709.

2 This report may have been used as reference 10 in the draft report Section 4.

3 This report may have been used as reference 37 in the draft report Section 4.

RECENT PERFORMANCE/ENGINEERING TESTSAT TACONITE PLANTS IN MINNESOTA

	Source	AQD No.	Emission Unit	Parameter	Test Date
	National Steel Pellet	62B	2B	TSP	09/11/86
	National Steel Pellet	62B	2	TSP, Opacity	04/14/87
	National Steel Pellet	62B	kiln; waste gas stack 2A	PM, Opacity	06/22/93
	National Steel Pellet	62B	No. 31	TSP, Opacity	(to be submitted)
	National Steel Pellet	*62B*	*6 sources*	*TSP, Opacity*	*07/24/88*[4]
	National Steel Pellet	*62B*	*waste gas stack 2A*	*TSP, Opacity*	*06/05/91*[5]
	National Steel Pellet	62B	primary crusher	PM	(to be submitted)
	National Steel Pellet	62B	No. 1 drive tower	PM	(to be submitted)
	National Steel Pellet	*62B*	*waste gas stack EP#31*	*TSP, Opacity*	*06/17/92*[6]
	National Steel Pellet	62B	waste gas stack 2B /EP31	PM10,CO,NO_x,SO_2,VOC	09/12/94
	National Steel Pellet	62B	waste gas stack 2B /EP31	PM10,CO,NO_x,SO_2,VOC	09/16/94
	National Steel Pellet	62B	waste gas stack 2B /EP31	PM10,CO,NO_x,SO_2,VOC	09/23/94
F	National Steel Pellet	62B	waste gas stack 2B /EP31	PM10,CO,NO_x,SO_2,VOC	10/12/94
F	National Steel Pellet	62B	waste gas stack 2B /EP31	PM	10/13/94
	US Steel Minntac	26A	course crusher EP#4.3	PM,PM10, Opacity	03/30/93
	US Steel Minntac	26A	course crusher EP#4.4	PM,PM10, Opacity	03/30/93
	US Steel Minntac	26A	course crusher EP#4.7	PM,PM10, Opacity	03/30/93
F	US Steel Minntac	26A	pellatizer 4 EP#8.21	PM,PM10, Opacity	04/28/93
F	US Steel Minntac	26A	pellatizer 5 EP#8.22	PM,PM10, Opacity	04/28/93
F	US Steel Minntac	26A	pellatizers 4 and 6	sulfur balance; SO_2	report 6/21/94[7]

4 This report may have been used as reference 36 in the draft report Section 4.

5 This report may have been used as reference 33 in the draft report Section 4.

6 This report may have been used as reference 32 in the draft report Section 4.

7 University of Minnesota Natural Resources Research Institute Coleraine Minerals Research Laboratory (CMRL) conducted this agglomerator sufur balance study for U.S. Steel Minnesota Ore Operations (Minntac). Based on this study, the MPCA staff determined that the control efficiency for sulfur removal of a wet scrubber designed primarily to reduce particulate emission could be taken as 50% by weight (MPCA letter, 8/11/94). For a copy of the CMRL report, please contact Mr. Larry Salmela of U.S. Steel Minntac (telephone: 218/749-7569; FAX: 218/749-7360), or Hongming Jiang, Ph.D., P.E., Senior Engineer, MPCA (telephone: 612/296-7670; FAX: 612/297-7709; Internet: **hongming.jiang@pca.state.mn.us**).

TACONITE PLANTS IN MINNESOTA

(1) U.S. Steel Minnesota Ore Operations (AQD File No. 26A)

Mr. Larry Salmela
Department Manager, Environmental Control
U.S. Steel Minnesota Ore Operations
P.O. Box 417
County Highway 102
Mount Iron, Minnesota 55768

Telephone: (218)749-7569
FAX: (218)749-7360

(2) LTV Steel Mining Company (AQD File No. 48B)

Mr. Dennis Koschak
Area Manager, Technical Services
LTV Steel Mining Company
P.O. Box 847
Hoyt Lakes, Minnesota 55750

Telephone: (218)225-4219
FAX: (218)225-4230

(3) National Steel Pellet Company (AQD File No. 62B)

Mr. Donald E. Healy
Superintendent, Panning and Technical Services
National Steel Pellet Company
P.O. Box 217
Keewatin, Minnesota 55753

Telephone: (218)778-6521
FAX: (218)778-6112

(4) Northshore Mining Company (AQD File No. 27A)

Mr. Dennis M. Wagner
Senior Environmental Engineer
Northshore Mining Company
10 Outer Drive
Silver Bay, Minnesota 55614

Telephone: (218)226-6056
FAX: (218)226-3657

(5) Inland Steel Mining Company (AQD File No. 257)

Mr. Gustav R. Josephson
Staff Engineer
Inland Steel Mining Company
P.O. Box 1 (U.S. 53 North)
Virginia, Minnesota 55792

Telephone: (218)749-5910 Ext. 283
FAX: (218)749-5256

(6) Hibbing Taconite Company (AQD File No. 541)

Mr. Steven G. Rogers
Senior Environmental Engineer
Hibbing Taconite Company
P.O. Box 589
Hibbing, Minnesota 55746

Telephone: (218)262-6800
FAX: (218)262-6877

(7) Eveleth Mines (AQD File Nos. 869A, 869B)

Mr. David P. Johnson
Director -- Environmental, Safety & Health
Eveleth Mines
P.O. BOX 180
Eveleth, Minnesota 55734

Telephone: (218)744-7804
FAX: (218)744-7874

For file document duplication at a fee, the following staff may be contacted:

Ms. Lori Tabor
Compliance and Enforcement Section
Air Quality Division
Minnesota Pollution Control Agency

Telephone: (612)297-5367
FAX: (612)297-7709

What Type of t-Test Is Used for the Analysis in the Draft Report for AP-42 Section 11.23?

File: **TAC_T8**

X	Y
1.1	0.28
1.2	0.3
1.2	0.26
0.9	0.61
0.9	0.57
1.2	0.62
1.5	
1.3	
1.7	

It is unclear from the spreadsheets in the draft report which type of t-test is used there. For file TAC_T8, the draft provides an analysis similar to the one assuming equal variance here. Is it proper from the perspectives of statistics, although the end results do not differ much? The analyses done here make use of Microsoft Excel 5.0a.

t-Test: Two-Sample Assuming Unequal Variances

	X	*Y*
Mean	1.2222222	0.44
Variance	0.0669444	0.03116
Observations	9	6
Hypothesized Mean Difference	0	
df	13	
t Stat	6.9598661	
P(T<=t) one-tail	4.96E-06	
t Critical one-tail	1.7709317	
P(T<=t) two-tail	9.919E-06	
t Critical two-tail	2.1603682	

t-Test: Two-Sample Assuming Equal Variances

	X	*Y*
Mean	1.2222222	0.44
Variance	0.0669444	0.03116
Observations	9	6
Pooled Variance	0.0531812	
Hypothesized Mean Difference	0	
df	13	
t Stat	6.4357972	
P(T<=t) one-tail	1.108E-05	
t Critical one-tail	1.7709317	
P(T<=t) two-tail	2.215E-05	
t Critical two-tail	2.1603682	

FAX TRANSMI: Duplicate

TO: Mr. George J. Ryan
Executive Director
American Iron Ore Assoc

FROM: Richard Marinshaw
Midwest Research Institute
401 Harrison Oaks Boulevard, Suite 350
Cary, North Carolina 27513
(919) 677-0249, Ext. 5359

DATE: February 13, 1995

RECEIVING FAX NUMBER: 216-241-8262

SENDING FAX NUMBER: 919-677-0065

THIS FAX CONSISTS OF 8 PAGES (INCLUDING THIS PAGE)

As we discussed this morning, I am faxing you a copy of the letter from the Minnesota Pollution Control Agency to Ron Myers of EPA commenting on the revised draft AP-42 section on taconite ore processing.

Please let me know if you have any questions.

PS: I JUST RECEIVED YOUR FAX.

AMERICAN IRON ORE ASSOCIATION

SERVING THE IRON ORE INDUSTRY OF THE UNITED STATES AND CANADA

January 12, 1995

Post-it™ Fax Note 7671 | Date | # of pages ▶
To RICK MARINSHAW | From G RYAN
Co./Dept. MEI | Co. AIOA
Phone # X5359 | Phone #
Fax # 919-677-0065 | Fax #

Mr. Ronald E. Myers
Emission Factors and Methodologies Section
U.S. Environmental Protection Agency
Office of Air Quality Planning and Standards
Research Triangle Park, NC 27711

Dear Mr. Myers:

AP-42, SECTION 8.22 (11.23)
TACONITE ORE PROCESSING

Through our consultant, W. Gale Biggs Associates, American Iron Ore Association has reviewed the most recent draft of the proposed AP-42 Section 8.22 (to be renumbered 11.23). We appreciate the opportunity to present our comments and hope that they are of use to you and your staff in establishing new emission factors for taconite processing.

American Iron Ore Association (AIOA) is a trade association that has represented iron ore interests in the United States and Canada since 1882. AIOA member companies account for approximately 98 percent of the iron ore produced in the United States. The companies operate state-of-the-art iron ore pellet plants in North America which competitively meet the stringent quality standards of steel producers. The plans have an effective annual capacity of more than 68 million tons of ore.

We recognize that the existing section number in the AP-42 document is 8.22, but that within the next few months an extensive reorganization of AP-42 will be taking place, renumbering this section as 11.23 in the review document.

In our earlier review (letter dated April 15, 1993) of this section — taconite ore processing emission factors — five issues were raised which we felt needed modification and/or classification. These issues are:

1) The use of old data in the preparation of the emission factors.

2) A failure to incorporate recent advances in pollution control technology.

Continued . . . /

Telephone (216) 241-8261
614 Superior Avenue, West
915 Rockefeller Building
Cleveland, Ohio 44113-1383
Facsimile (216) 241-8262

AMERICAN IRON ORE ASSOCIATION

3) The presentation of asbestos as an issue in the taconite mining and processing industry.

4) The misrepresentation of fugitive emission factors.

5) The changes from old emission values to new ones.

Each of these issue are discussed separately below.

1) THE USE OF OLD DATA IN THE PREPARATION OF THE EMISSION FACTORS

AIOA mounted a substantial effort to assemble and provide to EPA recent stack test data collected form its member companies. These were provided to EPA in AIOA's April 15, 1993, submittal. We are happy to note that in the new draft, the number of documents used in the emission determination increased from 4 to 31. These data should provide emission factors which are much more representative for use in the taconite industry.

2) A FAILURE TO INCORPORATE RECENT ADVANCES IN POLLUTION CONTROL TECHNOLOGY

This draft of section 11.23 eliminated the table of control device efficiencies and included emission factors for both controlled and uncontrolled emissions. While this is still a compromise, it is a definite improvement in the presentation. AIOA expects that facilities would be able to argue for any case-by-case stack efficiencies that can be justified by appropriate data.

3) THE PRESENTATION OF ASBESTOS AS AN ISSUE IN THE TACONITE MINING AND PROCESSING INDUSTRY

AIOA presented as best an argument as possible in the time frame available for the last review of section 11.23 that the issue of asbestos was not a problem in the taconite ore processing industry. We were pleased to note that EPA was responsive to these arguments and that 1) asbestos was not mentioned in the descriptive portions of the section, and 2) emission factors were not included in the tables. We again request that the final presentation in AP-42 should not mention asbestos.

4) THE MISREPRESENTATION OF FUGITIVE EMISSION FACTORS

The elimination of the haul road traffic emissions from this section was a positive step. We agree that the section on haul road emissions (the future section 13.2) is far more

Continued . . . /

AMERICAN IRON ORE ASSOCIATION

Mr. Ronald E. Myers
Emission Factors and Methodologies Section
U.S. Environmental Protection Agency

January 12, 1995

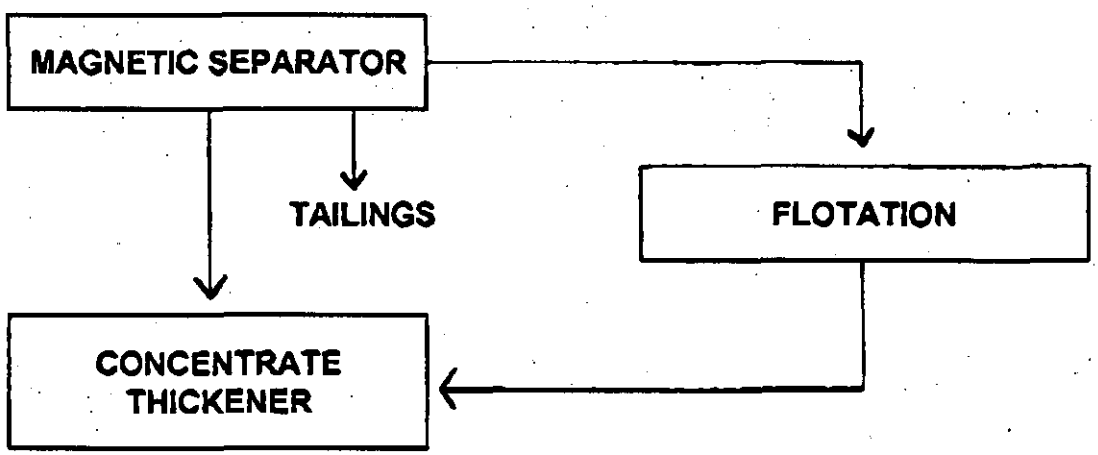
Unless additional information becomes available, all references to blasting on page 11.23-8 must be eliminated. Blasting is a short-term, albeit large, emission source with almost all of the particles in this very large size; only a very small fraction are in the size ranges of concern, i.e., PM_{10} or smaller. These emissions, therefore, settle quickly. This intermittent emission source occurs within the range of seconds and yet the standard is a 24-hour average. Since EPA has not produced any reliable measurements of blasting emissions, mention of blasting as a major particulate matter source needs to be deleted. An emission factor for blasting was eliminated from AP-42 many years ago because there was no technical justification to substantiate a value.

5) **THE CHANGES FROM OLD EMISSION VALUES TO NEW ONES**

Many of the concerns expressed on this topic have been answered with the changes as described above. The inclusion of almost eight times as many sources in the analysis of the emissions lends far more credibility to the proposed emission values. With the Clean Air Act Amendments of 1990, far more testing will be required and additional information should lead to further refinements in the emission values.

EDITORIAL COMMENTS

1) The flow diagram in Figure 11.23.1 (page 11.23-4) should include the possibility of flotation. Some plants have this included in their processing techniques. Below is a suggested inclusion of this process into the flow diagram. The spelling of "thicker" should be "thickener".



Continued . . . /

AMERICAN IRON ORE ASSOCIATION

Mr. Ronald E. Myers
Emission Factors and Methodologies Section
U.S. Environmental Protection Agency

2) An appropriate addition to show the flotation option must be made on page 11.23-5, six lines down from the top of the page, with the inclusion of **and/** as follows:

"After crushing, the size of the material is further reduced by wet grinding in rod mills **and/**or ball mills."

3) In table 11.23-2 on page 11.23-11, we request changing the name from "Unspecified conveyor:" to "Ore transfer". Conveyors produce almost no emissions; the vast bulk of emissions come from the transfer points.

4) For tables 11.23-4 and 11.23-5, in footnotes b & c, the word "that" should be changed to "than". This would be a total of four edits — two in each table.

* * *

We appreciate the opportunity to review the proposed emission section. We welcome working together in an effort to develop a section which both protects the environment and our industry.

Sincerely,

George J. Ryan
Executive Director

GJR:cal

DULUTH MISSABE AND IRON RANGE RAILWAY COMPANY

ENGINEERING DEPARTMENT
329 SECOND STREET
PROCTOR, MN 55810-1091

April 8, 1993

FILE: 930.001

W. Gale Biggs, PhD
POB 3344
Boulder, CO 80307

Attached for your submittal to EPA is a copy of each of the listed DM&IR documents. In reviewing these documents and the EPA Section 8.22, I note that EPA emission factors for pellet handling (30302316) Table 8.22-2, are 1.0 lb/ton whereas the emission factor we have used for pellet transfer is 0.0004h lbs/ton, where h is the average height of fall. Our current emission factors vary from 0.0008 to 0.0084 lbs/ton before control of emissions by water sprays and baghouses are considered. The use of these proposed EPA factors would effectively multiply our emissions from 119 to 1,250 times the current actual emissions.

The effect of added moisture content is clearly not considered in the EPA work, yet moisture is an important control method. Further, EPA has not comprehended baghouse filters at pellet handling or transfer locations. In our Two Harbors operation, baghouses at the railcar dump and at conveyor belt transfer locations provide 99+% effective emissions control.

George C. LaValley

George C. LaValley, P.E.
Manager-Environmental Engineering

Attachments

U. S. Steel
Minnesota Ore Operations
P.O. Box 417
Mt. Iron, MN 55768

20, 21, 25, 26, 27, 28
Need to call her. Still not clear what processes the conveyors in Ref. 28 ~~are~~ pertain to. 10/10/95
conveyor

11/04/1994

Mr. Richard Marinshaw
Midwest Research Institute
401 Harrison Oaks Boulevard, Suite 350
Cary, North Carolina 27513
(919) 677-0249, Ext. 5359

Re: AP-42 Revision: Taconite Mining

Dear Mr. Marinshaw:

Pursuant to my conversation with J. Duncan Shorey of AIOA, I am forwarding the following as aids to grouping particulate sources in taconite mining and processing from U.S. Steel - Minntac:

* Taconite Plant process flow diagrams (5)
  illustrating Crusher, Concentrator, Agglomerator
* R.D. Potts technical paper on Grate-Kiln System
* Agglomerator schematics (2)
* Stack Test dated 3/25/94

The complete stack test report attached is the only stack test conducted at Minntac since April 1993, and was conducted for engineering purposes as opposed to performance or compliance testing. If you have any further questions, I can be reached at (218) 749-7532.

-7569

Sincerely,

JH Kingston

Jane H. Kingston
Environmental Control Engineer

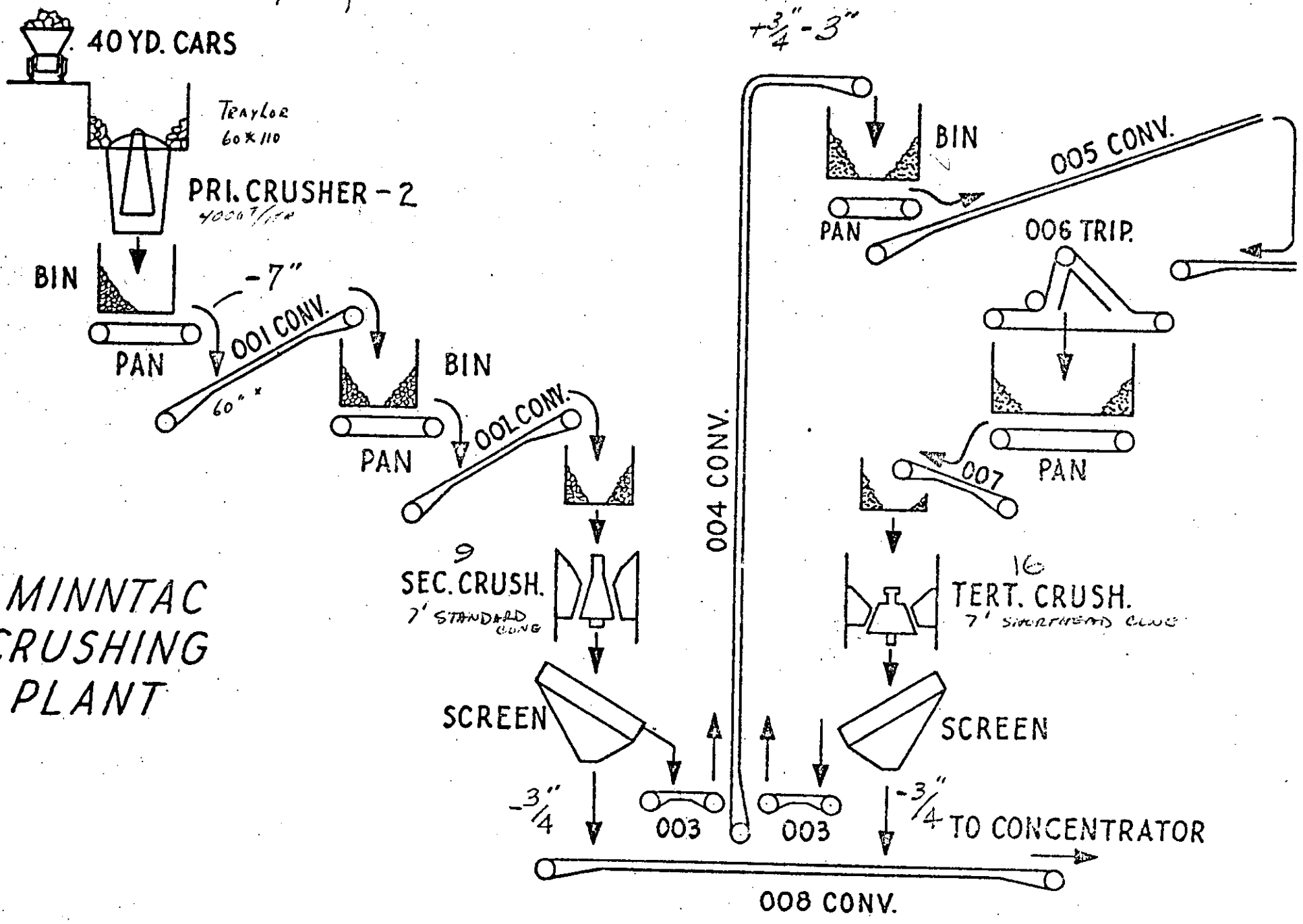
Attachments

cc: FJ Lanari
LC Salmela
JD Shorey

10/12/95
Jane Kingston
transferred to Pennsylvania
Larry Somel (?)
call 749-7569
(218)
or 749-.

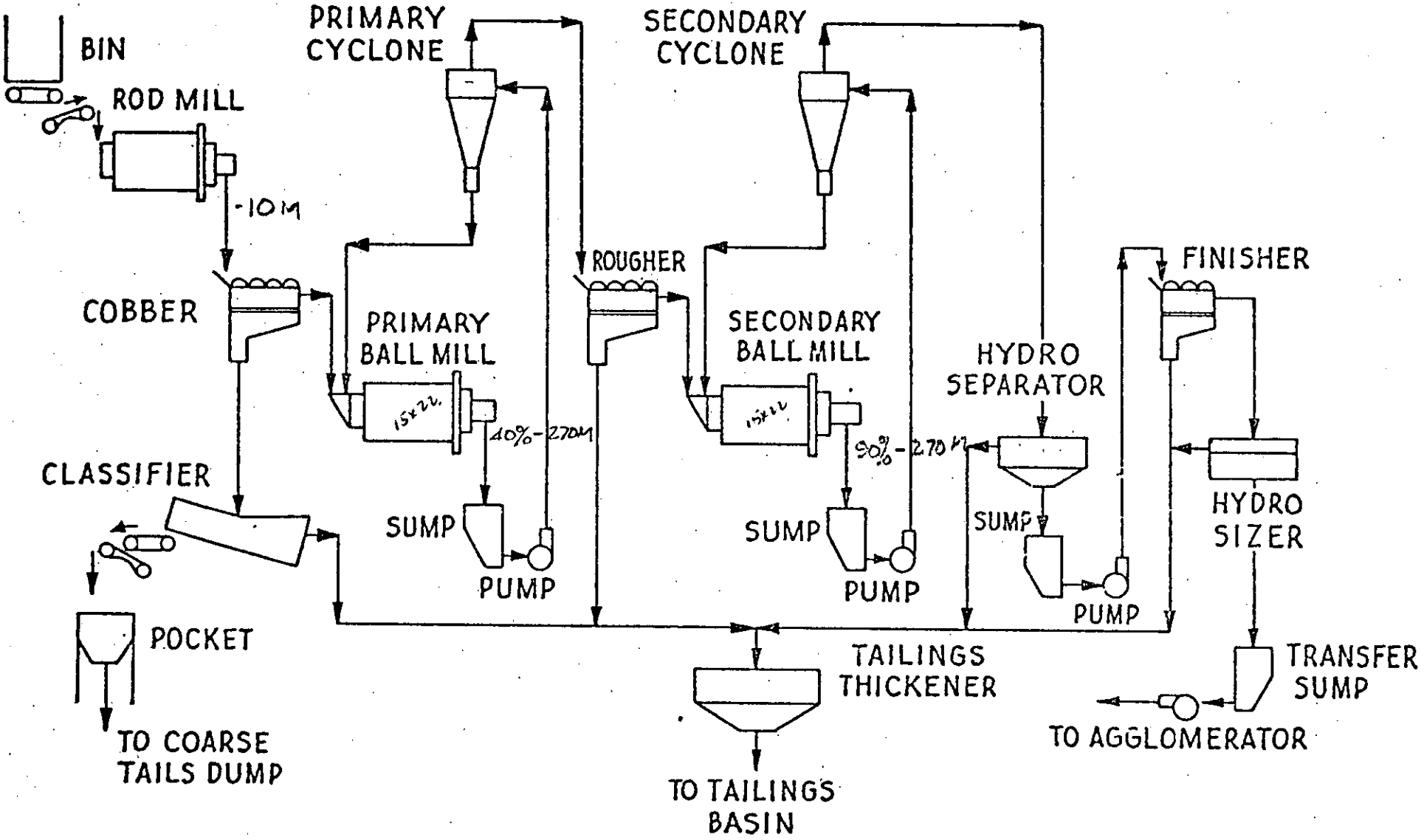
Phoned Larry NICM
TALKED TO 10/16/95
NICK BRASCUGLI
(218) 749-7532
WILL CHECK ONIT & CALL BACK

· 110,000 tons/day

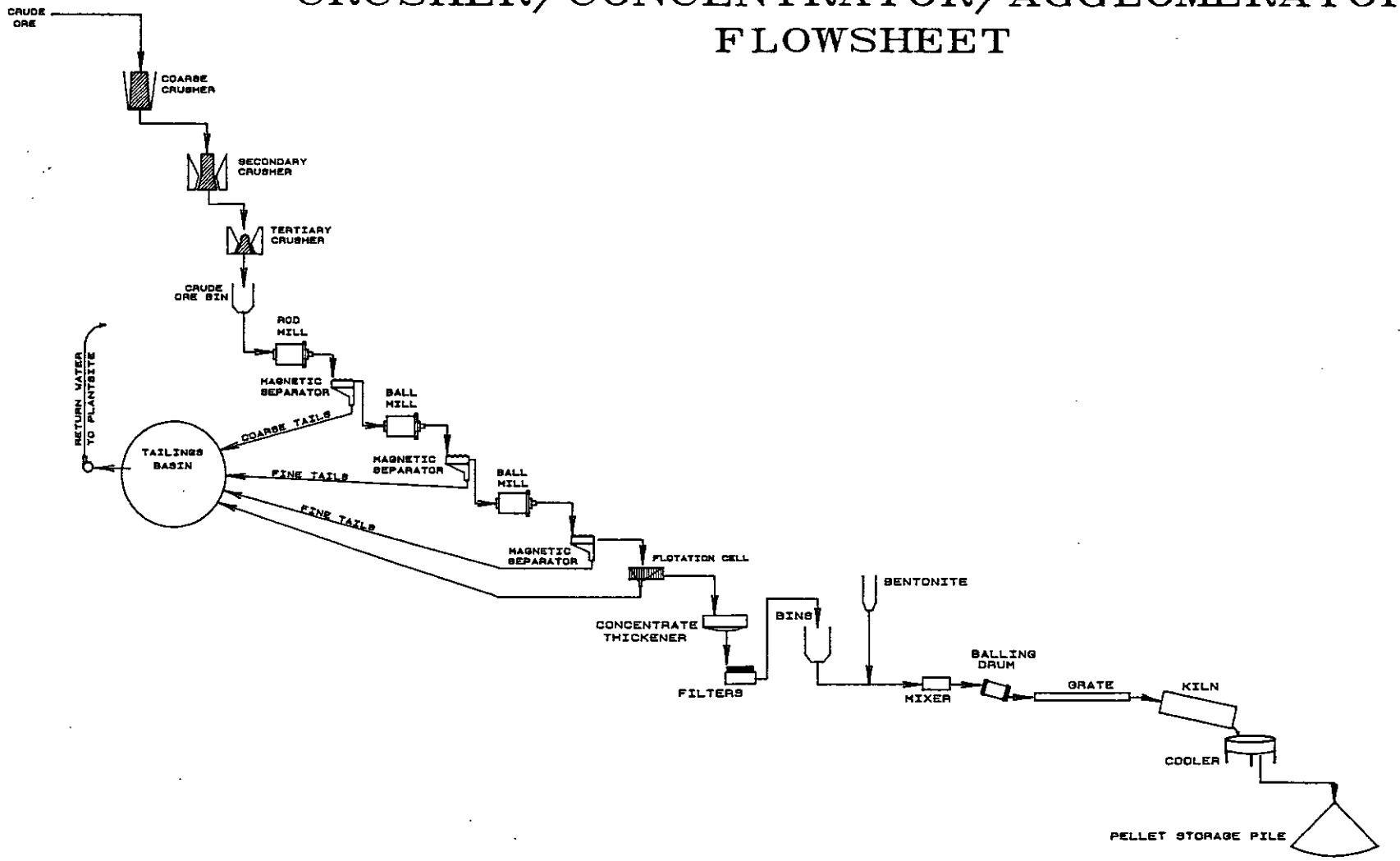


MINNTAC CRUSHING PLANT

MINNTAC CONCENTRATOR



CRUSHER/CONCENTRATOR/AGGLOMERATOR FLOWSHEET



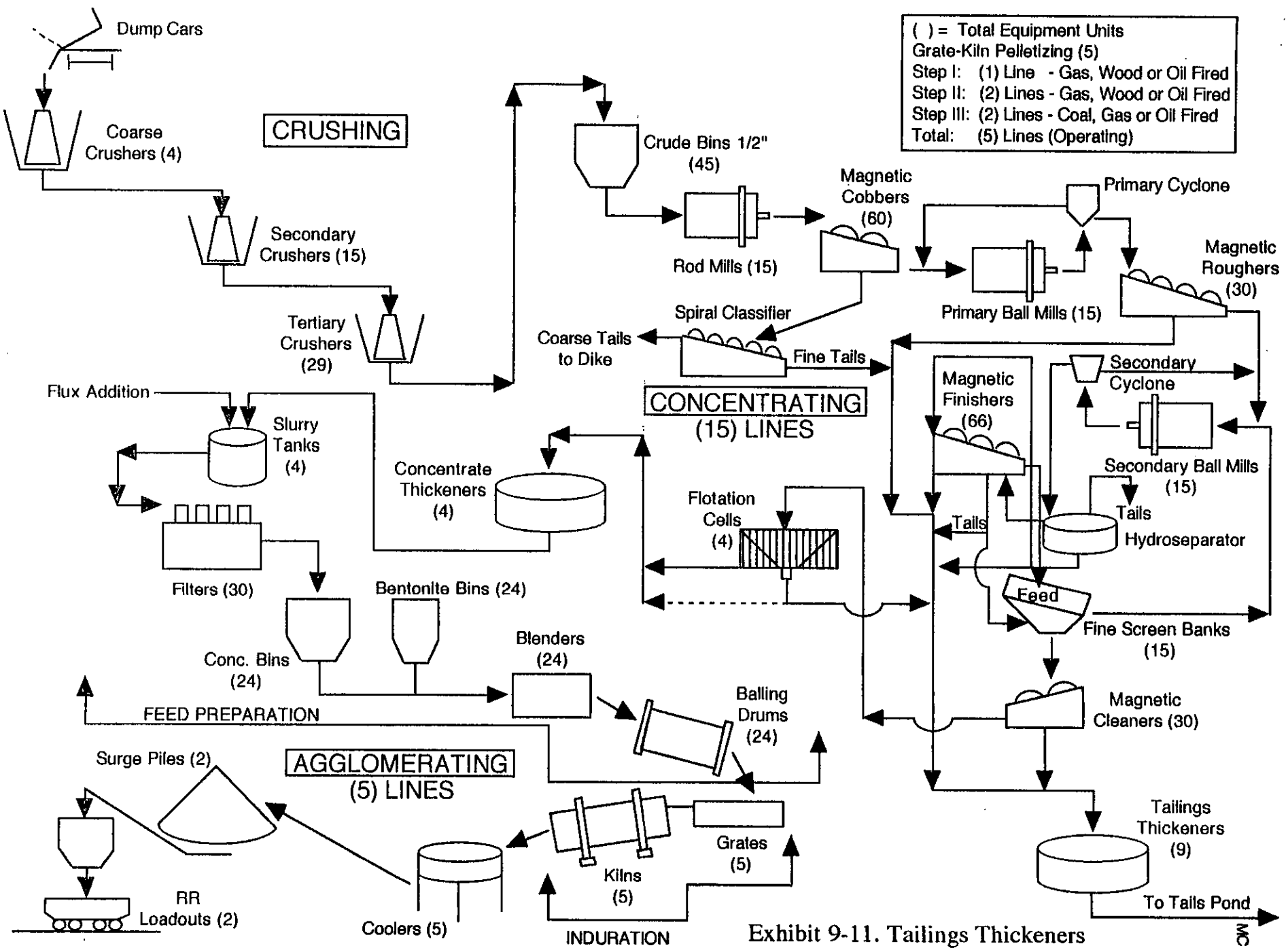
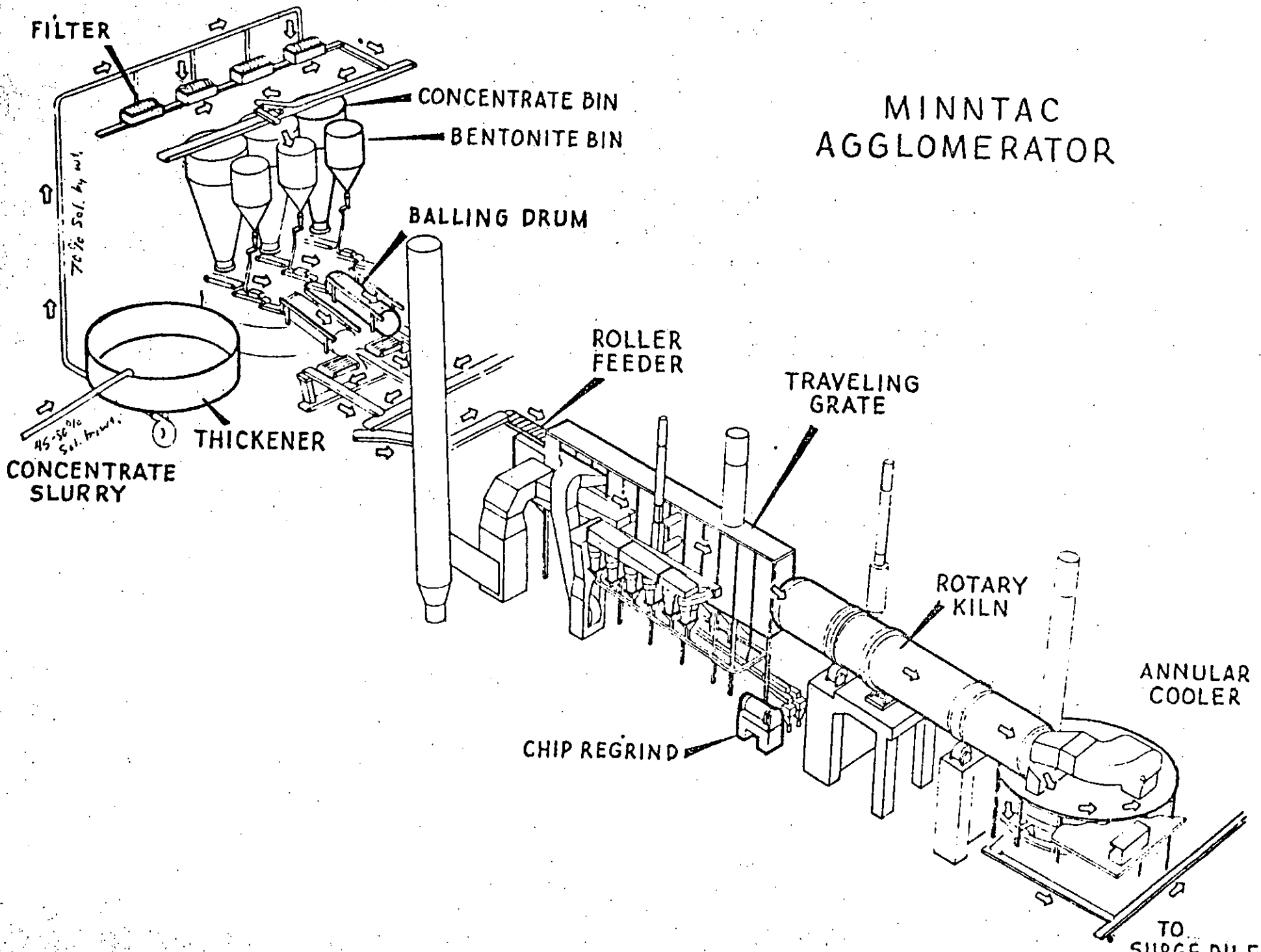
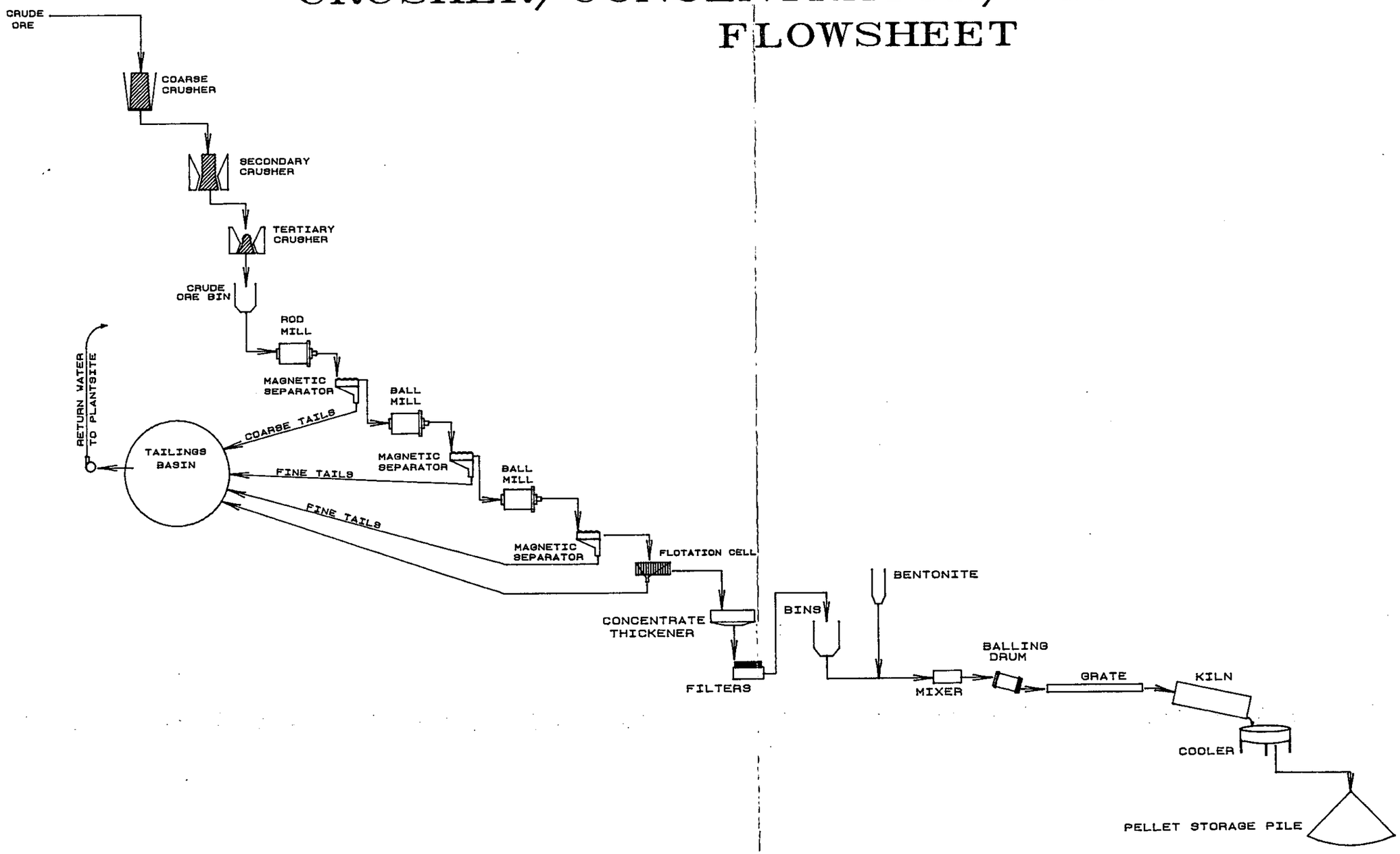


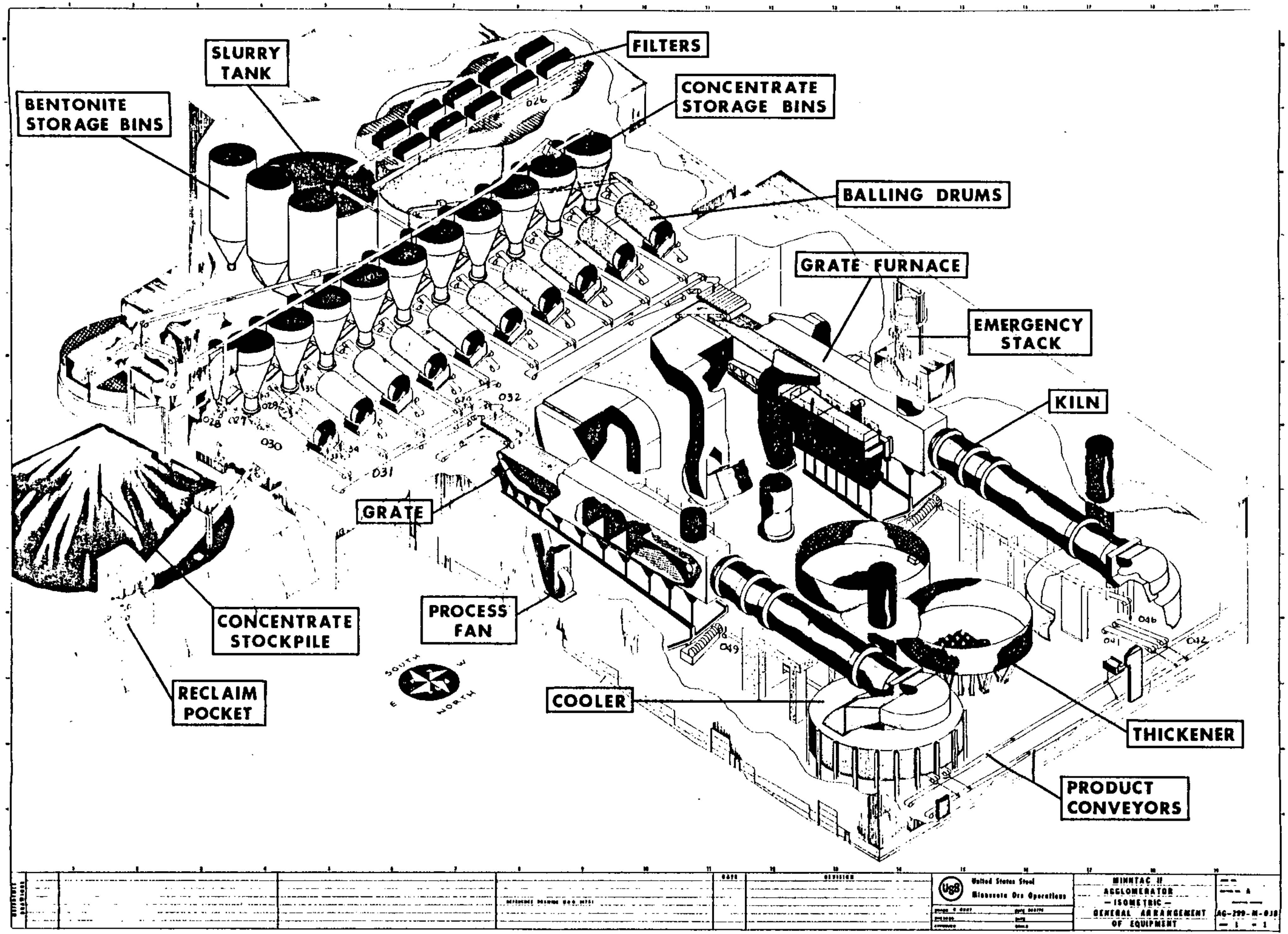
Exhibit 9-11. Tailings Thickeners

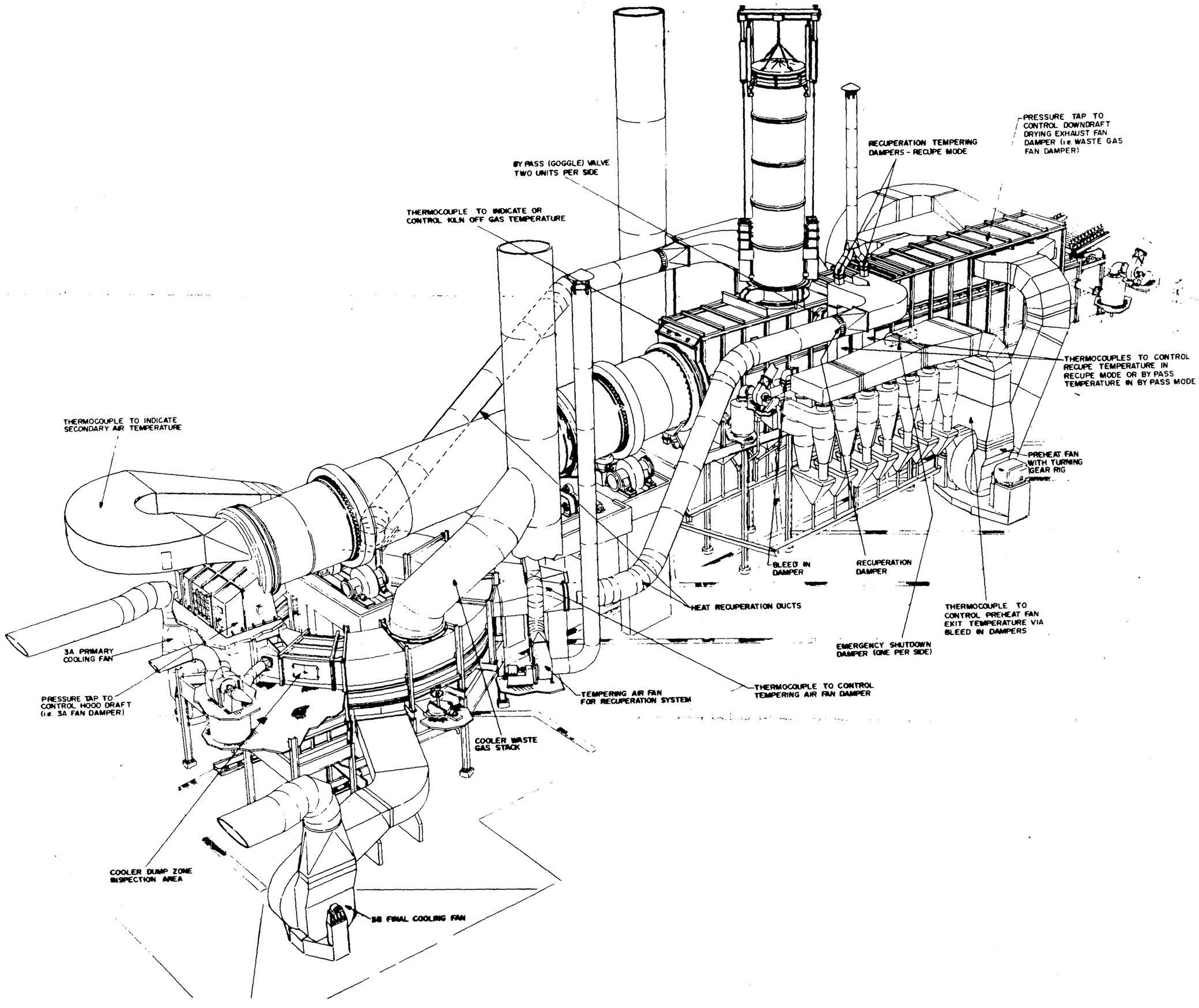
MINNTAC AGGLOMERATOR



CRUSHER/CONCENTRATOR/AGGLOMERATOR FLOWSHEET




FILTERS
SLURRY TANK
BENTONITE STORAGE BINS
CONCENTRATE STORAGE BINS
BALLING DRUMS
GRATE FURNACE
EMERGENCY STACK
KILN
GRATE
PROCESS FAN
CONCENTRATE STOCKPILE
RECLAIM POCKET
COOLER
THICKENER
PRODUCT CONVEYORS
SOUTH
NORTH
United States Steel
Minnesota Ore Operations
MINNTAC II
AGGLOMERATOR
— ISOMETRIC —
GENERAL ARRANGEMENT
OF EQUIPMENT


PRESSURE TAP TO CONTROL DOWNDRAFT DRYING EXHAUST FAN DAMPER (i.e. WASTE GAS FAN DAMPER)
RECUPERATION TEMPERING DAMPERS - RECUPE MODE
BY PASS (GOGGLE) VALVE TWO UNITS PER SIDE
THERMOCOUPLE TO INDICATE OR CONTROL KILN OFF GAS TEMPERATURE
THERMOCOUPLES TO CONTROL RECUPE TEMPERATURE IN RECUPE MODE OR BY PASS TEMPERATURE IN BY PASS MODE
THERMOCOUPLE TO INDICATE SECONDARY AIR TEMPERATURE
PREHEAT FAN WITH TURNING GEAR RIG
BLEED IN DAMPER
RECUPERATION DAMPER
HEAT RECUPERATION DUCTS
THERMOCOUPLE TO CONTROL PREHEAT FAN EXIT TEMPERATURE VIA BLEED IN DAMPERS
EMERGENCY SHUTDOWN DAMPER (ONE PER SIDE)
3A PRIMARY COOLING FAN
PRESSURE TAP TO CONTROL HOOD DRAFT (i.e. 3A FAN DAMPER)
TEMPERING AIR FAN FOR RECUPERATION SYSTEM
THERMOCOUPLE TO CONTROL TEMPERING AIR FAN DAMPER
COOLER WASTE GAS STACK
COOLER DUMP ZONE INSPECTION AREA
3B FINAL COOLING FAN

AG-299-GA-049

FACSIMILE MESSAGE

USX CORPORATION - U.S. STEEL GROUP, INC.
MINNTAC PLANT - ENVIRONMENTAL CONTROL
P.O. Box 417 County Highway 102
Mountain Iron, Minnesota 55768

FAX Number (218) 749-7360
For any problems with FAX messages from/to this number, please call Joanie at (218) 749-7394. Minntac's Steelcom prefix is 453.

DATE: 16 OCT 95 FROM: Larry Salmela (Voice phone -7569)

TO: Rick Marinchaw TOTAL PAGES: 3
Midwest Research Institute
FAX 919-677-0065

I am aware that Midwest Research Institute (MRI) is working on a project to develop emission factors for the taconite iron ore processing industry. I am also aware that MRI intends to refer to stack test results as baseline information.

The next pages of this FAX (a letter from me to the permit engineer at the Minnesota Pollution Control Agency responsible for this facility) may be relevant to helping MRI fit the data from several stack tests together. I don't know whether or not the stack test discussed in the letter is included in MRI's database, but I suggest that MRI consider my statement, "Thus we conclude that we cannot apply the stack test results from the February 18 & 19, 1992, test to the taconite crude ore crushing system emissions generally."

The crushing plant schematic is too large to FAX. If you want me to mail a copy to you, please call.

U. S. Steel
Minnesota Ore Operations
P.O. Box 417
Mt. Iron, MN 55768

September 27, 1995

Hongming Jiang, Ph.D., P.E.
Air Quality Division
Minnesota Pollution Control Agency
520 Lafayette Road North
St. Paul, MN 55155-4194

RE: Air Emission Permit No. 26A-91-I/O-1

Dear Hongming,

Ref 21

Enclosed please find a copy of the report from Interpoll Laboratories, Inc., "Results of the February 18 & 19, 1992, Particulate Emission Performance Testing on Two SEI Multiple Throat Venturi Type Scrubber Systems at the USS Minnesota Ore Operations Facility." You will notice that the report was submitted to Southern Environmental, Inc., (SEI). The reason for this was that USS contracted SEI to design and construct the two dust control systems on a total responsibility turn-key basis including sub-contracting the performance testing, which SEI did through Interpoll.

As I searched our file on this project, I found two confusing items for which I seek your advice.

1. The air emission permit cover page signed by Mr. J. Michael Valentine says that the permit is valid for only one year, but the permit transmittal letter from Mr. David L. Beil, P.E., to Mr. N.A. Brascugli dated March 7, 1991, says that the permit is valid for five years. I understand that a five year permit life is typical in MPCA-AQD. In the context of the new permitting program, we ask what our next action should be, if any. Our Part 70 permit application includes the emission units and the emission control units in question here.

2. Our file has a transmittal letter from SEI saying that two copies of this report were provided to USS. Only one is in the file now. I cannot find a transmittal letter in the file from USS to MPCA-AQD confirming that the missing copy was sent to MPCA. In your search you were also not able to find a copy in the permit file. We ask that you accept this copy as the permanent copy for the MPCA-AQD permit file.

There is an important reason not to regard this test as typical of emission units or emissions control unit performance in taconite crude ore processing, which is that the fine fractions have been removed from the material in process before the emission units related to this test. The fine crude ore fractions, smaller than one centimeter, have the great majority of the particulate matter susceptible to becoming air emissions.

Hongming Jiang, Ph.D., P.E.
MPCA-AQD
September 27, 1995

The Minntac crude ore crushing circuit, shown on an enclosed schematic, consists of three stages of crushing. The first stage, called the primary crushers, receive run of mine material with rock sizes from one meter to fine particulate and crush all of the material to less than about 15 centimeters. The second stage, called the secondary crushers, crush all of the material to less than about six centimeters. Immediately after each secondary crusher, a screen separates the material smaller than about 1.5 cm and sends it to the Concentrator. The material between about 1.5 and about 6 cm, called third stage crusher feed material, is sent to the third stage crushers. The third crushing stage, called the tertiary crushers, crush the material to about 1.5 cm. As in the secondary crushers, immedately after each third stage crusher is a screen which sends material smaller than about 1.5 cm to the Concentrator. The material larger than about 1.5 cm re-joins the third stage crusher feed material to be crushed in the tertiary crushers as many times as necessary.

One emission unit is served by each of the SEI multiple throat venturi type wet scrubber systems permitted by 26A-91-I/O-1, which is a conveyor transfer point for third stage crusher feed material conveyed by the 005-05 Conveyor shown on the enclosed schematic. From the crushing process description above we see that the portion of the crude ore containing virtually all of the fine particles has been removed before the emission units in question. In fact, these emission units operated indoors for more than 10 years without emission controls, which is an indication of their very low emission rate. The ventilation systems with the SEI emission control units were added in 1991 out of concern for the indoor workplace air quality. Thus we conclude that we cannot apply the stack test results from the February 18 & 19, 1992, test to the taconite crude ore crushing system emissions generally.

I will appreciate your consideration of the two questions given early in this letter. If you have any further questions, please do not hesitate to contact me.

Very sincerely yours,

Larry C. Salmela
Department Manager - Environmental Control

Enclosures

cc (w/o enc.): F.J. Lanari
W.S. Kubiak

CLIFFS MINING SERVICES COMPANY
CMSC-MN
Subsidiary of Cleveland-Cliffs Inc
Suite 811-200 West Superior Street
Duluth, Minnesota 55802

FACSIMILE MACHINE COVER SHEET

February 21, 1996
Date

TO : Rick Marinshaw

FROM : Chuck Hoffman--CMSC-MN Duluth Office

SUBJECT : Flow Sheets

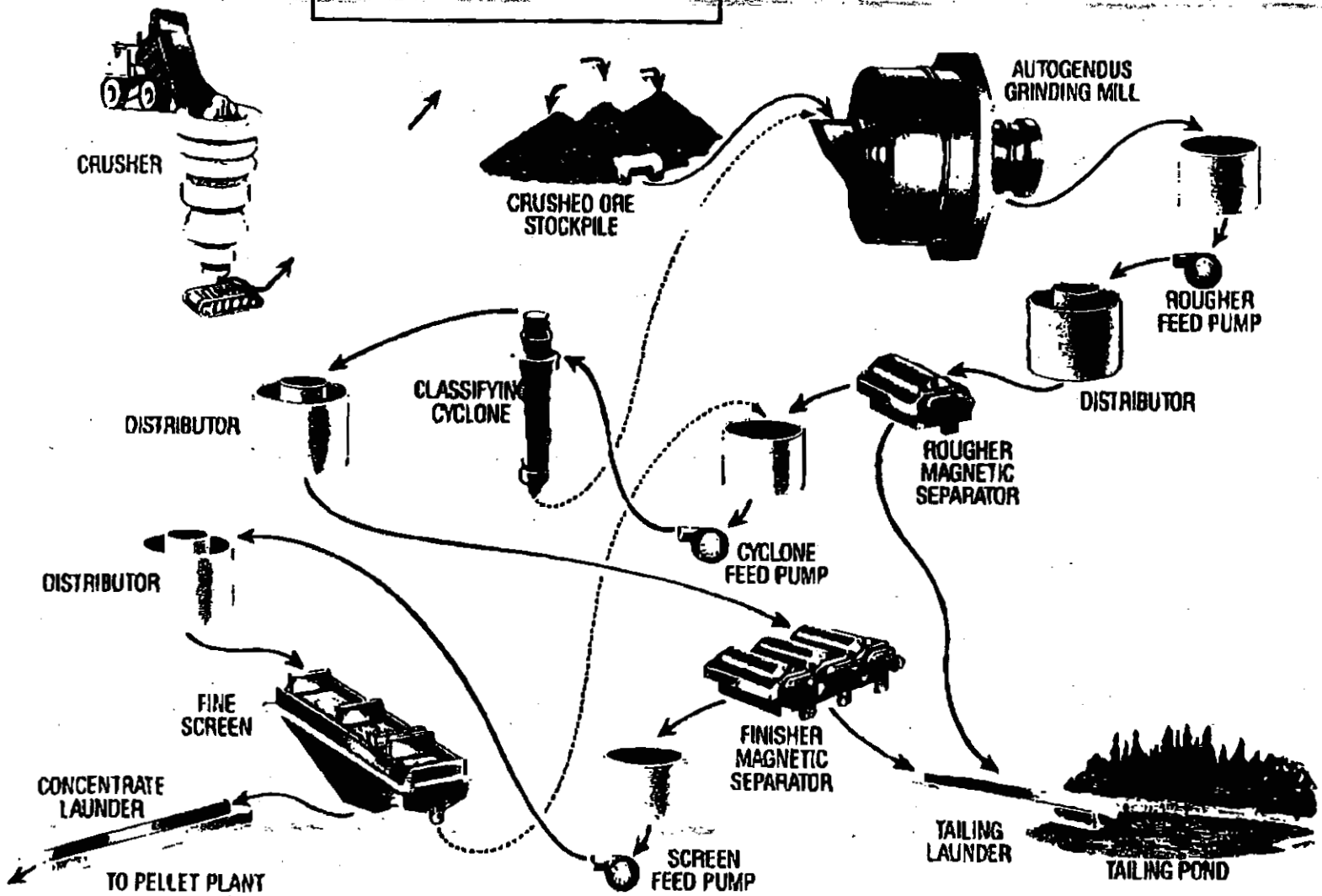
TOTAL PAGES, INCLUDING THIS SHEET: 11

We are transmitting from a Pitney Bowes 9720 - (218) 722-1792. If you do not receive all of the pages, please call (218) 720-6944.

REMARKS: I hope these are helpful. I was unable to reach Eveleth Taconite. My contact person there is Brad Anderson (218-744-7804). I did not call National Steel Pellet Company as they are not a member of IMAM. A contact person there is Charlie Lake (218-778-6521).

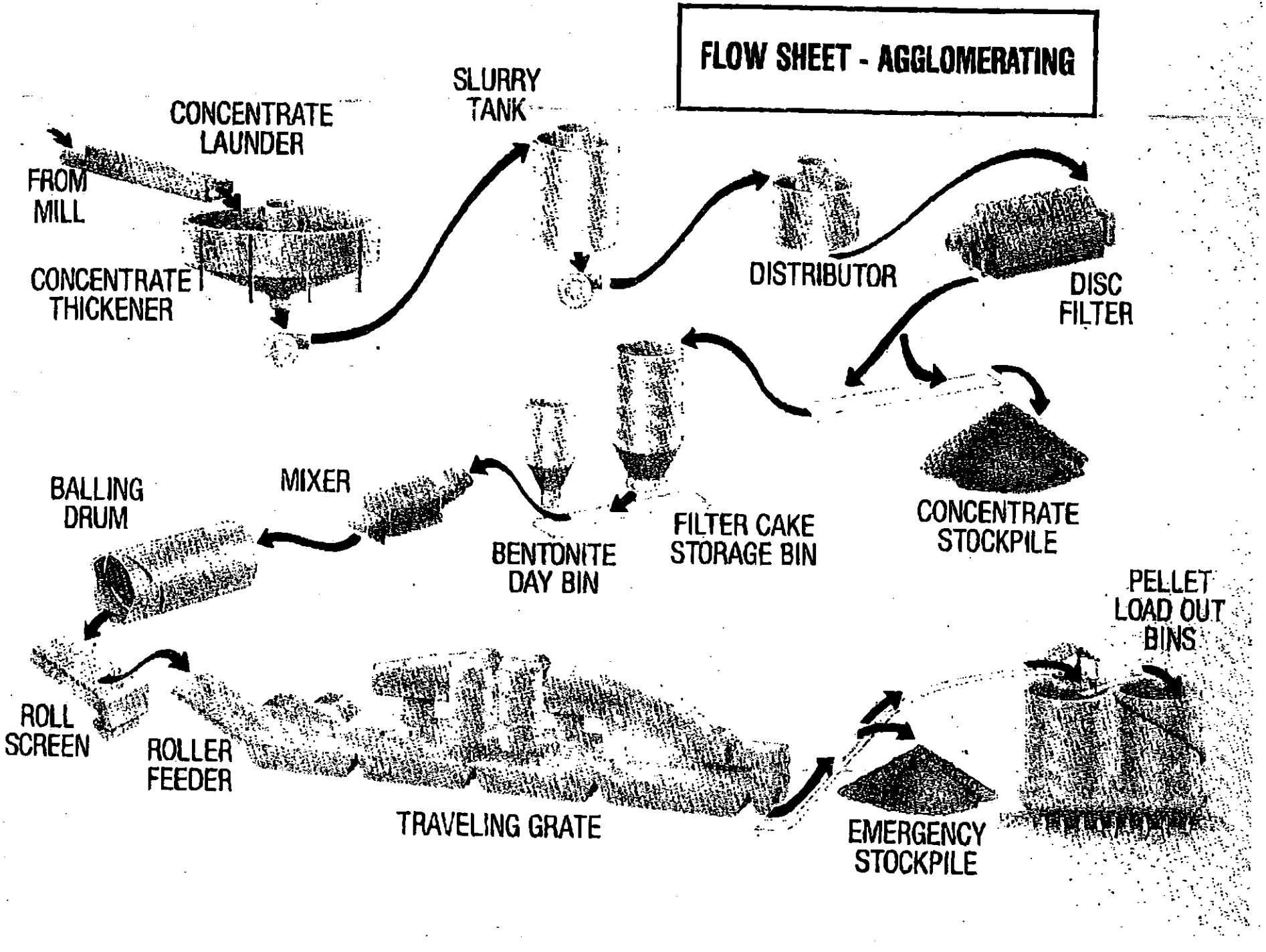
Hibbing Taconite Co.

FLOW SHEET - ORE DRESSING

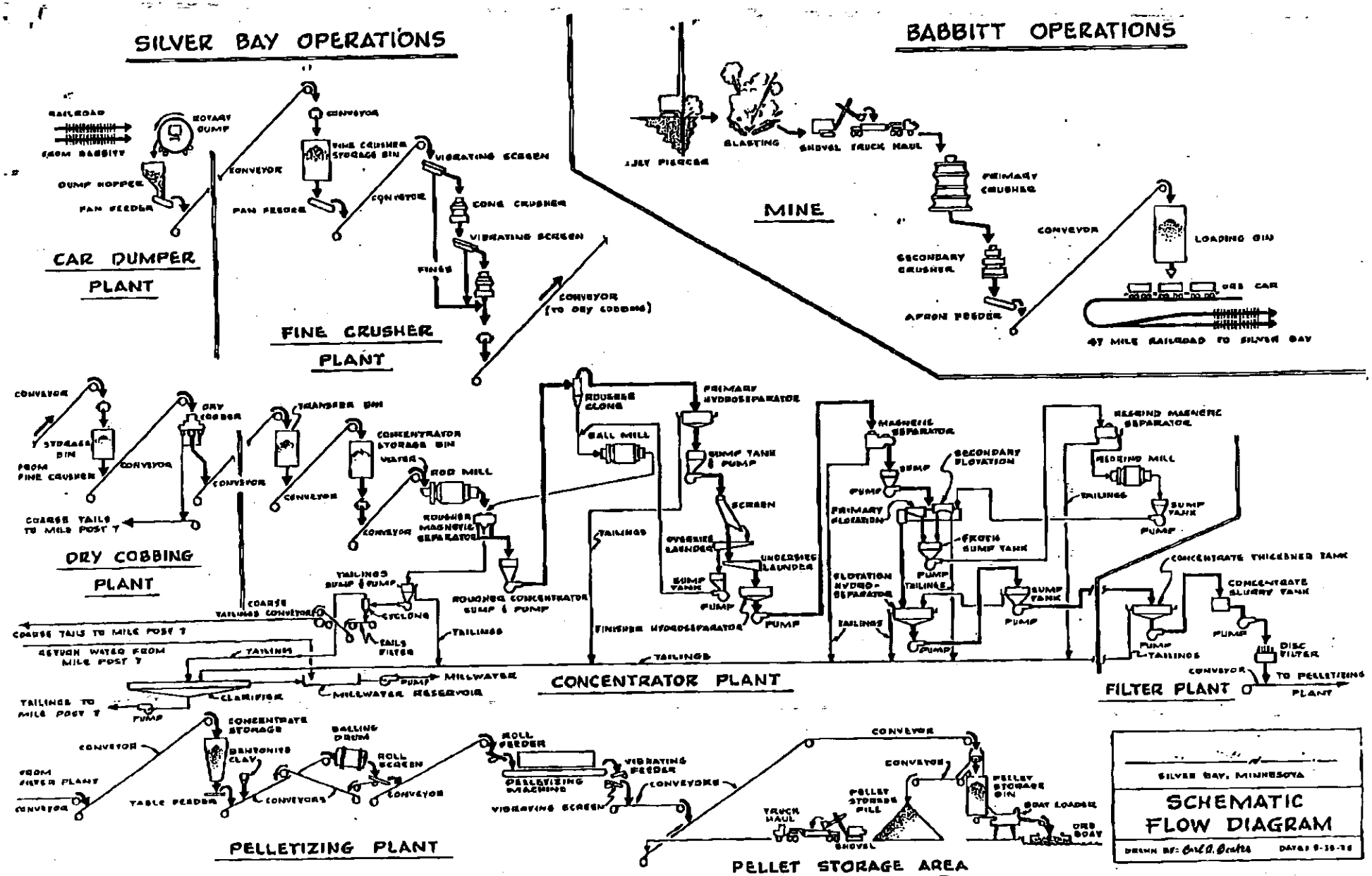


Hibbing Taconite Co.

FLOW SHEET - AGGLOMERATING

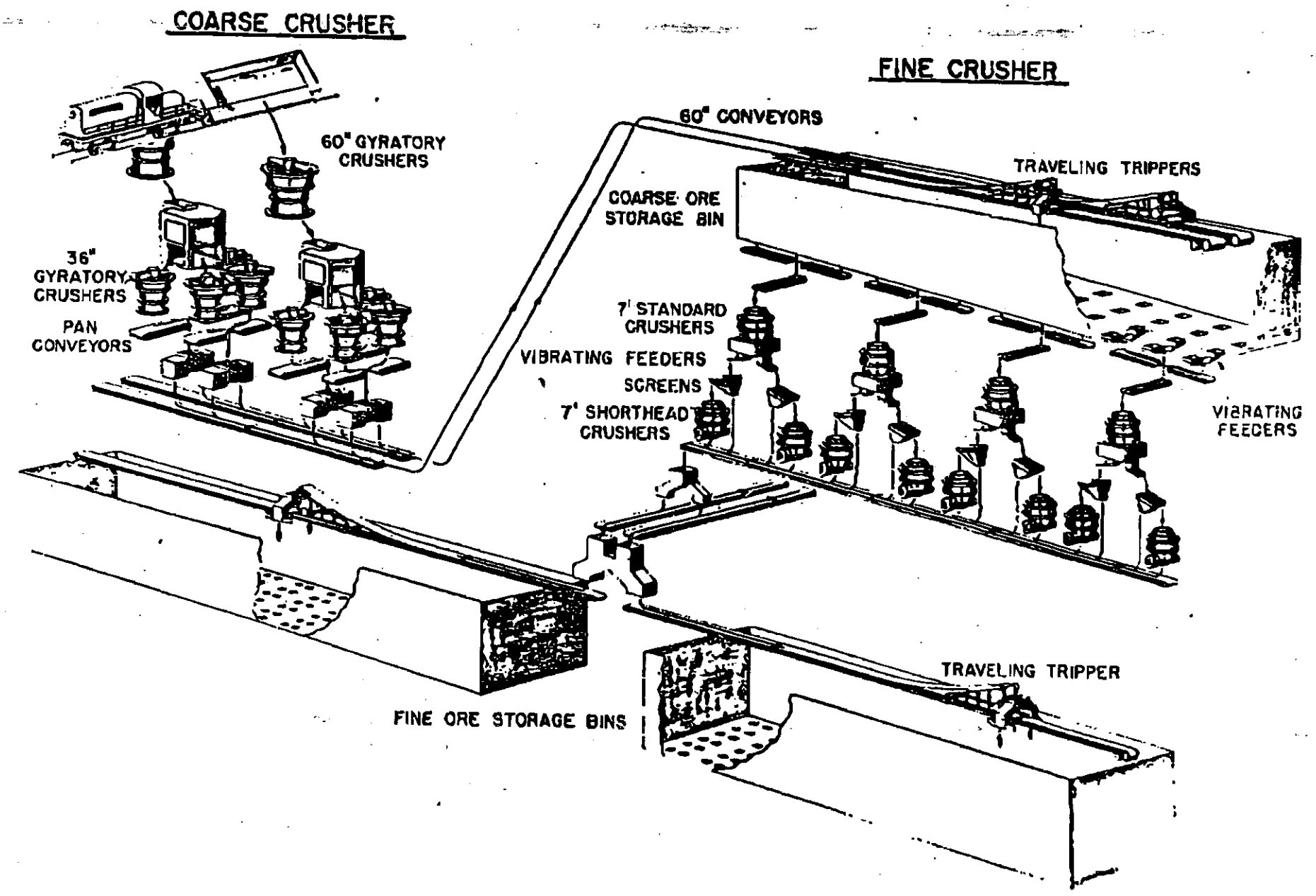


NORTHSHORE MINING



LTV STEEL MINING COMPANY

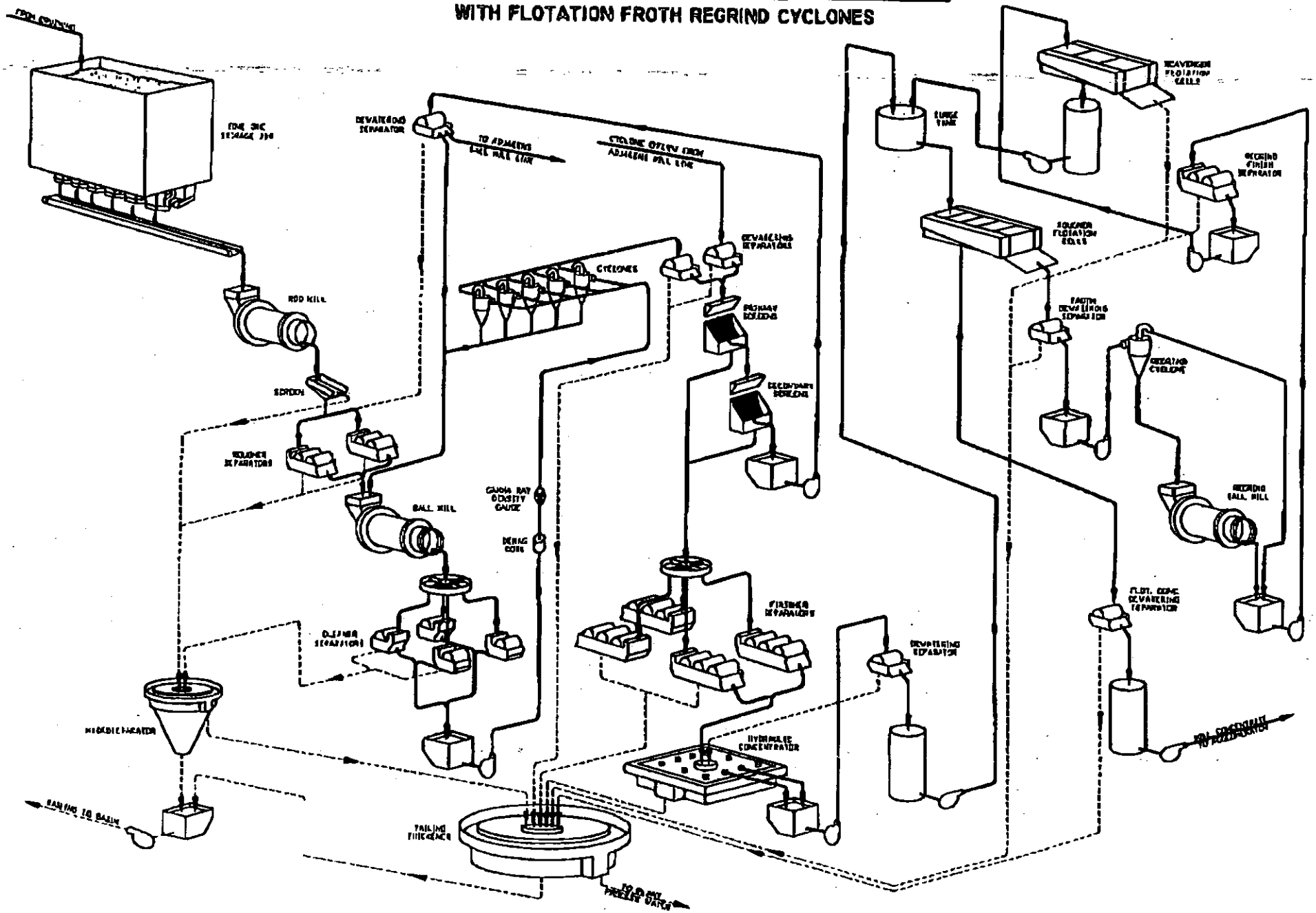
CRUSHING FLOWSHEET



LTV STEEL MINING COMPANY

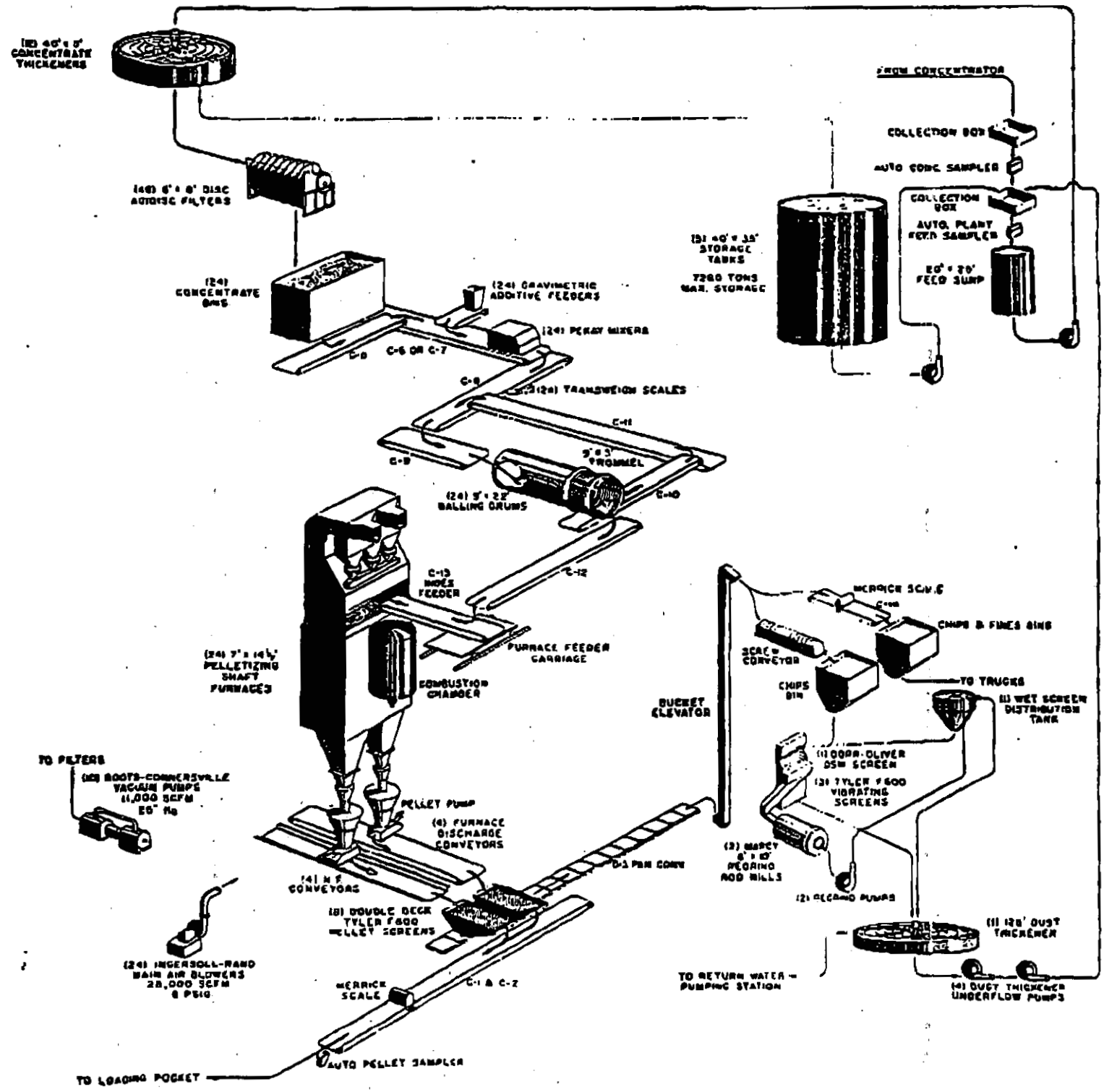
CONCENTRATOR FLOWSHEET

WITH FLOTATION FROTH REGRIND CYCLONES

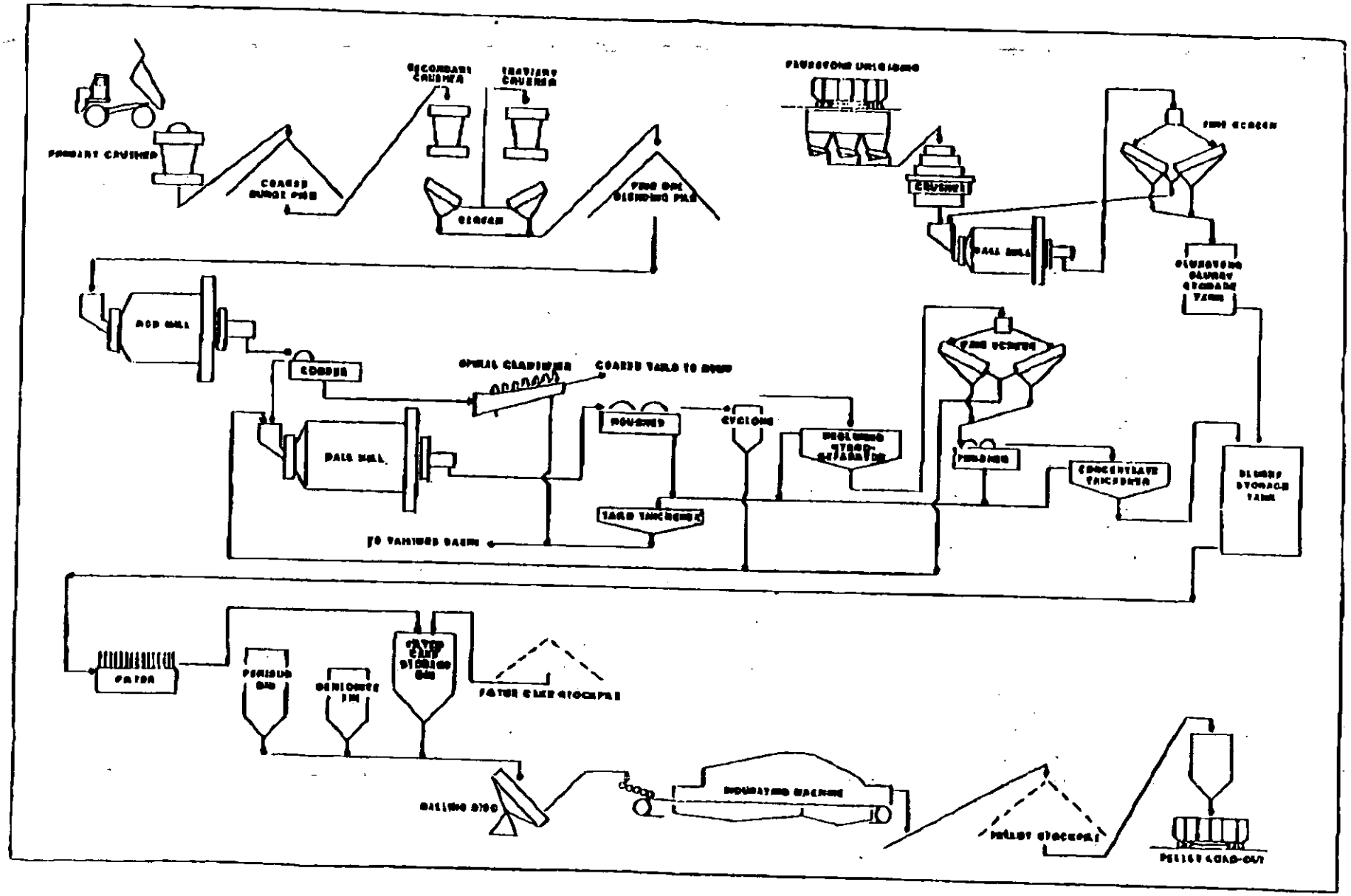


LTV STEEL MINING COMPANY

AGGLOMERATING FLOWSHEET



Inland Steel Mining Co
Minorca



Inland Steel Mining Co - Minorca

FLUXED PELLET CONFIGURATION
TRAVELING GRATE INDURATING FURNACE

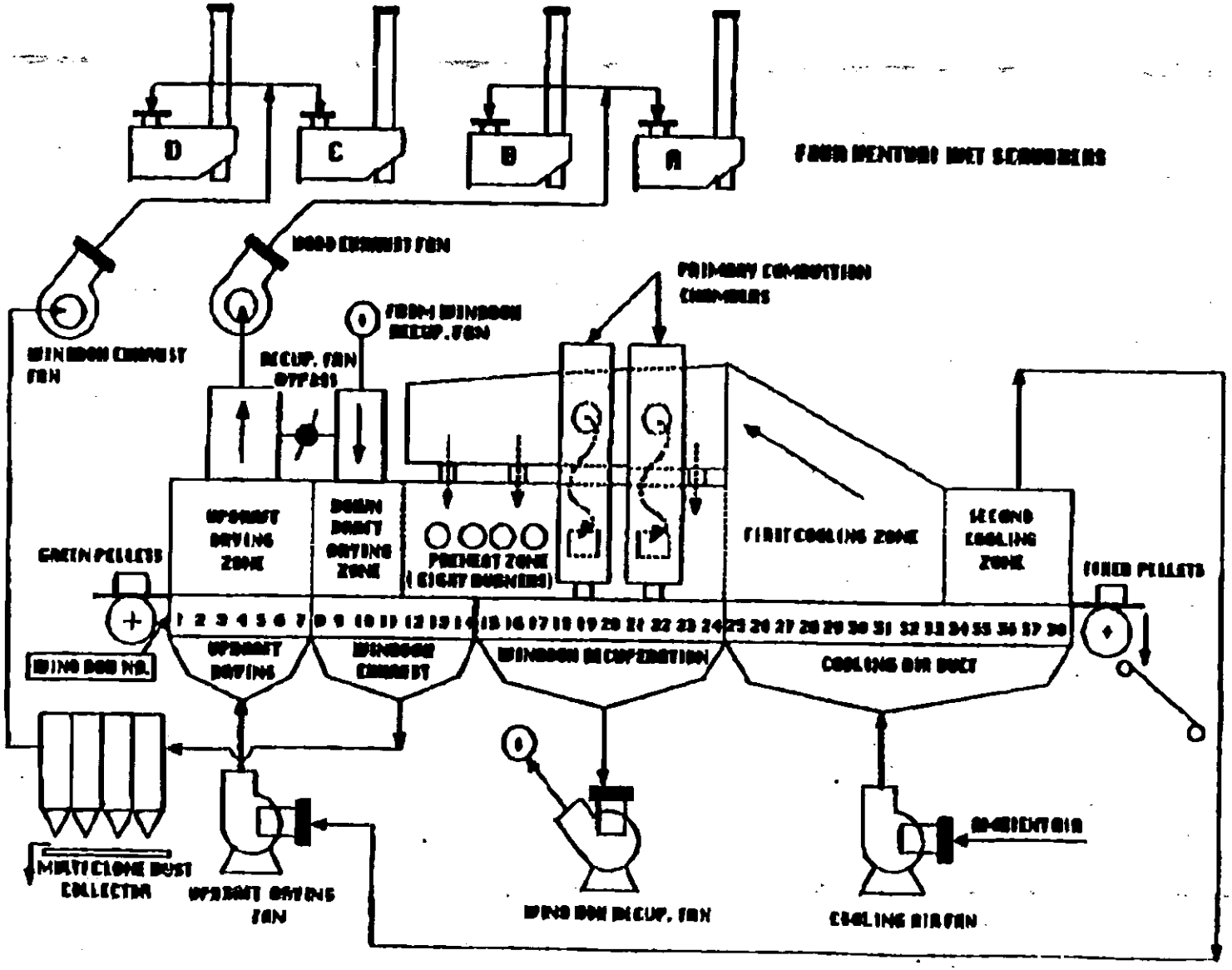
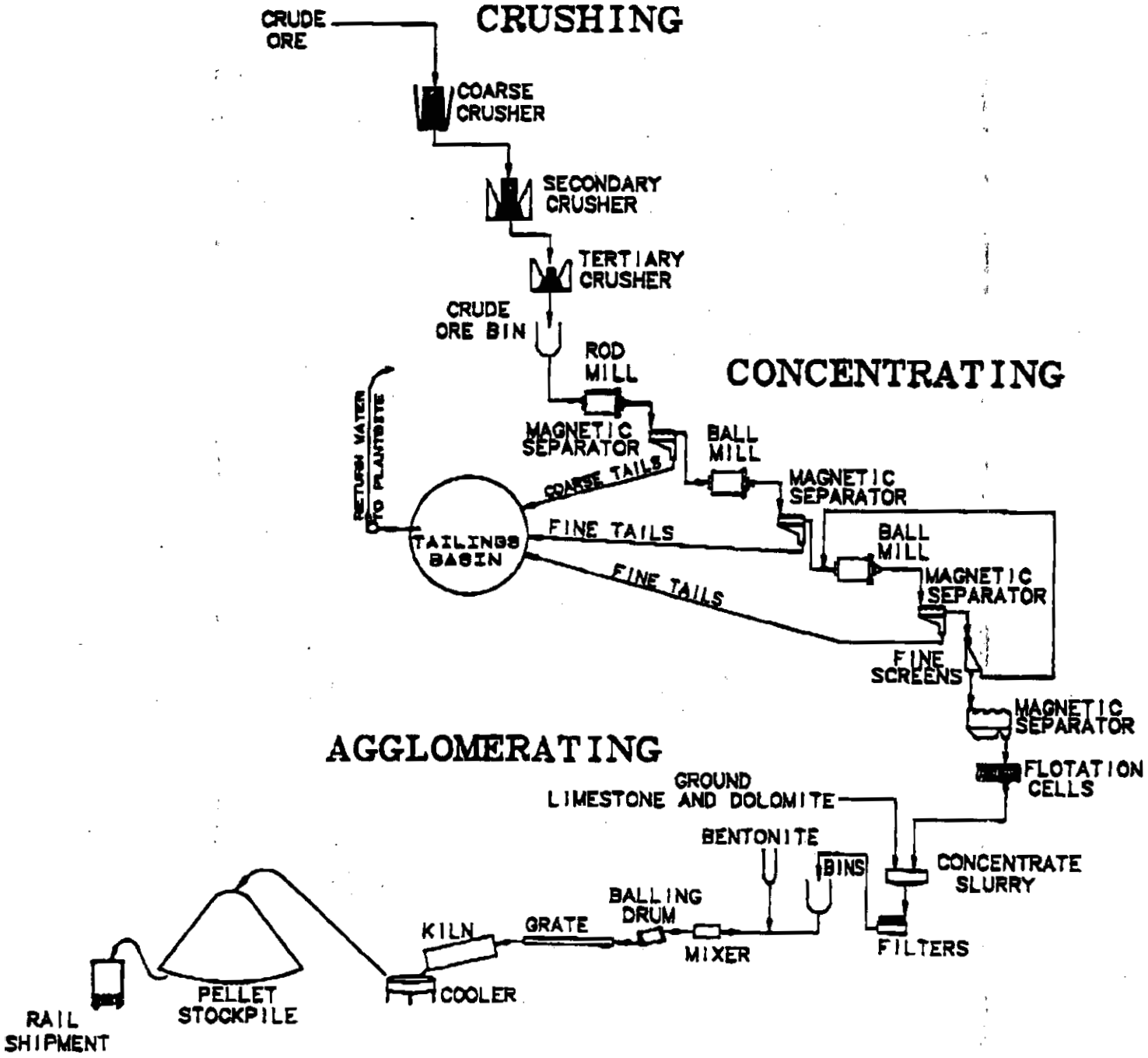


FIGURE 1-B

GENERALIZED MINNTAC FLOWSHEET

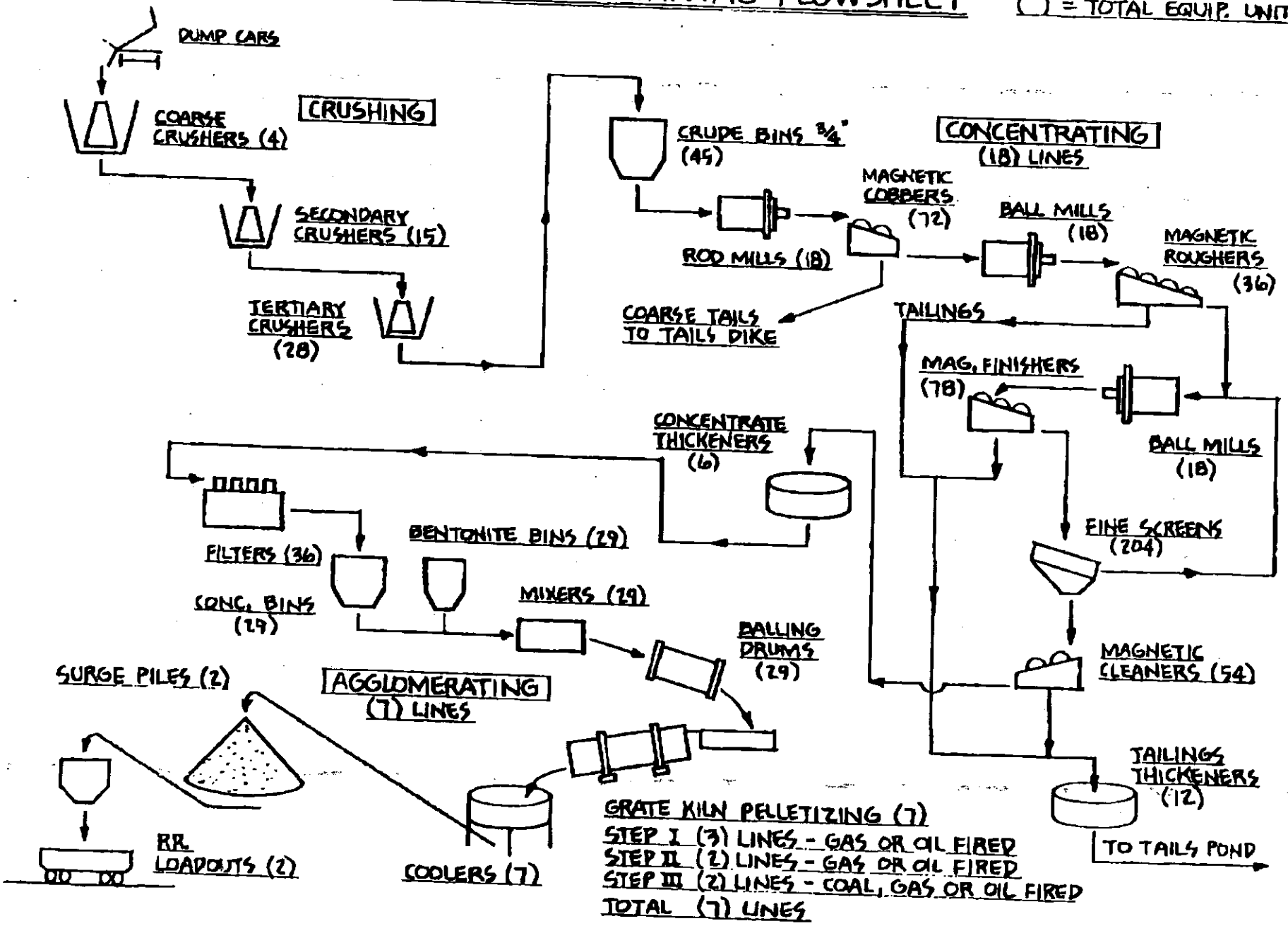


SK-103

MINNESOTA ORE OPERATIONS

GENERALIZED MINNTAC FLOWSHEET

( ) = TOTAL EQUIP. UNITS



U. S. Steel
Minnesota Ore Operations
P.O. Box 417
Mt. Iron, MN 55768

April 8, 1993

Mr. W. Gale Biggs
59 Benthaven Place
Boulder, Colorado 80303

RE: EPA, AP-42 Emission Factors
A10A Comment

Dear Mr. Biggs,

We are enclosing for reference in the subject Comment, recent stack test data as requested. You will note in reviewing these documents that some of the information was gathered for Engineering purposes and not formally submitted to he Agency. These tests were conducted for verification of performance on new systems recently installed or for permit application data. In the case of the Minntac Step II (Line 4 & 5) Venturi Scrubbers, the Engineering report reflects latest control technology with tests run in accordance with current compliance testing methods.

Reports enclosed as follows:

Number 9-2747 dated April 21, 1989
Number 0-2935 dated March 7, 1990
Number 0-694 dated February 8, 1980
Number 2-3503 dated March 11, 1992
Number 2-3526 dated April 23, 1992
Number 1-3380 dated August 15, 1991

Please call this office at 218/749-7485 with any questions you may have on the above.

Yours truly,

N. A. Brascugli
Manager-Technical Services

NAB/jem

cc J. F. Kaloski
W. S. Kubiak
J. H. Kingston

FAX TRANSMISSION

TO: J. Duncan Shorey
Oglebay Norton
Cleveland, OH

FROM: Richard Marinshaw
Midwest Research Institute
401 Harrison Oaks Boulevard, Suite 350
Cary, North Carolina 27513
(919) 677-0249, Ext. 5359

DATE: September 6, 1994

RECEIVING FAX NUMBER: 216-861-2863

SENDING FAX NUMBER: 919-677-0065

THIS FAX CONSISTS OF 3 PAGES (INCLUDING THIS PAGE)

As we discussed by telephone, Midwest Research Institute is currently revising the AP-42 section on taconite ore processing. I am sending you a table that summarizes the questions we have concerning the emission test reports provided by the American Iron Ore Association (AIOA) to U. S. Environmental Protection Agency on April 15, 1993 for this purpose. Please note that the table lists only those test reports with adequate data for developing emission factors. The AIOA provided several other test reports which we could not use because the reports did not specify process operating rates.

In addition to the questions noted on the following table, we would also like some general information on circular grate furnaces. In particular, how does this type differ from the straight grate or grate/kiln, and are circular grate furnaces currently in use in the industry?

I will contact you tomorrow at 9 AM to discuss this matter further.

Thank you for your cooperation on this effort.

Plant	Location	Source	Date	Ref.	Comments
Eveleth Taconite	Eveleth, MN	grate/kiln (Line 1)	11/75	1	
Empire Mining	Palmer, MN	grate/kiln	11/75	2	
Reserve Mining	Silver Bay, MN	fine crusher straight grate hood vent	6/74	3	
Hibbing Taconite	Hibbing, MN	straight grate (No. 2)	8/86	5	"Wind box and hood exhaust" tested. What processes included in the emissions stream?
Hibbing Taconite	Hibbing, MN	straight grate (No. 3)	5/85	6	"Wind box and hood exhaust" tested. What processes included in the emissions stream?
Hibbing Taconite	Hibbing, MN	crusher discharge crusher discharge crusher discharge crusher discharge	6/77	7	Crusher Feed Mills 2, 3, 5, and 6 tested. What processes included in the emissions stream? Primary crushing?
Hibbing Taconite	Hibbing, MN	hearth layer feeder straight grate (No. 2) straight grate (No. 3) straight grate (No. 1) discharge hearth layer screen bentonite bin product transfer point	8/77	8	What is hearth layer feeder? Identified as "machine discharge." Is it typical to duct separately? What is hearth layer screen?
Hibbing Taconite	Hibbing, MN	straight grate (No. 3) hearth layer feeder (No. 3) straight grate (No. 3) discharge mill feed	9/79	9	What is mill feed?
Cyprus Northshore Mining	Circle Pines, MN	crusher (No. 1)	4/90	10	"Primary dust collector" (multiclone) tested. How does it differ from the "secondary" dust collector (also a multiclone), which was also tested (Ref. 11). Primary crushing?
Cyprus Northshore Mining	Circle Pines, MN	crusher (No. 1)	4/90	11	"Secondary dust collector" tested.
Erie Mining	Hoyt Lakes, MN	vertical shaft (D-2)	5/84	12	What are the "mechanical collectors" tested?
Erie Mining	Hoyt Lakes, MN	vertical shaft (D-2)	12/81	13	Same question as above.
Erie Mining	Hoyt Lakes, MN	vertical shaft (D-1)	3/80	14	Same question as above.
Eveleth Taconite	Eveleth, MN	grate/kiln (Line 2)	12/87	15	
Eveleth Taconite	Eveleth, MN	pellet cooler	7/81	16	

Plant	Location	Source	Date	Ref.	Comments
Eveleth Taconite	Eveleth, MN	pellet cooler	4/80	17	Same cooler as Ref. 16?
Eveleth Taconite	Eveleth, MN	grate/kiln (Line 2)	1/80	18	
Eveleth Taconite	Eveleth, MN	grate/kiln (Line 2)	6/75	19	
USS Minnesota Ore	Mountain Iron, MN	grate/kiln (No. 4) grate/kiln (No. 5)	4/92	20	
USS Minnesota Ore	Mountain Iron, MN	crusher discharge crusher feed	3/92	21	Primary crusher?
Hibbing Taconite	Hibbing, MN	crusher	10/82	22	Primary crusher?
Erie Mining	Hoyt Lakes, MN	pellet screen loading pocket	7/80	23	What is a "loading pocket"?
Erie Mining	Hoyt Lakes, MN	vertical shaft (E-2) vertical shaft (E-2) vertical shaft (D-2) vertical shaft (D-2)	6/84	24	
USS Minnesota Ore	Mountain Iron, MN	grate/kiln (Step 3, Line 7)	8/91	25	Is this same source as for Ref. 20?
USS Minnesota Ore	Mountain Iron, MN	grate/kiln (Line 7)	3/90	26	Same source as Ref. 20 or 25?
USS Minnesota Ore	Mountain Iron, MN	grate/kiln (Line 6) grate/kiln (Line 7) pellet cooler (Line 6) primary crusher turn bin conveyor transfer	4/89	27	Same source as Ref. 20 or 25? Same source as Ref. 21? How does it differ from feed or discharge emissions? What is a "turn bin"?
USS Minnesota Ore	Mountain Iron, MN	conveyor transfer (No. 6.39) conveyor transfer (No. 6.34) conveyor transfer (No. 6.41) conveyor transfer (No. 6.56) conveyor transfer (No. 6.47) conveyor transfer (No. 6.49) secondary bin (No. 6.40) tertiary crusher (No. 44) tertiary bin (No. 43) grate feed (No. 43)	2/80	28	Need additional information on the locations of the conveyors relative to other processes. What is the "secondary bin"? What is the "tertiary bin"? What is "grate-feed end"?
Eveleth Taconite	Eveleth, MN	grate/kiln (Line 2)	6/87	29	
Inland Steel Mining	Virginia, MN	straight grate	8/86	30	
Hibbing Taconite	Hibbing, MN	straight grate (Line No. 1) straight grate (Line No. 2)	5/87	31	Is this a different kiln from those tested previously? Same as No. 2 in Refs. 5 and 8?

MIDWEST RESEARCH INSTITUTE
Suite 350
401 Harrison Oaks Blvd.
Cary, N.C. 27513
Telephone (919) 677-0249
Fax (919) 677-0065

FAX TRANSMISSION

TO: Stuart Arkley (612) 296-7774
FROM: Brian Shrager /Ext. 5224
TIME: 3:00
DATE: 4/4/95

THIS FAX CONSISTS OF 1 PAGES (INCLUDING THIS PAGE)
RECEIVING FAX NUMBER: (612) 297-7709

COMMENTS: Stuart,

This is a written request for the latest reports that we discussed earlier today. Again, these reports will be used to update the EPA document "AP-42". Our EPA work assignment manager in Mr. Ron Myers. His phone # is (919) 541-5407, if you need confirmation. My mailing address is shown above. Thanks

Brian

LIST OF TEST REPORTS INCLUDED IN AP-42 BACKGROUND SECTION FOR TACONITE ORE PROCESSING--CALL PLANTS TO FILL IN THE BLANKS

Ref. No.	Facility	Test date	Acid or flux pellets (include % flux if available)
✓ 1	Eveleth--Eveleth	11/75	Acid
✓ 2	Empire--Palmer	11/75	Acid
✓ 3	Reserve--Silver Bay	06/74	Acid
✓ 5	Hibbing--Hibbing	08/05/86	Acid
✓ 6	Hibbing--Hibbing	04/30/85	Flux
✓ 7	Hibbing--Hibbing	01/77	Acid
✓ 8	Hibbing--Hibbing	06,07/77	Acid
✓ 9	Hibbing--Hibbing	09/4-6/79	Acid
12	Erie--Hoyt Lakes	05/22-23/84	Acid
13	Erie--Hoyt Lakes	12/17/81	Acid
14	Erie--Hoyt Lakes	02/20/80	Acid
✓ 15	Eveleth--Eveleth	10/12-15/87	Acid
✓ 18	Eveleth--Near Eveleth	12/13-14/79	Acid
✓ 19	Eveleth--Fairlane	06/12/75	Acid
✓ 20	USS--Mountain Iron	03,04/92	Flux
✓ 21	USS--Mountain Iron	02/18-19/92	Irrelevant
24	Erie--Hoyt Lakes	06/12-15/84	Acid
✓ 25	USS--Mountain Iron	08/6/91	Flux
✓ 26	USS--Mountain Iron	01/25/90	Flux
✓ 27	USS--Mountain Iron	04/21/89	Flux
✓ 28	USS--Mountain Iron	01/08-10/80 acid	Began in 4/88
✓ 29	Eveleth--Eveleth	05/21-22/87	Acid
✓ 30	Inland--Virginia	08/06-08/86	Acid
✓ 31	Hibbing--Hibbing	05/05-07/87	Acid - alternate fuel

LTV

→ pg. E-1 fuel data PH-fuel means flux pellets

→ preheat burners

→ all gas used was used in preheat burners

Douglas C. Schrader
President - Iron Mining Assoc. of Minn.
325 South Lake St. Suite 609
Duluth, MN 55802
(218) 722-0566

Send Tac. Tbl
Steve Rogers
(218) 262-6823 (fax)

Iron Mining Association
C.B. ~~Chuck~~ Hoffman Env. Committee
Cleveland Cliffs, Inc.
Suite 811 200 West Superior St.
Duluth, MN 55802

CONTACT REPORT--MRI Project No. 4602-01

From: Brian Shrager, Environmental Engineering Department

Date of Contact: 03/06/95

Contacted by: Telephone

Company/Agency: Hibbing Taconite Company
P.O. Box 589
Hibbing, MN 55746

Telephone Number: (218) 262-6800

Person(s) Contacted/Title(s)
Mr. Steven Rogers, Senior Environmental Engineer

CONTACT SUMMARY:

Mr. Rogers was contacted to determine what type of taconite pellets were produced during several emission tests conducted at Hibbing in the 1980s. He stated that during the April 1985 test, flux pellets were produced, and acid pellets were produced during the 1986 and 1987 tests. He also requested that the draft AP-42 section be sent to Chuck Hoffman, Chairman of the environmental committee of the Iron Mining Association. Mr. Hoffman's phone number is (218) 722-0566, and his address is:

C.B. Hoffman
Cleveland Cliffs, Incorporated
Suite 811
200 West Superior Street
Duluth, MN 55802

Mr. Rogers also asked for copies of the emission factor tables from the current AP-42 section, which were faxed to him shortly after the phone conversation. Finally, Mr. Rogers stated that Hibbing currently produces only acid pellets.

CONTACT REPORT--MRI Project No. 4602-01

From: Brian Shrager, Environmental Engineering Department

Date of Contact: 03/06,07/95

Contacted by: Telephone

Company/Agency: Eveleth Mines
P.O. Box 180
Eveleth, MN 55734

Telephone Number: (218) 744-7804

Person(s) Contacted/Title(s)
Mr. David Johnson, Director, Environmental, Safety & Health

CONTACT SUMMARY:

Mr. Johnson was contacted to determine what type of taconite pellets were produced during two emission tests conducted at Eveleth in the 1980s. A voice mail message was left, and Mr. Johnson responded by voice mail that both tests (5/87 and 10/87) at Eveleth were conducted while acid pellets were being produced.

CONTACT REPORT--MRI Project No. 4602-01

From:	Brian Shrager, Environmental Engineering Department
Date of Contact:	03/06,07/95
Contacted by:	Telephone
Company/Agency:	U.S. Steel Minnesota Ore Operations P.O. Box 417 County Highway 102 Mount Iron, MN 55768
Telephone Number:	(218) 749-7569

Person(s) Contacted/Title(s)
Mr. Larry Salmela, Department Manager, Environmental Control

CONTACT SUMMARY:

Mr. Salmela was contacted to determine what type of taconite pellets were produced during several emission tests conducted at U.S. Steel in the 1980s and early 1990s. He stated that flux pellets were produced during all of the tests conducted after April of 1988. He also provided information on the number of facilities operating the various types of kilns. One facility (LTV) operates vertical kilns (approximately 24 kilns). Three facilities (Hibbing, Inland, and Northshore) operate straight grates. Five facilities (National Steel, U.S. Steel, Eveleth, Empire, and Tilden) operate grate/kilns (approximately 14 total grate/kilns in operation).

CONTACT REPORT--MRI Project No. 4602-01

From: Brian Shrager, Environmental Engineering Department

Date of Contact: 03/06,07/95

Contacted by: Telephone

Company/Agency: Inland Steel Mining Company
P.O. Box 1 (U.S. 53 North)
Virginia, MN 55792

Telephone Number: (218) 749-5910

Person(s) Contacted/Title(s)
Mr. Gus Josephson, Staff Engineer

CONTACT SUMMARY:

Mr. Josephson was contacted to determine what type of taconite pellets were produced during an emission test conducted at Inland in August of 1986. A voice mail message was left, and Mr. Josephson returned the call and stated that the test was conducted while acid pellets were being produced.

CONTACT REPORT--MRI Project No. 4602-01

From: Brian Shrager, Environmental Engineering Department

Date of Contact: 03/07/95

Contacted by: Telephone

Company/Agency: LTV Steel Mining Company
P.O. Box 847
Hoyt Lakes, MN 55750

Telephone Number: (218) 225-4219

Person(s) Contacted/Title(s)
Mr. Dennis Koschak, Area Manager, Technical Services

CONTACT SUMMARY:

Mr. Koschak was contacted to determine what type of taconite pellets were produced during four emission tests conducted at LTV (known as Erie at the time of testing) in the 1980s. Mr. Koschak stated that the tests were all conducted while acid pellets were being produced.

HIBBING TACONITE COMPANY

EMPLOYEE RELATIONS

PO BOX 589

HIBBING, MINNESOTA 55746

FAX COVER SHEET

(218) 262-6823

DATE: 3/6/95

TIME: 3:15 P.M.

TO: BRIAN SCHRAGER (9-919-677-0065)

FROM: STEVEN ROGERS

TOTAL PAGES INCLUDING THIS SHEET: 3

NOTES FYI

IF YOU DO NOT RECEIVE ALL OF THE PAGES INDICATED, PLEASE CALL US AT (218) 262-5923.

Minnesota Pollution Control Agency

February 24, 1995

Mr. Steve Rogers
Hibbing Taconite Company
P.O. Box 598
Hibbing, Minnesota 55746-0589

RE: Calculation of 1993 Emissions and Fee

Dear :Mr. Rogers:

Minnesota Pollution Control Agency (MPCA) staff has received telephone calls and letters of concern from the taconite industry on the emission factors that were used to determine their 1993 emissions and fee estimate. Emission factors from the (Draft) 5th edition AP-42 factors were originally used. After careful comparison of Fourth Edition and (Draft) Fifth Edition Emission Factors and the methods MPCA staff use to calculate emissions, MPCA staff will pursue the following course of action.

1. The (Draft) 5th edition AP-42 taconite emission factors will not be used for the estimation of 1993 emissions, because these factors are in draft form.

2. All taconite facilities 1993 emissions and resulting fees have been recalculated using 4th edition AP-42 factors. During recalculation special attention was given to ensure that the identical 4th edition AP-42 emission factors were applied to the same processes in different facilities. The only exception to using the AP-42 factors were emission estimation methods accepted under Minn. Rules pt. 7019.3010.

3. If and when the draft taconite section of AP-42 is finalized, each 5th edition emission factor will be reviewed on the basis of quality of the data and similarity to actual processes before the decision is made to use them in place of the 4th edition AP-42 emission factors.

4. All facilities in the state will have their 1994 emissions calculated using AP-42 emission factors, Minnesota emission factors, or emission estimation methods stated in Minn. Rules pt. 7019.3010.

C: CBH, SWH

520 Lafayette Rd. N.; St. Paul, MN 55155-4194; (612) 296-6300 (voice); (612) 282-5332 (TTY)
Regional Offices: Duluth • Brainerd • Detroit Lakes • Marshall • Rochester

MPCA staff is interested in pursuing development of State Factors where Federal Factors appear erroneous. We welcome your input on this process. If you have any questions please contact me at (612)296-7320.

Sincerely,

Paul Y. Kim
Emission Inventory Coordinator
Compliance and Enforcement Section
Air Quality Division

PYK:jmr

TABLE 8.22-1. PARTICULATE EMISSION FACTORS FOR TACONITE ORE PROCESSING, WITHOUT CONTROLS[a]

EMISSION FACTOR RATING: D

Source	Emissions[b] kg/Mg	Emissions[b] lb/ton
Ore transfer	0.05	0.10
Coarse crushing and screening	0.10	0.20
Fine crushing	39.9	79.8
Bentonite transfer	0.02	0.04
Bentonite blending	0.11	0.22
Grate feed	0.32	0.64
Indurating furnace waste gas	14.6	29.2
Grate discharge	0.66	1.32
Pellet handling	1.7	3.4

[a]Reference 1. Median values.
[b]Expressed as units per unit weight of pellets produced.

the balling section, since the iron ore concentrate is normally too wet to cause appreciable dusting. Additional emission points in the pelletizing process include the main waste gas stream from the indurating furnace, pellet handling, furnace transfer points (grate feed and discharge), and for plants using the grate/kiln furnace, annular coolers. In addition, tailings basins and unpaved roadways can be sources of fugitive emissions.

Fuel used to fire the indurating furnace generates low levels of sulfur dioxide emissions. For a natural gas fired furnace, these emissions are about 0.03 kilograms of SO_2 per megagram of pellets produced (0.06 lb/ton). Higher SO_2 emissions (about 0.06 to 0.07 kg/Mg, or 0.12 to 0.14 lb/ton) would result from an oil or coal fired furnace.

Particulate emissions from taconite ore processing plants are controlled by a variety of devices, including cyclones, multiclones, rotoclones, scrubbers, baghouses and electrostatic precipitators. Water sprays are also used to suppress dusting. Annular coolers are generally left uncontrolled because their mass loadings of particulates are small, typically less than 0.11 grams per normal cubic meter (0.05 gr/scf).

The largest source of particulate emissions in taconite ore mines is traffic on unpaved haul roads.[4] Table 8.22-4 presents size specific emission factors for this source determined through source testing at one taconite mine. Other significant particulate emission sources at taconite mines are wind erosion and blasting.[4]

As an al [illegible] for open dust sources given [illegible] ed emission

Faxed 3/6/95

Post-It™ brand fax transmittal memo 7671 | # of pages ▸ 4

To Steven Rogers	From Brian Shrager
Co. Hibbing	Co. MRI
Dept.	Phone #
Fax # (218) 262-6823	Fax #

Here are the four tables from the current 10/86 AP-42 section.

TABLE 8.22-2. CONTROL EFFICIENCIES FOR COMBINATIONS OF CONTROL DEVICES AND SOURCES[a]

Control	Coarse crushing	Ore transfer	Fine crushing	Bentonite transfer	Bentonite blending	Grate feed	Grate discharge	Waste gas	Pellet handling
Scrubber	95(10)f 91.6(4)f 99(2)m	99.5(18)f 99(5)f 97(4)m 99(1)m	99.5(5)f 99.6(6)f 97(10)m 97(19)e	98(1)f	98.7(1)f 99.3(1)f	98.7(2)f 98(1)m 99(5)e	99.3(2)f 99(5)e 98(1)e	98.5(1)e 89(1)e	99.3(2)f 99.7(1)f 99(2)f 97.5(1)e
Cyclone	85(1)f	95(2)e						95-98(56)f	
Multiclone	92(2)f 88(2)f							95-98(2)f	
Rotoclone	91.6(4)f	98(1)f	99.7(7)f 98.3(4)f						98(1)e
Bag collector	99(2)m 99.9(2)m 99(4)e 99.9(2)e			99(8)e	99(2)f 99.7(1)f				
Electrostatic precipitator								98.9(2)f 98.8(1)e	
Dry mechanical collector	85(1)f	85(1)f							
Centrifugal collector						88(1)f 98(1)e 99.4(1)e	88(1)f 99.4(1)e		

[a] Reference 1. Control efficiencies are expressed as percent reduction. Numbers in parentheses are the number of indicated combinations with the stated efficiency. The letters m, f, e denote whether the stated efficiencies were based upon manufacturer's rating (m), field testing (f), or estimations (e). Blanks indicate that no such combinations of source and control technology are known to exist, or that no data on the efficiency of the combination are available.

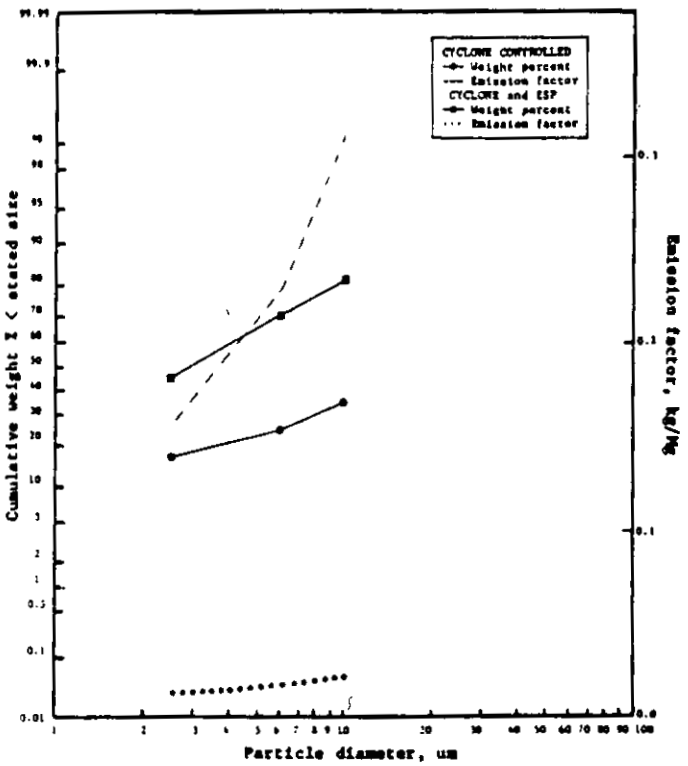


Figure 8.22-3. Particle size distributions and size specific emission factors for indurating furnace waste gas stream from taconite ore pelletizing.

TABLE 8.22-3. PARTICLE SIZE DISTRIBUTIONS AND SIZE SPECIFIC EMISSION FACTORS FOR CONTROLLED INDURATING FURNACE WASTE GAS STREAM FROM TACONITE ORE PELLETIZING[a]

SIZE-SPECIFIC EMISSION FACTOR RATING: D

Aerodynamic particle diameter, um	Particle size distribution[b]		Size specific emission factor, kg/Mg[c]	
	Cyclone controlled	Cyclone/ESP controlled	Cyclone controlled	Cyclone/ESP controlled
2.5	17.4	48.0	0.16	0.012
6.0	25.6	71.0	0.23	0.018
10.0	35.2	81.5	0.31	0.021

[a]Reference 3. ESP = electrostatic precipitator. After cyclone control, mass emission factor is 0.89 kg/Mg, and after cyclone/ESP control, 0.025 kg/Mg. Mass and size specific emission factors are calculated from data in Reference 3, and are expressed as kg particulate/Mg of pellets produced.
[b]Cumulative weight % < particle diameter.
[c]Size specific emission factor = mass emission factor x particle size distribution, %/100.

TABLE 8.22-4. UNCONTROLLED EMISSION FACTORS FOR HEAVY DUTY VEHICLE TRAFFIC ON HAUL ROADS AT TACONITE MINES[a]

Surface material	Emission factor by aerodynamic diameter (um)					Units	Emission Factor Rating
	≤30	≤15	≤10	≤5	≤2.5		
Crushed rock and glacial till	3.1	2.2	1.7	1.1	0.62	kg/VKT	C
	11.0	7.9	6.2	3.9	2.2	lb/VMT	C
Crushed taconite and waste	2.6	1.9	1.5	0.9	0.54	kg/VKT	D
	9.3	6.6	5.2	3.2	1.9	lb/VMT	D

[a]Reference 4. Predictive emission factor equations, which provide generally more accurate estimates, are in Chapter 11. VKT = vehicle kilometers travelled. VMT = vehicle miles travelled.

factor equations are presented in Chapter 11 of this document. Each equation has been developed for a source operation defined by a single dust generating mechanism, common to many industries, such as vehicle activity on unpaved roads. The predictive equation explains much of the observed variance in measured emission factors by relating emissions to parameters which characterize source conditions. These parameters may be grouped into three categories, 1) measures of source activity or energy expended, i. e., the speed and weight of a vehicle on an unpaved road; 2) properties of the material being disturbed, i. e., the content of suspendable fines in the surface material of an unpaved road; and 3) climatic parameters, such as the number of precipitation free days per year, when emissions tend to a maximum.

Because the predictive equations allow for emission factor adjustment to specific source conditions, such equations should be used in place of the single valued factors for open dust sources in Tables 8.22-1 and 8.22-4, whenever emission estimates are needed for sources in a specific taconite ore mine or processing facility. One should remember that the generally higher quality ratings assigned to these equations apply only if 1) reliable values of correction parameters have been determined for the specific sources of interest, and 2) the correction parameter values lie within the ranges tested in developing the equations. In the event that site specific values are not available, Chapter 11 lists measured properties of road surface and aggregate process materials found in taconite mining and processing facilities, and these can be used to estimate correction parameter values for the predictive emission factor equations. The use of mean correction parameter values from Chapter 11 reduces the quality ratings of the factor equations by one level.

AQ412-003

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Office of Air Quality Planning and Standards
Research Triangle Park, North Carolina 27711

DEC 02 94

Ms. Lisa J. Thorvig
Manager, Air Quality Division
Minnesota Air Pollution Control Agency
520 Lafayette Road
St. Paul, Minnesota 55155

Dear Ms. Thorvig:

The Emission Factor and Inventory Group of the U. S. Environmental Protection Agency (EPA) is in the process of updating the document *Compilation of Air Pollutant Emission Factors, Volume I: Stationary Point and Area Sources* (known more commonly as AP-42). As part of this process, we are now seeking comments on the draft sections that are to be included in the next update of AP-42.

Enclosed is a copy of the revised draft Section 11.23, Taconite Ore Processing, and the corresponding background report for the section. This section has been revised to incorporate the information provided to us by the American Iron Ore Association in April 1993. We would appreciate your organization reviewing the enclosed draft AP-42 section and background report and sending us your comments. In addition, please feel free to distribute copies of these documents to other interested persons. We would appreciate a response to this request by January 13, 1995.

The emission factors presented in AP-42 generally are based upon results from validated tests or other emission evaluations that are similar to EPA reference test methods. As a result, revisions to the emission factors presented in AP-42 must be supported by equivalent documentation. If you disagree with any emission factors presented in the enclosed AP-42 section or have additional supporting documentation, we would appreciate your providing either a copy of the documentation or information on how we can obtain copies of the supporting documentation. We would also appreciate specific comments on the process description, the process flow diagram, and the table of emission sources (Table 11.23-1) presented in the enclosed draft AP-42 section.

We look forward to receiving your comments. If you have questions or need additional time to respond, I can be reached by telephone at (919) 541-5407 or by fax at (919) 541-0684.

Sincerely,

Ronald E. Myers
Emission Factor and Inventory Group
Emissions, Monitoring, and
Analysis Division

2 Enclosures

FAX TRANSMISSION

TO: J. Duncan Shorey
Oglebay Norton
Cleveland, OH

FROM: Richard Marinshaw
Midwest Research Institute
401 Harrison Oaks Boulevard, Suite 350
Cary, North Carolina 27513
(919) 677-0249, Ext. 5359

DATE: September 7, 1994

RECEIVING FAX NUMBER: 216-861-2863

SENDING FAX NUMBER: 919-677-0065

THIS FAX CONSISTS OF 3 PAGES (INCLUDING THIS PAGE)

I made a few additions and changes to the table that I faxed you yesterday regarding the emission test reports provided by the American Iron Ore Association (AIOA) to EPA for the AP-42 revisions.

I will phone you at 9 AM this morning to discuss the table/reports.

Thanks again for your help.

Plant	Location	Source	Date	Ref.	Comments
Eveleth Taconite	Eveleth, MN	grate/kiln (Line 1)	11/75	1	
Empire Mining	Palmer, MN	grate/kiln	11/75	2	
Reserve Mining	Silver Bay, MN	fine crusher straight grate hood vent	6/74	3	Should the hood vent emissions be combined with the straight grate to give total furnace emissions?
Hibbing Taconite	Hibbing, MN	straight grate (No. 2)	8/86	5	"Wind box and hood exhaust" tested. What processes included in the emissions stream?
Hibbing Taconite	Hibbing, MN	straight grate (No. 3)	5/85	6	"Wind box and hood exhaust" tested. What processes included in the emissions stream?
Hibbing Taconite	Hibbing, MN	crusher discharge crusher discharge crusher discharge crusher discharge	6/77	7	Crusher Feed Mills 2, 3, 5, and 6 tested. What processes included in the emissions stream? Primary crushing?
Hibbing Taconite	Hibbing, MN	hearth layer feeder straight grate (No. 2) straight grate (No. 1) straight grate (No. 1) discharge hearth layer screen bentonite bin product transfer point	8/77	8	What is "hearth layer feeder"? Identified as "machine discharge." Is it typical to duct separately? What is "hearth layer screen"? Does "product" mean pellets?
Hibbing Taconite	Hibbing, MN	straight grate (No. 3) hearth layer feeder (No. 3) straight grate (No. 3) discharge mill feed	9/79	9	 What is "mill feed"?
Cyprus Northshore Mining	Circle Pines, MN	crusher (No. 1)	4/90	10	"Primary dust collector" (multiclone) tested. How does it differ from the "secondary" dust collector (also a multiclone), which was also tested (Ref. 11). Primary crushing?
Cyprus Northshore Mining	Circle Pines, MN	crusher (No. 1)	4/90	11	"Secondary dust collector" tested.
Erie Mining	Hoyt Lakes, MN	vertical shaft (D-2) vertical shaft (E-2)	5/84	12	What are the "mechanical collectors" tested?
Erie Mining	Hoyt Lakes, MN	vertical shaft (D-2)	12/81	13	Same question as above.
Erie Mining	Hoyt Lakes, MN	vertical shaft (D-1)	3/80	14	Same question as above.
Eveleth Taconite	Eveleth, MN	grate/kiln (Line 2)	12/87	15	
Eveleth Taconite	Eveleth, MN	pellet cooler	7/81	16	

Plant	Location	Source	Date	Ref.	Comments
Eveleth Taconite	Eveleth, MN	pellet cooler	4/80	17	Same cooler as Ref. 16?
Eveleth Taconite	Eveleth, MN	grate/kiln (Line 2)	1/80	18	
Eveleth Taconite	Eveleth, MN	grate/kiln (Line 2)	6/75	19	
USS Minnesota Ore	Mountain Iron, MN	grate/kiln (No. 4) grate/kiln (No. 5)	4/92	20	
USS Minnesota Ore	Mountain Iron, MN	crusher discharge crusher feed	3/92	21	Primary crusher? Does the combination of these two represent total crusher emissions?
Hibbing Taconite	Hibbing, MN	crusher	10/82	22	Primary crusher? Same as Ref. 7?
Erie Mining	Hoyt Lakes, MN	pellet screen loading pocket	7/80	23	What is a "loading pocket"?
Erie Mining	Hoyt Lakes, MN	vertical shaft (E-2) vertical shaft (E-2) vertical shaft (D-2) vertical shaft (D-2)	6/84	24	
USS Minnesota Ore	Mountain Iron, MN	grate/kiln (Step 3, Line 7)	8/91	25	
USS Minnesota Ore	Mountain Iron, MN	grate/kiln (Line 7)	3/90	26	Same source as Ref. 25?
USS Minnesota Ore	Mountain Iron, MN	grate/kiln (Line 6) grate/kiln (Line 7) pellet cooler (Line 6) primary crusher turn bin conveyor transfer	4/89	27	 Same source as Ref. 20 or 25? Same source as Ref. 21? How does it differ from feed or discharge emissions? What is a "turn bin"?
USS Minnesota Ore	Mountain Iron, MN	conveyor transfer (No. 6.39) conveyor transfer (No. 6.34) conveyor transfer (No. 6.41) conveyor transfer (No. 6.56) conveyor transfer (No. 6.47) conveyor transfer (No. 6.49) secondary bin (No. 6.40) tertiary crusher (No. 44) tertiary bin (No. 43) grate-feed end (No. 43)	2/80	28	Need additional information on the locations of these conveyors relative to other processes. What is the "secondary bin"? What is the "tertiary bin"? What is "grate-feed end"?
Eveleth Taconite	Eveleth, MN	grate/kiln (Line 2)	6/87	29	
Inland Steel Mining	Virginia, MN	straight grate	8/86	30	
Hibbing Taconite	Hibbing, MN	straight grate (Line No. 1) straight grate (Line No. 2)	5/87	31	Is this a different kiln from those tested previously? Same as No. 2 in Refs. 5 and 8?

LTV Steel Mining Company
CLIFFS MINING COMPANY, MANAGER

RAY W. VON BITTER
GENERAL MANAGER

Direct (218) 225-4222
FAX (218) 225-4230

April 7, 1993

Mr. W. Gale Biggs
W. Gale Biggs Associates
P O Box 3344
Boulder, Colorado 80307

Reference: American Iron Ore Association AP42 Position Paper
LTV Steel Mining Company

Dear Mr. Biggs:

Please find attached copies of reports concerning emissions at LTV Steel Mining Company's taconite processing plant. These emission reports are categorized so that the data can be applied appropriately in an amended AP.42 relative to the vertical shaft furnace.

Vertical Shaft Furnace - Mechanical Collector

- "Results of the June 12, 13, 14 and 15, 1984 Dust Collection Efficiency Tests on the D-2 and E-2 Furnace Top Gas Mechanical Collectors."

- "Results of the December 17, 1981, Compliance Test on the D-2 Furnace Dust Control System."

- "Results of the May 22 and 23, 1984, Dust collection Efficiency Tests on the D-2 and E-2 Furnace Top Gas Mechanical Collectors."

Vertical Shaft Furnace - West Collector

- "Results of the February 20, 1980, Particulate Emission Test on the D-1 Furnace Top Gas Wet Collector."

Pellet Handling Conveyor Discharge Point

- "Results of the June 25 and 26, 1980 Particulate Emission Compliance Tests on the No. 2 Loading Pocket Collector and the No. 7 and 8 Pellet Screen Collector."

These attachments should satisfy your request for information as authorized by Cleveland Cliffs through the American Iron Ore Association's effort to ammend EPA AP-42.

Sincerely,

LTV STEEL MINING COMPANY

Dennis Koschak for

R. W. von Bitter

RWvB:a
Attach.
C:\DOC\DFK52
cc: R. M. Tuthill w/o attach.
P. D. Brick w/o attach.
C. B. Hoffman w/o attach.
D. F. Koschak w/o attach.

Hibbing Taconite Company
P.O. Box 589
Hibbing, Minnesota 55746

FAX TRANSMITTAL COVER PAGE
fax number (218) 262-6879

DATE: 5-23-95

TO: BRIAN SHRAGER

COMPANY: MRI

FAX NUMBER: (919) 677-0065

FROM: SCOTT HAUTALA

SUBJECT: TSP/PM-10 EMISSION FACTORS

NUMBER OF PAGES INCLUDING COVER SHEET: 2

If all pages are not received please notify:

NAME: SCOTT

AT PHONE NUMBER (218) 262- 6856

Scott Hautala
Env. Coord. - Aggl
Hibbing Taconite Company
P.O. Box 589
Hibbing, MN 55746
(218) 262-6856 fax (218) 262-6879

May 23, 1995

Mr. Brian Shrager
Midwest Research Inc.
fax (919) 677-0065

SUBJECT: TSP / PM-10 AP-42 Emission Factors for Taconite Ore Processing - Induration Processes

Dear Mr. Shrager:

Previously you talked with Mr. Steven Rogers about the stack testing that was performed in 1994 on the furnaces. You also sent him the current AP-42 tables on emission factors from Section 8.22. I have your fax number from a copy of these Tables. I assisted Mr. Steve Rogers in submitting our Title V application and our Air Emissions Inventory.

Upon filling out this year's annual air emissions inventory, the MPCA and Hibbing Taconite Company (HTC) had several unresolved issues. One issue is the AP-42 emission factor for TSP / PM-10 for the Indurating Furnace. I was hoping that you could answer a couple of questions for me.

- First, there are three main types of furnaces for indurating pellets: straight grate, grate/kiln, and vertical shaft. Do you know what process(es) the emission factors are based from? I cannot find this information in the Documentation Section. I cannot find information that a straight grate furnace was tested. Airflows and TSP/PM-10 generation vary depending on the type of furnace.

- Second, what are the units of "tons pellets produced"? According to normal operating practice, the actual unit is in Long Tons. However, the MPCA requires us to convert our production into Short Tons on the Air Emissions Inventory. Is the AP-42 emission factor of 29.2 #/ton Short, Long, or Metric Tons?

- Lastly, The straight grate indurating furnace has different zones where different amounts of PM-10/TSP are generated. Part of the waste gas is pretreated with a multiclone before entering the venturi scrubbers. Based on the 1994 stack tests, HTC shows an even distribution of TSP across the stacks. Because of high stack moistures and temperatures, PM-10 testing cannot be performed directly. However, using the AP-42 emission factor gives the MPCA the right to say that there is more TSP/PM-10 emitting from one section than the other. Using the AP-42 emission factor, if in fact valid for this process, is there any way to model the straight grate furnace to more accurately represent actual stack emissions?

Please call with your phone number and address to further discuss these issues. Thank you.

\mripm10a

Table 4-1. Average Concentration of Target Metals in the Emissions of an Uncontrolled Fine Crusher (Ref. 4)

Metal	Concentration (ug/g of PM)
arsenic	92
cadmium	23
cobalt	808
chromium (total)	618
copper	1,821
molybdenum	216
lead	634
nickel	775
vanadium	6,130
zinc	2,383

Missing
Table 2-1.
Same as Table 8.22-1.

Table 4-2. Summary of Test Data for New Emission Factors for Taconite Ore Processing

Source	Control	Pollutant	No. of Runs	EF Range (a) kg/Mg (lb/ton)	EF Average (a) kg/Mg (lb/ton)	Data Rating	Ref. No.
Grate/kiln (natural gas)	none (b)	SO2	2	0.042-0.047 (0.084-0.093)	0.045 (0.089)	B	1
Grate/kiln (natural gas)	venturi scrubber	SO2	3	0.0005-0.068 (0.001-0.135)	0.027 (0.053)	B	1
Grate/kiln	none (c)	CO2	3	52-59 (104-117)	55 (109)	A	2
Fine crushing	rotoclone	asbestos	1	4.0E-05 (7.9E-05)	4.0E-05 (7.9E-05)	B	3
Straight gate	none (d)	asbestos	1	1.3E-03 (2.6E-03)	1.3E-03 (2.6E-03)	B	3
Straight gate Dry hood exhaust	none (d)	asbestos	1	4.9E-04 (9.7E-04)	4.9E-04 (9.7E-04)	B	3

(a) Mass emitted per mass of pellets produced.
(b) Gas stream passes through cyclones for material recovery between preheating and drying.
(c) Sample taken at outlet of dropout box.
(d) Emissions may have been reduced by a roll screen designed to remove fines from the green pellet feed.

Table 4-3. Summary of New Emission Factors Developed for Taconite Ore Processing

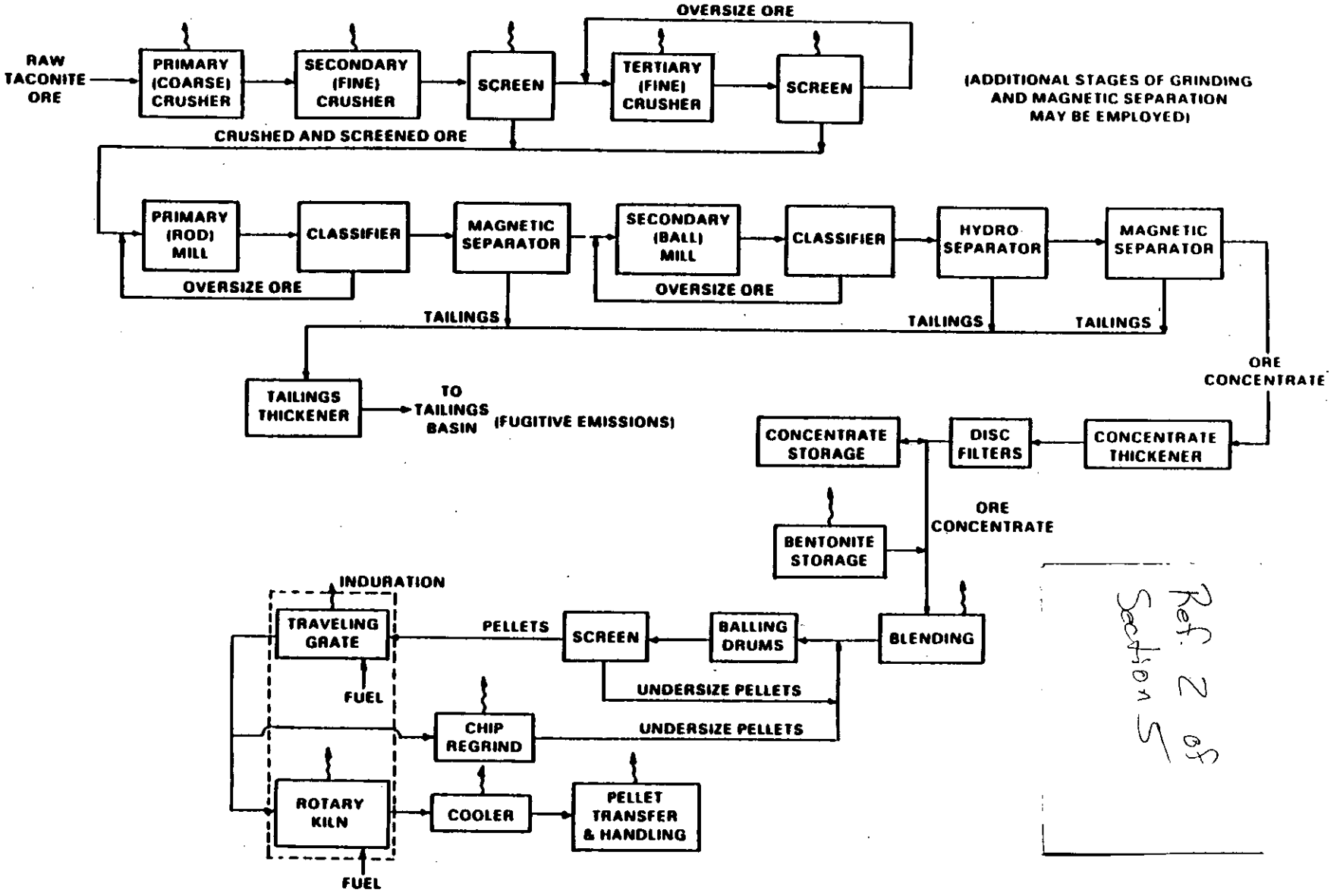
Source	Control	Pollutant	No. of Tests	Average EF (a) kg/Mg (lb/ton)	EF Rating	Reference No.
Grate/kiln (natural gas)	none (b)	SO2	1	0.045 (0.089)	D	1
Grate/kiln (natural gas)	venturi scrubber	SO2	1	0.027 (0.053)	D	1
Grate/kiln	none (c)	CO2	1	55 (109)	D	2
Fine crushing	rotoclone	asbestos	1	4.0E-05 (7.9E-05)	E	3
Straight gate	none (d)	asbestos	1	1.3E-03 (2.6E-03)	E	3
Straight gate Dry hood exhaust	none (d)	asbestos	1	4.9E-04 (9.7E-04)	E	3

(a) Mass emitted per mass of pellets produced.
(b) Gas stream passes through cyclones for material recovery between preheating and drying.
(c) Sample taken at outlet of dropout box.
(d) Emissions may have been reduced by a roll screen designed to remove fines from the green pellet feed.

TABLE 8.22-1. NUMBER AND PRODUCTION RATE OF TACONITE MINES BY STATE.[1]

State	Number of mines	Number of pellet plants	Crude ore produced[a]	Usable ore produced[a]
Minnesota	7	7	140,000	41,000
Michigan	2	3	45,000	16,000
Missouri	1	0	1,600	1,000
Other	11	0	1,100	1,000
Total	21	10	187,700	59,000

[a]Thousand megagrams tons per year in 1989.



Ref. 2 of Section 5

Figure 2-1. Taconite ore processing plant. (Process emissions are indicated by ⟩.)

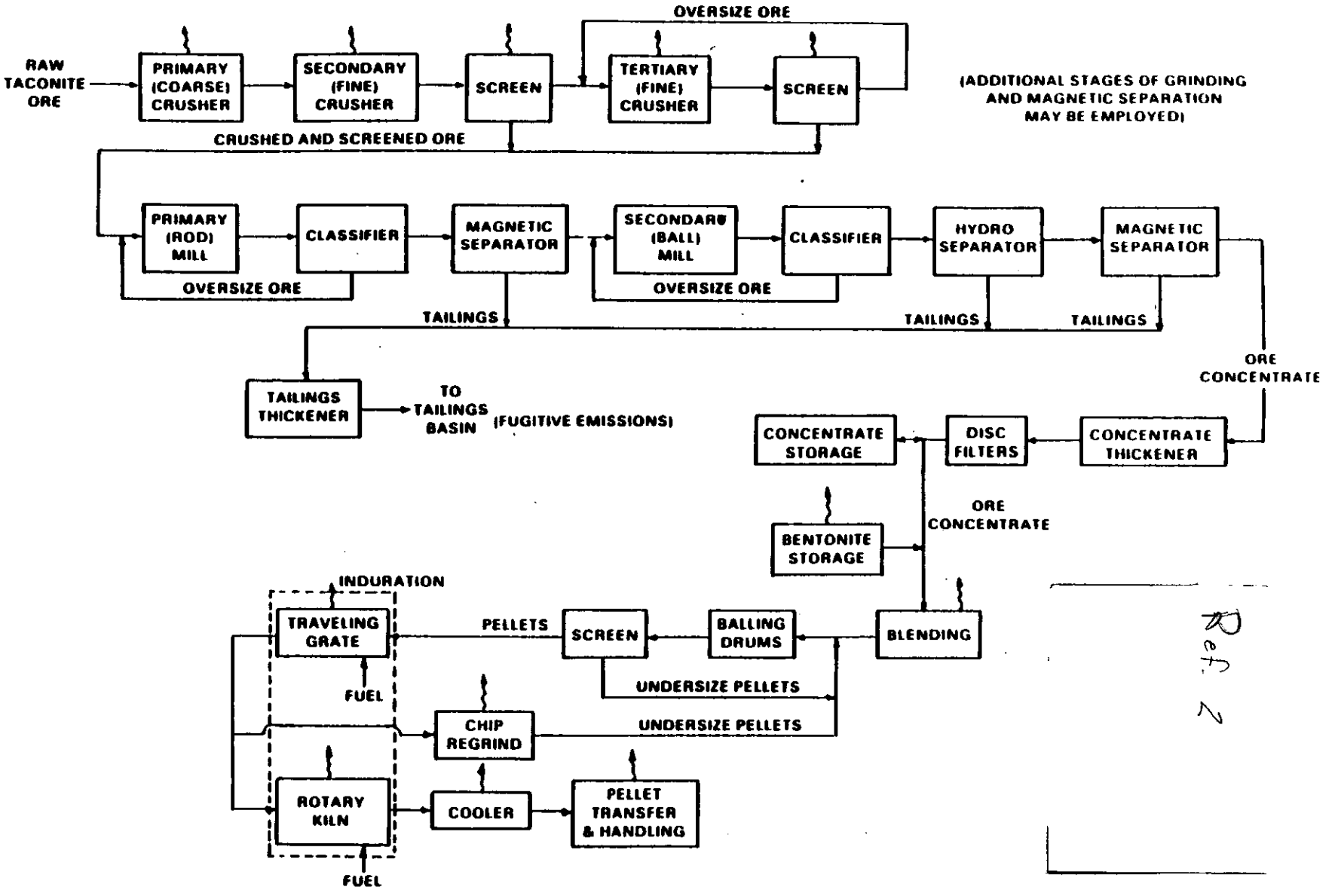


Figure 8.22-1. Taconite ore processing plant. (Process emissions are indicated by ≀ .)

TABLE 8.22-2. (METRIC UNITS)
EMISSION FACTORS FOR PARTICULATE MATTER FROM
TACONITE ORE PROCESSING (a)

All Emission Factors in kg/Mg of Pellets Produced
Ratings (A-E) Follow Each Factor

Source (SCC)	Filterable (b)				Condensible (c)			
	PM		PM-10		Inorganic		Organic	
Coarse crushing and screening (30302301)	0.10	D	(d)		(d)		(d)	
Fine crushing (30302302)	39.9	D	(d)		(d)		(d)	
Ore transfer (30302304)	0.05	D	(d)		(d)		(d)	
Bentonite transfer (30302307)	0.02	D	(d)		(d)		(d)	
Bentonite blending (30302308)	0.11	D	(d)		(d)		(d)	
Grate feed (30302309)	0.32	D	(d)		(d)		(d)	
Grate discharge (30302310)	0.66	D	(d)		(d)		(d)	
Indurating furnace waste gas (30302312-14)	14.6	D	(d)		(d)		(d)	
Pellet handling (30302316)	1.7	D	(d)		(d)		(d)	

(a) Reference 2. Emission factors represent uncontrolled emissions unless otherwise noted.
(b) Filterable PM is that particulate collected on or prior to the filter of an EPA Method 5 (or equivelant) sampling train. PM-10 values exclude that particulate collected in the PM-10 Sizer Cyclone of an EPA Mehtod 201 or 201A sampling train.
(c) Condensible PM is that particulate collected in the impinger portion of a particulate sampli train and analyzed by EPA method 202.
(d) No data available.

TABLE 8.22-2. (ENGLISH UNITS)
EMISSION FACTORS FOR PARTICULATE MATTER FROM
TACONITE ORE PROCESSING (a)

All Emission Factors in lb/ton of Pellets Produced
Ratings (A-E) Follow Each Factor

Source (SCC)	Filterable (b)				Condensible (c)			
	PM		PM-10		Inorganic		Organic	
Coarse crushing and screening (30302301)	0.20	D	(d)		(d)		(d)	
Fine crushing (30302302)	79.8	D	(d)		(d)		(d)	
Ore transfer (30302304)	0.10	D	(d)		(d)		(d)	
Bentonite transfer (30302307)	0.04	D	(d)		(d)		(d)	
Bentonite blending (30302308)	0.22	D	(d)		(d)		(d)	
Grate feed (30302309)	0.64	D	(d)		(d)		(d)	
Grate discharge (30302310)	1.32	D	(d)		(d)		(d)	
Indurating furnace waste gas (30302312-14)	29.2	D	(d)		(d)		(d)	
Pellet handling (30302316)	3.4	D	(d)		(d)		(d)	

(a) Reference 2. Emission factors represent uncontrolled emissions unless otherwise noted.
(b) Filterable PM is that particulate collected on or prior to the filter of an EPA Method 5 (or equivelant) sampling train. PM-10 values exclude that particulate collected in the PM-10 Sizer Cyclone of an EPA Mehtod 201 or 201A sampling train.
(c) Condensible PM is that particulate collected in the impinger portion of a particulate sampli train and analyzed by EPA method 202.
(d) No data available.

TABLE 8.22-3. AVERAGE CONCENTRATION OF TESTED METALS IN THE EMISSIONS OF AN UNCONTROLLED FINE CRUSHER (a)

Metal	Concentration (ug/g)
arsenic	92
cadmium	23
cobalt	808
total chromium	618
copper	1821
molybdenum	216
lead	634
nickel	775
vanadium	6130
zinc	2383

(a) Reference 2.

TABLE 8.22-4. (METRIC UNITS)
TACONITE ORE PROCESSING (a)

All Emission Factors in kg/Mg of Pellets Produced
Ratings (A-E) Follow Each Factor

Source (SCC)	SO2		CO2		Asbestos (b)	
Indurating furnace waste gas (30302312)	0.045	D	(c)		(c)	
Indurating furnace waste gas after venturi srcubber	0.027	D	(c)		(c)	
Indurating furnace waste gas (30302312)	(c)		55	D	(c)	
Fine crushing (2 cone crushers and screens) (30302302)	(c)		(c)		4.0E-05	E
Indurating furnace waste gas (30302312)	(c)		(c)		1.3E-03	E
Straight gate dryer hood exhaust	(c)		(c)		4.9E-04	E

(a) References 4, 5, and 6. Emission factors represent uncontrolled emissions unless otherwise noted.
(b) Asbestos emissions result from asbestos fibers present in some raw taconite ores.
(c) No data available.

TABLE 8.22-4. (ENGLISH UNITS)
TACONITE ORE PROCESSING (a)

All Emission Factors in lb/ton of Pellets Produced
Ratings (A-E) Follow Each Factor

Source (SCC)	SO2		CO2		Asbestos (b)	
Indurating furnace waste gas (30302312)	0.089	D	(c)		(c)	
Indurating furnace waste gas after venturi srcubber	0.053	D	(c)		(c)	
Indurating furnace waste gas (30302312)	(c)		109	D	(c)	
Fine crushing (2 cone crushers and screens) (30302302)	(c)		(c)		7.9E-05	E
Indurating furnace waste gas (30302312)	(c)		(c)		2.6E-03	E
Straight gate dryer hood exhaust	(c)		(c)		9.7E-04	E

(a) References 4, 5, and 6. Emission factors represent uncontrolled emissions unless otherwise noted.
(b) Asbestos emissions result from asbestos fibers present in some raw taconite ores.
(c) No data available.

TABLE 8.22-5. SUMMARY OF SIZE-SPECIFIC EMISSION FACTORS FOR PARTICULATE EMISSIONS FROM CONTROLLED INDURATING FURNACE WASTE GAS (a)

EMISSION FACTOR RATING: D

Aerodynamic diameter, um	Cyclone controlled			Cyclone/ESP controlled		
	Cumulative % less than diameter	Emission factor		Cumulative % less than diameter	Emission factor	
		kg/Mg	lb/ton		kg/Mg	lb/ton
2.5	17.4	0.16	0.32	48.0	0.012	0.024
6.0	25.6	0.23	0.46	71.0	0.018	0.036
10.0	35.2	0.31	0.62	81.5	0.021	0.042

(a) Reference 4. ESP = electrostatic precipitator. After cyclone control, mass emission factor is 0.89 kg/Mg, and after cyclone/ESP control, 0.025 kg/Mg. Emission factors are expressed as kg/Mg of pellets produced.

TABLE 8.22-6. EMISSION FACTORS FOR UNCONTROLLED PARTICULATE EMISSIONS FROM HEAVY DUTY VEHICLE TRAFFIC ON HAUL ROADS AT TACONITE MINES (a)

Aerodynamic diameter, um	Crushed rock and glacial till		Crushed taconite and waste	
	kg/VKT	lb/VMT	kg/VKT	lb/VMT
2.5	0.62	2.2	0.54	1.9
5.0	1.1	3.9	0.90	3.2
10.0	1.7	6.2	1.5	5.2
15.0	2.2	7.9	1.9	6.6
30.0	3.1	11	2.6	9.3
Emission factor rating:	C	C	D	D

(a) Reference 5. VKT = vehicle kilometers travelled. VMT = vehicle miles travelled. Predictive emission factor equations, which provide generally more accurate estimates, are in Chapter 11.