

July 19, 2002

Mr. James Alexander
US Steel - Gary Works
One North Broadway
Gary, IN 46402-3199

Re: 089-14988-00121
First Significant Modification to
CP 089-8606-00121

Dear Mr. Alexander:

US Steel - Gary Works was issued a permit on July 10, 1998 authorizing the construction of one (1) plate mill heat treatment furnace with maximum heat input capacity of 56.5 MMBtu/hr. A letter requesting changes to this permit was received on October 29, 2001. Pursuant to the provisions of IC 13-15-7-1 a significant modification to this permit is hereby approved as described in the attached Technical Support Document.

The permit is hereby modified as follows:

(1)

Emission Offset Minor Source Limit

7. That the input natural gas to the heat treatment furnace shall be limited to 279.2 million cubic feet per year, rolled on a daily basis. This production limitation is equivalent to NOx emissions of 25.1 tons per 365-day period, rolled on a daily basis. The input natural gas to the annealing furnaces shall be limited to 3.1 million cubic feet per month. This production limitation is equivalent to NOx emissions of 0.22 tons per month. Therefore, the Emission Offset rules, 326 IAC 2-3, will not apply.

The following table shows the VOC emissions increases due to modifications at Gary Works during the five-year period prior to and including 2001 (i.e. 1997 through 2001).

Modification Projects	VOC Emissions Increase (tons/year)
160/210-inch Plate Mill Heat Treatment Furnace	0.42
Existing Hydrogen Atmosphere Batch Annealing Furnace	0.048
Levy Plant Modification	0.17
RTO Sludge Dryers	0.02
Oil Reclamation Plant Modification	0.17

U.S. Aggregates Slag Processing Facility	0.01
Repermit Boiler No. 4 A	0.36
Sinter Plant Burners/Coke Oven Battery Injection Jets	0.75
EGL Boiler Modifications	0.072
84-Inch HSM Reheat Furnaces COG Redistribution Project	2.74
Total VOC Emissions Increase	4.76

VOC emissions increases over the past 5 years are less than the de minimis levels of 25 tons per year for VOC, therefore, 326 IAC 2-3 (Emission Offset) does not apply.

(2)

The monthly report for the NOx emissions from the plate mill heat treatment furnace was changed to reflect the above mentioned changes.

All other conditions of the permit shall remain unchanged and in effect. Please attach a copy of this modification and the following revised permit pages to the front of the original permit.

This decision is subject to the Indiana Administrative Orders and Procedures Act - IC 4-21.5-3-5. If you have any questions on this matter, please contact Ghassan Shalabi, OAQ, 100 North Senate Avenue, P.O. Box 6015, Indianapolis, Indiana, 46206-6015, or call at (800) 451-6027, press 0 and ask for Ghassan Shalabi or extension (3-0431), or dial (317) 233-0431.

Sincerely,
Original signed by Paul Dubenetzky

Paul Dubenetzky, Chief
Permits Branch
Office of Air Quality

Attachments

GAS

cc: File - Lake County
U.S. EPA, Region V
Lake County Health Department
City of Gary Division of Air Control
Northwest Regional Office
Air Compliance Section Inspector - Ramesh Tejula
Compliance Data Section - Karen Nowak
Administrative and Development - Lisa Lawrence
Technical Support and Modeling - Michele Boner

**CONSTRUCTION PERMIT
OFFICE OF AIR MANAGEMENT**

**U.S. Steel - Gary Works
One North Broadway
Gary, Indiana 46402**

is hereby authorized to construct

- (a) hydrogen atmosphere batch annealing furnaces including seven fixed burner bases and five movable heating hoods, with a total heat input capacity of 10.26 million British Thermal Units per hour;
- (b) one (1) plate mill heat treatment furnace with a maximum heat input capacity of 56.5 million British Thermal Units per hour.

This permit is issued to the above mentioned company (herein known as the Permittee) under the provisions of 326 IAC 2-1 and 40 CFR 52.780, with conditions listed on the attached pages.

Construction Permit No.: CP-089-8606-00121	
Original Issued by: Paul Dubenetzky, Branch Chief Office of Air Management	Issuance Date: October 20, 1997

First Significant Modification: 089-14988-00121	
Issued by: Original signed by Paul Dubenetzky Paul Dubenetzky, Branch Chief Office of Air Management	Issuance Date: July 19, 2002

Construction Conditions

General Construction Conditions

1. That the data and information supplied with the application shall be considered part of this permit. Prior to any proposed change in construction which may affect allowable emissions, the change must be approved by the Office of Air Management (OAM).
2. That this permit to construct does not relieve the permittee of the responsibility to comply with the provisions of the Indiana Environmental Management Law (IC 13-11 through 13-20; 13-22 through 13-25; and 13-30), the Air Pollution Control Law (IC 13-17) and the rules promulgated thereunder, as well as other applicable local, state, and federal requirements.

Effective Date of the Permit

3. That pursuant to IC 13-15-5-3, this permit becomes effective upon its issuance.
4. That pursuant to 326 IAC 2-1-9(b)(Revocation of Permits), the Commissioner may revoke this permit if construction is not commenced within eighteen (18) months after receipt of this approval or if construction is suspended for a continuous period of one (1) year or more.
5. That notwithstanding Construction Condition No. 6, all requirements and conditions of this construction permit shall remain in effect unless modified in a manner consistent with procedures established for modifications of construction permits pursuant to 326 IAC 2 (Permit Review Rules).

First Time Operation Permit

6. That this document shall also become a first-time operation permit pursuant to 326 IAC 2-1-4 (Operating Permits) when, prior to start of operation, the following requirements are met:
 - (a) The attached affidavit of construction shall be submitted to the Office of Air Management (OAM), Permit Administration & Development Section, verifying that the facilities were constructed as proposed in the application. The facilities covered in the Construction Permit may begin operating on the date the Affidavit of Construction is postmarked or hand delivered to IDEM.
 - (b) If construction is completed in phases; i.e., the entire construction is not done continuously, a separate affidavit must be submitted for each phase of construction. Any permit conditions associated with operation start up dates such as stack testing for New Source Performance Standards (NSPS) shall be applicable to each individual phase.
 - (c) Permittee shall receive an Operation Permit Validation Letter from the Chief of the Permit Administration & Development Section and attach it to this document.
 - (d) The operation permit will be subject to annual operating permit fees pursuant to 326 IAC 2-1-7.1(Fees).

- (e) The Permittee has submitted their Part 70 permit on December 13, 1996 for the existing source. The equipment being reviewed under this permit shall be incorporated in the submitted Part 70 application.

Local Agency Requirement

7. That an application for an operation permit must be made ninety (90) days before start up to:

Gary Local Agency
Division of Air Pollution Control
504 Broadway, Suite 1012
Gary, Indiana 46402

and

IDEM/Northwest Indiana Office
Gainer Bank Building
504 North Broadway, Suite 418
Gary, Indiana 46402-1921

The operation permit issued by the Gary Local Agency shall contain as a minimum the conditions in the Operation Conditions section of this permit.

8. That when the facility is constructed and placed into operation the following operation conditions shall be met:

Operation Conditions

General Operation Conditions

1. That the data and information supplied in the application shall be considered part of this permit. Prior to any change in the operation which may result in an increase in allowable emissions exceeding those specified in 326 IAC 2-1-1 (Construction and Operating Permit Requirements), the change must be approved by the Office of Air Management (OAM).
2. That the permittee shall comply with the provisions of the Indiana Environmental Management Law (IC 13-11 through 13-20; 13-22 through 13-25; and 13-30), the Air Pollution Control Law (IC 13-17) and the rules promulgated thereunder.

Preventive Maintenance Plan

3. That pursuant to 326 IAC 1-6-3 (Preventive Maintenance Plans), the Permittee shall prepare and maintain a preventive maintenance plan, including the following information:
- (a) Identification of the individual(s) responsible for inspecting, maintaining, and repairing emission control devices.
- (b) A description of the items or conditions that will be inspected and the inspection schedule for said items or conditions.
- (c) Identification of the replacement parts which will be maintained in inventory for quick

replacement.

The preventive maintenance plan shall be submitted to IDEM, OAM upon request and shall be subject to review and approval.

Transfer of Permit

4. That pursuant to 326 IAC 2-1-6 (Transfer of Permits):

- (a) In the event that ownership of this steel mill is changed, the Permittee shall notify OAM, Permit Branch, within thirty (30) days of the change. Notification shall include the date or proposed date of said change.
- (b) The written notification shall be sufficient to transfer the permit from the current owner to the new owner.
- (c) The OAM shall reserve the right to issue a new permit.

Permit Revocation

5. That pursuant to 326 IAC 2-1-9(a)(Revocation of Permits), this permit to construct and operate may be revoked for any of the following causes:

- (a) Violation of any conditions of this permit.
- (b) Failure to disclose all the relevant facts, or misrepresentation in obtaining this permit.
- (c) Changes in regulatory requirements that mandate either a temporary or permanent reduction of discharge of contaminants. However, the amendment of appropriate sections of this permit shall not require revocation of this permit.
- (d) Noncompliance with orders issued pursuant to 326 IAC 1-5 (Episode Alert Levels) to reduce emissions during an air pollution episode.
- (e) For any cause which establishes in the judgment of IDEM, the fact that continuance of this permit is not consistent with purposes of 326 IAC 2-1 (Permit Review Rules).

Availability of Permit

6. That pursuant to 326 IAC 2-1-3(l), the Permittee shall maintain the applicable permit on the premises of this source and shall make this permit available for inspection by the IDEM, Gary Local Agency, or IDEM Northwest Office or other public official having jurisdiction.

Emission Offset Minor Source Limit

7. That the input natural gas to the heat treatment furnace shall be limited to 279.2 million cubic feet per year, rolled on a daily basis. This production limitation is equivalent to NOx emissions of 25.1 tons per 365-day period, rolled on a daily basis. The input natural gas to the annealing furnaces shall be limited to 3.1 million cubic feet per month. This production limitation is equivalent to NOx emissions of 0.22 tons per month. Therefore, the Emission Offset rules, 326 IAC 2-3, will not apply.

The following table shows the VOC emissions increases due to modifications at Gary Works during the five-year period prior to and including 2001 (i.e. 1997 through 2001).

Modification Projects	VOC Emissions Increase (tons/year)
160/210-inch Plate Mill Heat Treatment Furnace	0.42
Existing Hydrogen Atmosphere Batch Annealing Furnace	0.048
Levy Plant Modification	0.17
RTO Sludge Dryers	0.02
Oil Reclamation Plant Modification	0.17
U.S. Aggregates Slag Processing Facility	0.01
Repermit Boiler No. 4 A	0.36
Sinter Plant Burners/Coke Oven Battery Injection Jets	0.75
EGL Boiler Modifications	0.072
84-Inch HSM Reheat Furnaces COG Redistribution Project	2.74
Total VOC Emissions Increase	4.76

VOC emissions increases over the past 5 years are less than the de minimis levels of 25 tons per year for VOC, therefore, 326 IAC 2-3 (Emission Offset) does not apply.

Annual Emission Reporting

8. That pursuant to 326 IAC 2-6 (Emission Reporting), the Permittee must annually submit an emission statement for the source. This statement must be received by April 15 of each year and must comply with the minimum requirements specified in 326 IAC 2-6-4. The annual statement must be submitted to:

Indiana Department of Environmental Management
Data Support Section, Office of Air Management
100 North Senate Avenue, P. O. Box 6015
Indianapolis, Indiana 46206-6015

and

Gary Local Agency
Division of Air Pollution Control
504 Broadway, Suite 1012
Gary, Indiana 46402

and

IDEM/Northwest Indiana Office
Gainer Bank Building
504 North Broadway, Suite 418
Gary, Indiana 46402-1921

The annual emission statement covers the twelve (12) consecutive month time period starting December 1 and ending November 30.

Opacity Limitations

9. That pursuant to 326 IAC 5-1-2 (Visible Emission Limitations) except as provided in 326 IAC 5-1-3 (Temporary Exemptions), the visible emissions shall meet the following:
- (a) Visible emissions shall not exceed an average of 20% opacity in 24 consecutive readings.
 - (b) Visible emissions shall not exceed 60% opacity for more than a cumulative total of 15 minutes (60 readings) in a 6-hour period.

Reporting Requirements

10. That a log of information necessary to document compliance with operation permit condition no. 7 shall be maintained. These records shall be kept for at least the past 36 month period and made available upon request to the Office of Air Management (OAM).

- (a) A quarterly summary shall be submitted to:

Indiana Department of Environmental Management
Compliance Data Section, Office of Air Management
100 North Senate Avenue, P.O. Box 6015
Indianapolis, Indiana 46206-6015

and

Gary Local Agency
Division of Air Pollution Control
504 Broadway, Suite 1012
Gary, Indiana 46402

and

IDEM/Northwest Indiana Office
Gainer Bank Building
504 North Broadway, Suite 418
Gary, Indiana 46402-1921

within thirty (30) calendar days after the end of the quarter being reported in the format attached. These reports shall include the natural gas usage in the heat treatment furnace and the natural gas usage in the annealing furnaces.

- (b) Unless otherwise specified in this permit, any notice, report, or other submissions required by this permit shall be timely if:
- (i) Postmarked on or before the date it is due; or
- (ii) Delivered by any other method if it is received and stamped by IDEM, OAM and Gary Local Agency and IDEM Northwest Office, on or before the date it is due.
- (c) All instances of deviations from any requirements of this permit must be clearly identified in such reports.
- (d) Any corrective actions taken as a result of an exceedance of a limit, an excursion from the parametric values, or a malfunction that may have caused excess emissions must be clearly identified in such reports.
- (e) The first report shall cover the period commencing the postmarked submission date of the Affidavit of Construction.

Open Burning

11. That the permittee shall not open burn any material except as provided in 326 IAC 4-1-3, 326 IAC 4-1-4 or 326 IAC 4-1-6.

Emergency Reduction Plans

12. Pursuant to 326 IAC 1-5-2 (Emergency Reduction Plans; Submission):
- (a) The Permittee prepared and submitted written emergency reduction plans (ERPs) consistent with safe operating procedures on December 13, 1996.
 - (b) If the ERP is disapproved by IDEM, OAM, Gary Local Agency, or IDEM Northwest Office, the Permittee shall have an additional thirty (30) days to resolve the differences and submit an approvable ERP. If after this time, the Permittee does not submit an approvable ERP, IDEM, OAM, Gary Local Agency, or IDEM Northwest Office, shall supply such a plan.
 - (c) These ERPs shall state those actions that will be taken, when each episode level is declared, to reduce or eliminate emissions of the appropriate air pollutants.
 - (d) Said ERPs shall also identify the sources of air pollutants, the approximate amount of reduction of the pollutants, and a brief description of the manner in which the reduction will be achieved.
 - (e) Upon direct notification by IDEM, OAM, Gary Local Agency, or IDEM Northwest Office, that a specific air pollution episode level is in effect, the Permittee shall immediately put into effect the actions stipulated in the approved ERP for the appropriate level. [326 IAC 1-5-3]

Indiana Department of Environmental Management
Office of Air Quality
and
City of Gary Division of Air Control
and
IDEM Northwest Regional Office

**Technical Support Document (TSD) for a Significant Permit Modification to
a Construction Permit**

Source Background and Description

Source Name:	U.S.Steel - Gary Works
Source Location:	One North Broadway, Gary , Indiana 46402
County:	Lake
SIC Code:	3312
Operation Permit No.:	CP 089-8606-00121
Operation Permit Issuance Date:	October 20, 1997
Permit Modification No.:	089-14988-00121
Permit Reviewer:	Ghassan Shalabi

The Office of Air Quality (OAQ) has reviewed a permit modification application from US Steel-Gary Works relating to:

Changing the annual Natural Gas Consumption Limit of the LOI Pulse-Fired Plate Heat Treatment Furnace, 160/210 - inch plate mill from 140.5 MMSCF/yr to 279.2 MMSCF/yr (This fuel limitation was specified in construction permit no. CP 089-8606-00121, issued on October 20, 1997).

US Steel - Gary Works based the request on the following:

- (a) The limit imposed by IDEM in the construction permit CP 089-8606-00121 was based on 1,000 BTU/SCF higher heating value (HHV) of natural gas. The source is claiming that the HHV of the natural gas supplied to US Steel - Gary Works is 1,026 BTU/SCF.
- (b) The limit imposed by IDEM in the construction Permit CP 089-8606-00121 was based on the design heat consumption rate of 0.986 MMBtu/ton of steel throughput. Based on measurements of the natural gas consumption and the corresponding steel plate throughput rates during the period from initial startup of the furnace to the present, it became apparent to the source that the maximum annual average heat consumption rate at the furnace is 2.01 MMBtu/ton and not 0.986 MMBtu/ton.

History

The source submitted an application for a Part 70 permit on December 13, 1996. The Part 70 permit is not yet issued.

The source applied for construction permit (089-8606-00121) on May 20, 1997 and the permit was issued on October 20, 1997.

On October 29, 2001, US Steel - Gary Works submitted an application to the OAQ requesting the change of the annual natural gas consumption limit of the LOI Pulse-Fired Plate Heat Treatment Furnace, 160/210 - inch plate mill (construction permit no. CP 089-8606-00121).

On November 27, 2001, US Steel - Gary Works submitted an application to the OAQ requesting

the approval to install four fixed burner bases and three moveable heating hoods to the existing hydrogen atmosphere batch coil annealing facility (construction permit no. CP 089-8606-00121).

These two applications request modifications to units permitted under one construction permit (089-8606-00121). In addition, both applications were submitted within a short period from each other and both involve combustion of fuel. Therefore, IDEM, OAQ decided to combine the above mentioned applications to make sure that PSD is evaluated properly since NO_x and VOC are the primary pollutants of concern.

The source was provided a copy of the draft approval on April 10, 2002 to be reviewed. However, on May 9, 2001 IDEM, OAQ received the source's comments on the draft with a request to delete any reference to the modification to the Hydrogen Annealing Facility because the source decided to cancel that project. Therefore, the modification request to the Hydrogen Annealing Facility is not included in this review.

Stack Summary

Stack ID	Operation	Height (feet)	Diameter (feet)	Flow Rate (acfm)	Temperature (°F)
S-1	Heat treatment furnace	125	4.92	6970	870

Recommendation

The staff recommends to the Commissioner that the Significant Permit Modification be approved. This recommendation is based on the following facts and conditions:

Unless otherwise stated, information used in this review was derived from the application and additional information submitted by the applicant.

Application for the purposes of this review was received on October 29, 2001. Additional information was received on January 15, 2002 and March 27, 2002.

Emission Calculations

The calculations submitted by the applicant have been verified and found to be accurate and correct. These calculations are provided in Appendix A of this document (6 pages).

Revised Potential to Emit for the heat treatment furnace

Pursuant to 326 IAC 2-1.1-1(16), Potential to Emit is defined as "the maximum capacity of a stationary source to emit any air pollutant under its physical and operational design. Any physical or operational limitation on the capacity of a source to emit an air pollutant, including air pollution control equipment and restrictions on hours of operation or type or amount of material combusted, stored, or processed shall be treated as part of its design if the limitation is enforceable by the U. S. EPA."

Pollutant	Potential To Emit (tons/year)*
PM	0.46
PM-10	1.83
SO ₂	0.14
VOC	1.33
CO	20.26
NO _x	43.31

HAP's	Potential To Emit (tons/year)*
Hexane	0.434
Formaldehyde	0.0181
Other	0.0029
TOTAL	0.455

- * 1. The Potential to Emit was calculated at the maximum natural gas throughput of 482.4 MMCF/yr to the heat treatment furnace. For detailed calculations look at appendix A.
 2. HHV of natural gas = 1026 Btu / scf

Justification for Modification

The Operating permit is being modified through a Significant Modification because an emission limitation in the original permit is being relaxed. Therefore, this modification will be subject to public notice and 30 day public comment. This modification is being performed pursuant to IC 13-15-7-1.

Actual Emissions

The following table shows the actual emissions from the source. This information reflects the 2000 OAQ emission data.

Pollutant	Actual Emissions (tons/year)
PM	2,357
PM-10	2,357
SO ₂	5,677
VOC	1,992
CO	88,276
NO _x	5,884

Limited Potential to Emit

The table below summarizes the total potential to emit, reflecting all limits, of the significant emission units.

Process/facility	Limited Potential to Emit (tons/year)					
	PM	PM-10	SO ₂	VOC	CO	NO _x
Limited Potential to Emit for the Heat Treatment Furnace ¹	0.26	1.06	0.08	0.77	11.73	25.07
Past actual emissions from Heat Treatment Furnace ²	0.12	0.48	0.04	0.35	5.32	11.37
Net emission increase Heat Treatment Facility	0.14	0.58	0.05	0.42	6.41	13.69
PSD or offset threshold	15	25	25	25	100	40

1. The limited emission is achieved by limiting the natural gas throughput to 279.2 MMCF/yr and using natural gas with a HHV of 1026 Btu/scf.
 2. Past actual emissions from the heat treatment are calculated based on 126.7 MMCF/yr which is the average annual NG consumption rates for the years October 1, 1999 to September 30, 2000 and October 1, 2000 to September 30, 2001. HHV used equals 1000 Btu/scf

County Attainment Status

The source is located in Lake County.

Pollutant	Status
PM-10	Moderate non-attainment
SO ₂	Primary non-attainment
NO ₂	Attainment or unclassified
Ozone	Severe non-attainment
CO	attainment or unclassified
Lead	attainment or unclassified

Volatile organic compounds (VOC) are precursors for the formation of ozone. Therefore, VOC emissions are considered when evaluating the rule applicability relating to the ozone standards. Lake County has been designated as nonattainment for ozone.

Federal Rule Applicability

- (a) There are no New Source Performance Standards (NSPS)(326 IAC 12 and 40 CFR Part 60) applicable to this source.
- (b) There are no National Emission Standards for Hazardous Air Pollutants (NESHAPs)(326 IAC 14 and 40 CFR art 63) applicable to this source.

State Rule Applicability

There are no additional state rules that apply to this facility as a result of the proposed changes.

Modifications to CP 089-8606-00121

See Appendix A of this document for detailed emissions calculations (6 Pages). CP 089-8606-00121 is modified as follows:

(1)
 Page 5

Emission Offset Minor Source Limit

- 7. That the input natural gas to the heat treatment furnace shall be limited to ~~440.5~~ **279.2** million cubic feet per year, rolled on a daily basis. This production limitation is equivalent to NOx emissions of ~~42.3~~ **25.1** tons per 365-day period, rolled on a daily basis. The input natural gas to the annealing furnaces shall be limited to 3.1 million cubic feet per month. This production limitation is equivalent to NOx emissions of 0.22 tons per month. Therefore, the Emission Offset rules, 326 IAC 2-3, will not apply.

The following paragraph was deleted from the permit because it is no longer applicable.
~~During the first 365 days of operation, the input natural gas to the heat treatment furnace shall be limited such that the total usage divided by the accumulated days of operation shall not exceed 384,931 cubic feet per day.~~

The following table shows the ~~NOx~~ and VOC emissions increases due to modifications at Gary Works during the five-year period prior to and including ~~1997 (i.e. 1993 through 1997)~~ **2001 (i.e. 1997 through 2001)**.

Pollutant	VOC	NOx
New Plate Mill Treatment Furnace	0.20	12.30
New South Sheet Mill Hydrogen Atmosphere Batch Annealing Furnaces	0.10	2.64

Previous No. 2 Q-BOP Shop Modification Project	0.098	5.80
New 84-inch Hot Strip Mill Sludge Dryer	23.62	2.56
Totals	24.67	23.3
Offset de minimis level	25	25

(Because NOx is no longer a trigger for NA review in Lake and Porter Counties as of September 16th, effective date of the NOx SIP call rule, the NOx emissions increase was not included in the table below).

Modification Projects	VOC Emissions Increase (tons/year)
160/210-inch Plate Mill Heat Treatment Furnace	0.42
Existing Hydrogen Atmosphere Batch Annealing Furnace	0.048
Levy Plant Modification	0.17
RTO Sludge Dryers	0.02
Oil Reclamation Plant Modification	0.17
U.S. Aggregates Slag Processing Facility	0.01
Repermit Boiler No. 4 A	0.36
Sinter Plant Burners/Coke Oven Battery Injection Jets	0.75
EGL Boiler Modifications	0.072
84-Inch HSM Reheat Furnaces COG Redistribution Project	2.74
Total VOC Emissions Increase	4.76

NOx and VOC emissions increases over the past 5 years are less than the de minimis levels of 25 tons per year for NOx and 25 tons per year for VOC, therefore, 326 IAC 2-3 (Emission Offset) does not apply.

(2)

The monthly report for the NOx emissions from the plate mill heat treatment furnace was changed to reflect the above mentioned changes.

Conclusion

The operations of this LOI Pulse-Fired Plate Heat Treatment Furnace, 160/210 - inch plate mill shall be subject to the conditions of the attached proposed Significant Modification 089-14988-00121.

Appendix A

U.S. STEEL - GARY WORKS
Gary, Indiana
089-14988-00121

160/210 INCH PLATE MILL - GARY PLATE PRODUCTS CHANGE OF ANNUAL NATURAL GAS CONSUMPTION LIMIT LOI PLATE HEAT TREATMENT FURNACE

Calculations Used to Estimate Changes in Emission Rates of Regulated Air Pollutants

Given:

1. The furnace fires natural gas exclusively at a maximum rated heat input capacity of 56.5 MMBTU/hr.
2. The maximum steel throughput rate for the heat treatment of carbon steel plate is 142,510 tons per year.
3. The current operation permit limits annual natural gas consumption in the furnace to 140.5 million standard cubic feet of natural gas total during any consecutive 365-day period (140.5 MMSCF/yr).
4. Since the startup of the furnace, the maximum rolling 12-month average heat consumption factor at the furnace is 2.01 million BTUs per ton of steel throughput (MMBTU/ton).
5. The design NO_x emission factor for the burners in the furnace is 0.175 lbs NO_x/MMBTU.
6. The higher (gross) heating value of natural gas supplied to Gary Works is 1,026 BTU/SCF.
7. For all criteria air pollutants except NO_x and for all hazardous air pollutants emitted from the combustion of natural gas, use emission factors specified in EPA's AP-42, Section 1.4, July 1998. For NO_x use the design emission factor.

Calculate Annual Natural Gas Consumption Rates for Various Scenarios

1. Unlimited Potential to Emit:

$$\frac{56.5 \text{ MMBTU}}{\text{hr}} \times \frac{1 \text{ SCF}}{1,026 \text{ BTU}} \times \frac{8,760 \text{ hrs}}{\text{yr}} = 482.4 \text{ MMSCF/yr}$$

2. Current Limited Potential to Emit

From current operation permit use 140.5 MMSCF/yr.

3. Future Limited Potential to Emit

$$\frac{142,510 \text{ tons}}{\text{yr}} \times \frac{2.01 \text{ MMBTU}}{\text{ton}} \times \frac{1 \text{ SCF}}{1,026 \text{ BTU}} = 279.2 \text{ MMSCF/yr}$$

4. Past Actual Emissions

Use the average annual natural gas consumption rates for the most recent two-year (24-month) period as representative of normal operations.

Period	Total Fuel Consumption MMSCF
October 1, 1999 to September 30, 2000	126.8
October 1, 2000 to September 30, 2001	126.6
Total	253.4
Average	126.7 MMSCF/yr

Calculate Annual Emission Rates of Regulated Pollutants for Various Scenarios

Let:

ER_i = Annual emission rate of pollutant "i" ~ tons "i" per year

EF_i = Emission factor for pollutant "i" ~ lbs "i"/MMSCF

Q = Annual natural gas consumption rate ~ MMSCF/yr

$$ER_i \left(\frac{\text{tons "i"}}{\text{yr}} \right) = Q \left(\frac{\text{MMSCF}}{\text{yr}} \right) \times EF_i \left(\frac{\text{lbs "i"}}{\text{MMSCF}} \right) \times \frac{1 \text{ ton "i"}}{2,000 \text{ lbs "i"}}$$

1. Unlimited Potential to Emit
($Q = 482.4 \text{ MMSCF/yr}$)

$$ER_i = 0.0005 (482.4)(EF_i)$$

$$ER_i = 0.2412 (EF_i)$$

2. Current Limited Potential to Emit
(Q = 140.5 MMSCF/yr)

$$ER_i = 0.0005 (140.5)(EF_i)$$

$$ER_i = 0.07025 (EF_i)$$

3. Future Limited Potential to Emit
(Q = 279.2 MMSCF/yr)

$$ER_i = 0.0005 (279.2)(EF_i)$$

$$ER_i = 0.1396 (EF_i)$$

4. Past Actual Emissions
(Q = 126.7 MMSCF/yr)

$$ER_i = 0.0005 (126.7)(EF_i)$$

$$ER_i = 0.06335 (EF_i)$$

See Tables 1 and 2 on the next two sheets for calculated annual emission rates for criteria pollutants and hazardous air pollutants, respectively.

Appendix A

U.S. Steel - Gary Works
 Gary, Indiana
 089-14988-00121

160/210-Inch Plate Mill LOI Pulse-Fired Plate Heat Treatment Furnace
 Change of Annual Natural Gas Consumption Limit

Estimated Annual Emissions of Criteria Air Pollutants

Pollutant	Emission Factor (lbs/MMSCF)	Unlimited Potential to Emit Q=482.4 ⁽³⁾	Current Limited Potential to Emit Q=140.5 ⁽³⁾	Future Limited Potential to Emit Q=279.2 ⁽³⁾	Past Actual Emissions Q=126.7 ⁽³⁾	Increase (Future Potential Minus Past Actual)
Particulate Matter	1.9 ⁽¹⁾	0.46	0.13	0.26	0.12	0.14
Particulate Matter (PM10)	7.60 ⁽¹⁾	1.83	0.53	1.06	0.48	0.58
Sulfur Dioxide	0.60 ⁽¹⁾	0.14	0.04	0.08	0.04	0.05
Oxides of Nitrogen	179.55 ⁽²⁾	43.31	12.61	25.07	11.37	13.69
Carbon Monoxide	84.00 ⁽¹⁾	20.26	5.90	11.73	5.32	6.41
Volatile Organic Compounds	5.50 ⁽¹⁾	1.33	0.39	0.77	0.35	0.42
Lead	0.000500 ⁽¹⁾	0.000121	0.000035	0.000070	0.000032	0.000038

Note: All emission rates expressed as tons of pollutant emitted per year.

(1) Emission factors specified in EPA's AP-42, Section 1.4, July 1998 for natural gas combustion.

(2) Emission factor for NOx from burner manufacturer's guarantee of 0.175 lbs NOx/MMBTU and higher heating value of natural gas of 1,026 BTU/SCF.

(3) Annual natural gas consumption rate in million standard cubic feet per year.

Appendix A

U.S. Steel - Gary Works
Gay, Indiana
089-14988-00121

160/210-Inch Plate Mill LOI Pulse-Fired Plate Heat Treatment Furnace
Change of Annual Natural Gas Consumption Limit

Estimated Annual Emissions of Hazardous Air Pollutants

Pollutant	Emission Factor	Unlimited Potential to Emit 482.4	Current Limited Potential to Emit 140.5	Future Limited Potential to Emit 279.2	Past Actual Emissions 126.7	Increase (Future Potential Minus Past Actual)
Non-POMs						
Benzene	2.10E-03	5.07E-04	1.48E-04	2.93E-04	1.33E-04	1.60E-04
Dichlorobenzene	1.20E-03	2.89E-04	8.43E-05	1.68E-04	7.60E-05	9.15E-05
Formaldehyde	7.50E-02	1.81E-02	5.27E-03	1.05E-02	4.75E-03	5.72E-03
Hexane	1.80E+00	4.34E-01	1.26E-01	2.51E-01	1.14E-01	1.37E-01
Naphthalene	6.10E-04	1.47E-04	4.29E-05	8.52E-05	3.86E-05	4.65E-05
Toluene	3.40E-03	8.20E-04	2.39E-04	4.75E-04	2.15E-04	2.59E-04
<i>Subtotal Non-POMs</i>		<i>4.54E-01</i>	<i>1.32E-01</i>	<i>2.63E-01</i>	<i>1.19E-01</i>	<i>1.44E-01</i>
POMs						
2-Methylnaphtalene	2.40E-05	5.79E-06	1.69E-06	3.35E-06	1.52E-06	1.83E-06
3-Methylchloranthrene	1.80E-06	4.34E-07	1.26E-07	2.51E-07	1.14E-07	1.37E-07
7,12-Dimethylbenz(a)-anthracene	1.60E-05	3.86E-06	1.12E-06	2.23E-06	1.01E-06	1.22E-06
Acenaphthene	1.80E-06	4.34E-07	1.26E-07	2.51E-07	1.14E-07	1.37E-07
Acenaphthylene	1.80E-06	4.34E-07	1.26E-07	2.51E-07	1.14E-07	1.37E-07
Anthracene	2.40E-06	5.79E-07	1.69E-07	3.35E-07	1.52E-07	1.83E-07
Benz(a)anthracene	1.80E-06	4.34E-07	1.26E-07	2.51E-07	1.14E-07	1.37E-07
Benzo(a)pyrene	1.20E-06	2.89E-07	8.43E-08	1.68E-07	7.60E-08	9.15E-08
Benzo(b)fluoranthene	1.80E-06	4.34E-07	1.26E-07	2.51E-07	1.14E-07	1.37E-07
Benzo(g,h,l)perylene	1.20E-06	2.89E-07	8.43E-08	1.68E-07	7.60E-08	9.15E-08
Benzo(k)fluoranthene	1.80E-06	4.34E-07	1.26E-07	2.51E-07	1.14E-07	1.37E-07
Chrysene	1.80E-06	4.34E-07	1.26E-07	2.51E-07	1.14E-07	1.37E-07
Dibenzo(a,h)anthracene	1.20E-06	2.89E-07	8.43E-08	1.68E-07	7.60E-08	9.15E-08
Fluoranthene	3.00E-06	7.24E-07	2.11E-07	4.19E-07	1.90E-07	2.29E-07
Fluorene	2.80E-06	6.75E-07	1.97E-07	3.91E-07	1.77E-07	2.14E-07
Indeno(1,2,3-cd)pyrene	1.80E-06	4.34E-07	1.26E-07	2.51E-07	1.14E-07	1.37E-07
Phenanthrene	1.70E-05	4.10E-06	1.19E-06	2.37E-06	1.08E-06	1.30E-06
Pyrene	5.00E-06	1.21E-06	3.51E-07	6.98E-07	3.17E-07	3.81E-07
<i>Subtotal POMs</i>		<i>2.13E-05</i>	<i>6.20E-06</i>	<i>1.23E-05</i>	<i>5.59E-06</i>	<i>6.73E-06</i>
Metallic HAPs						
Arsenic	2.00E-04	4.82E-05	1.41E-05	2.79E-05	1.27E-05	1.53E-05
Beryllium	1.20E-05	2.89E-06	8.43E-07	1.68E-06	7.60E-07	9.15E-07
Cadmium	1.10E-03	2.65E-04	7.73E-05	1.54E-04	6.97E-05	8.39E-05
Chromium	1.40E-03	3.38E-04	9.84E-05	1.95E-04	8.87E-05	1.07E-04
Cobalt	8.40E-05	2.03E-05	5.90E-06	1.17E-05	5.32E-06	6.41E-06
Manganese	3.80E-04	9.17E-05	2.67E-05	5.30E-05	2.41E-05	2.90E-05
Mercury	2.60E-04	6.27E-05	1.83E-05	3.63E-05	1.65E-05	1.98E-05
Nickel	2.10E-03	5.07E-04	1.48E-04	2.93E-04	1.33E-04	1.60E-04
Selenium	2.40E-05	5.79E-06	1.69E-06	3.35E-06	1.52E-06	1.83E-06
<i>Subtotal Metallic HAPs</i>		<i>1.34E-03</i>	<i>3.91E-04</i>	<i>7.76E-04</i>	<i>3.52E-04</i>	<i>4.24E-04</i>
Total HAPs		4.55E-01	1.33E-01	2.64E-01	1.20E-01	1.44E-01

Note: All emission rates expressed as tons of pollutant emitted per year.

(1) Emission factors specified in EPA's AP-42, Section 1.4, July 1998 for natural gas combustion.

(2) Annual natural gas consumption rate in million standard cubic feet per year.

Appendix A

U.S. Steel - Gary Works
 Gay, Indiana
 089-14988-00121

Total Potential to Emit after modification

Pollutant	Emission Factor	Potential to Emit
Particulate Matter	1.9 ⁽¹⁾	0.46
Particulate Matter (PM10)	7.60 ⁽¹⁾	1.830
Sulfur Dioxide	0.60 ⁽¹⁾	0.140
Oxides of Nitrogen	179.55 ⁽²⁾	43.310
Volatile Organic Compounds	5.50 ⁽¹⁾	1.330
Carbon Monoxide	84.00 ⁽¹⁾	20.260
Lead	0.0005 ⁽¹⁾	0.0001

Limited Potential to Emit after modification

Pollutant	Emission Factor	Increase (Future limited PTE Minus Past Actual)
Particulate Matter	1.9 ⁽¹⁾	0.14
Particulate Matter (PM10)	7.60 ⁽¹⁾	0.580
Sulfur Dioxide	0.60 ⁽¹⁾	0.050
Oxides of Nitrogen	179.55 ⁽²⁾	13.980
Volatile Organic Compounds	5.50 ⁽¹⁾	0.420
Carbon Monoxide	84.00 ⁽¹⁾	6.410
Lead	0.0005 ⁽¹⁾	0.0000

Note: All emission rates expressed as tons of pollutant emitted per year.

(1) Emission factors specified in EPA's AP-42, Section 1.4, July 1998 for natural gas combustion in boilers with heat input capacities less than 100 MMBTU/hr.

(2) Maximum guaranteed emission factor of 0.14 lbs NOx/MMBTU at 1,026 BTU/SCF.