State of Utah

SPENCER J. COX
Governor

DEIDRE HENDERSON
Lieutenant Governor

Department of
Environmental Quality

Tim Davis
Executive Director

DIVISION OF AIR QUALITY
Bryce C. Bird
Director

DAQE-AN104230020-25

December 10, 2025

Cesar Hernandez
Interstate Brick Company
9780 South 5200 West
West Jordan, UT 84081-5625
Cesar.Hernandez@interstatebrick.com

Dear Mr. Hernandez:

Re: Approval Order: Modification to Approval Order DAQE-AN104230019-25 to Add a Brick Slip Manufacturing Line
Project Number: N104230020

The attached Approval Order (AO) is issued pursuant to the Notice of Intent (NOI) received on August 26, 2025. Interstate Brick Company must comply with the requirements of this AO, all applicable state requirements (R307), and Federal Standards.

The project engineer for this action is **Stockton Antczak**, who can be contacted at (385) 306-6724 or santczak@utah.gov. Future correspondence on this AO should include the engineer's name as well as the DAQE number shown on the upper right-hand corner of this letter. No public comments were received on this action.

Sincerely,

Bryce C. Bird
Director

BCB:SA:jg

Attachments: Appendix A, B, C, D, and E

cc: Salt Lake County Health Department
EPA Region 8

STATE OF UTAH

Department of Environmental Quality
Division of Air Quality

APPROVAL ORDER
DAQE-AN104230020-25
Modification to Approval Order DAQE-AN104230019-25 to Add a Brick Slip Manufacturing Line

Prepared By
Stockton Antczak, Engineer
(385) 306-6724
santczak@utah.gov

Issued to
Interstate Brick Company - Brick Manufacturing Plant

Issued On
December 10, 2025

Issued By

Bryce C. Bird
Director
Division of Air Quality

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GENERAL INFORMATION

CONTACT/LOCATION INFORMATION

Owner Name
Interstate Brick Company

Source Name
Interstate Brick Company - Brick Manufacturing Plant

Mailing Address
9780 South 5200 West
West Jordan, UT 84081-5625

Physical Address
9780 South 5200 West
West Jordan, UT 84081-5625

Source Contact
Name: Greg Stevenson
Phone: (801) 280-5200
Email: greg.stevenson@basalite.com

UTM Coordinates
413,434 m Easting
4,491,705 m Northing
Datum NAD83
UTM Zone 12

SIC code 3251 (Brick & Structural Clay Tile)

SOURCE INFORMATION

General Description
Interstate Brick Company (ISB) operates a brick and tile manufacturing plant in West Jordan City, Salt Lake County, Utah. The operation includes raw materials (clay) storage, crushing/blending operations, and three natural gas-fired kilns used to fire the products. Crushing and screen operations are controlled with baghouses.

NSR Classification
Minor Modification at Major Source

Source Classification
Located in Salt Lake County PM_{10} Maint Area, Northern Wasatch Front O3 NAA, Salt Lake City UT $PM_{2.5}$ NAA, Salt Lake County SO_2 NAA
Salt Lake County
Airs Source Size: A

Applicable Federal Standards
Title V (Part 70) Major Source

Project Description
A brick slip manufacturing line was added to the permit. The manufacturing line includes a rectifying line, conveying devices, and a baghouse. The addition of this equipment and related material transportation will result in a small increase to PM_{10} and $PM_{2.5}$ emissions.

SUMMARY OF EMISSIONS

The emissions listed below are an estimate of the total potential emissions from the source. Some rounding of emissions is possible.

Criteria Pollutant	Change (TPY)	Total (TPY)
Carbon Monoxide	0	219.48
Nitrogen Oxides	0	49.35
Particulate Matter - PM_{10}	-0.81	62.53
Particulate Matter - PM_{10} (Fugitives)	0	45.68
Particulate Matter - $PM_{2.5}$	-0.84	62.50
Sulfur Dioxide	0	69.00
Volatile Organic Compounds	0	14.87

Hazardous Air Pollutant	Change (lbs/yr)	Total (lbs/yr)
Generic HAPs (CAS #GHAPS)	0	5400
Hydrochloric Acid (Hydrogen Chloride) (CAS #7647010)	0	14400
Hydrogen Fluoride (Hydrofluoric Acid) (CAS #7664393)	0	13400
Organic HAPs (CAS #OHAPS)	0	8600
	Change (TPY)	**Total (TPY)**
Total HAPs	0	20.90

SECTION I: GENERAL PROVISIONS

I.1	All definitions, terms, abbreviations, and references used in this AO conform to those used in the UAC R307 and 40 CFR. Unless noted otherwise, references cited in these AO conditions refer to those rules. [R307-101]
I.2	The limits set forth in this AO shall not be exceeded without prior approval. [R307-401]
I.3	Modifications to the equipment or processes approved by this AO that could affect the emissions covered by this AO must be reviewed and approved. [R307-401-1]
I.4	All records referenced in this AO or in other applicable rules, which are required to be kept by the owner/operator, shall be made available to the Director or Director's representative upon request, and the records shall include the two-year period prior to the date of the request. Unless otherwise specified in this AO or in other applicable state and federal rules, records shall be kept for a minimum of two years. [R307-401-8]
I.5	At all times, including periods of startup, shutdown, and malfunction, owners and operators shall, to the extent practicable, maintain and operate any equipment approved under this AO, including associated air pollution control equipment, in a manner consistent with good air pollution control practice for minimizing emissions. Determination of whether acceptable operating and maintenance procedures are being used will be based on information available to the Director which may include, but is not limited to, monitoring results, opacity observations, review of operating and maintenance procedures, and inspection of the source. All maintenance performed on equipment authorized by this AO shall be recorded. [R307-401-4]
I.6	The owner/operator shall comply with UAC R307-107. General Requirements: Breakdowns. [R307-107]

I.7	The owner/operator shall comply with UAC R307-150 Series. Emission Inventories. [R307-150]
I.8	The owner/operator shall submit documentation of the status of construction or modification to the Director within 18 months from the date of this AO. This AO may become invalid if construction is not commenced within 18 months from the date of this AO or if construction is discontinued for 18 months or more. To ensure proper credit when notifying the Director, send the documentation to the Director, attn.: NSR Section. [R307-401-18]

SECTION II: PERMITTED EQUIPMENT

II.A <u>**THE APPROVED EQUIPMENT**</u>

II.A.1	**Brick Manufacturing Plant**
II.A.2	**Line #1** Tunnel Kiln #1 (not operational)
II.A.3	**Line #3** Line #3 kiln with packed tower scrubber and mist eliminator Scrubber air flow - 60,000 Actual Cubic Feet per Minute (ACFM) Line #3 baghouse - MikroPul
II.A.4	**Line #4** Line #4 kiln Wet scrubber and mist eliminator Scrubber air flow - 89,800 ACFM Line #4 vacuum cleaner Line #4 shapes dryer Line #4 baghouse - MikroPul
II.A.5	**Brick Slip Line** Brick slip rectifying Line Rectifier Baghouse - Maincer
II.A.6	**Grizzly Hopper**
II.A.7	**Primary and Secondary Crushers** Primary crusher with baghouse Crusher manufacturer - Stedman Capacity: 100 tons per hour Control: Pulse jet baghouse Installed before August 31, 1983 Secondary crusher/grinding Installed before August 31, 1983 Screens Installed before August 31, 1983

II.A.8	**Silos** Two soda ash silos Controlled by bin vent
II.A.9	**Clay Storage Piles**
II.A.10	**Miscellaneous Diesel Equipment**
II.A.11	**Miscellaneous Equipment** Extruder Vacuum Pumps, Storage Tanks, Vehicle Fueling Tanks, Space Heaters. This equipment is listed for informational purposes only.

SECTION II: SPECIAL PROVISIONS

II.B REQUIREMENTS AND LIMITATIONS

II.B.1	**Site-Wide Requirements**

II.B.1.a	The following limitations shall not be exceeded: A. Plant wide production/consumption limits 1) 2,880 tons of raw clay consumption per rolling 24-hour period 2) 393,236 tons of brick produced in Line #3 and Line #4 combined per rolling 12-month period 3) 512,582 tons of brick produced plantwide per rolling 12-month period. B. Tunnel Kiln #1 (Not operational until scrubber is online) 13.62 tons of product per hour averaged over a rolling 24-hour period C. Tunnel Kiln #3 17.92 tons of product per hour averaged over a rolling 24-hour period D. Tunnel Kiln #4 26.97 tons of product per hour averaged over a rolling 24-hour period E. Clay Prep for Line #3 not Including Kiln #3 6,240 hours of operation per rolling 12-month period F. Clay Prep for Line #4 not Including Kiln #4 6,240 hours of operation per rolling 12-month period G. Brick Slip Line 5,834 tons of brick slips produced per rolling 12-month period. To determine compliance with a rolling 12-month total, the owner/operator shall calculate a new 12-month total by the twentieth day of each month using data from the previous 12 months. Records of consumption, production, and/or hours of operation shall be kept for all periods when the plant is in operation. Production/consumption shall be determined by operator logs. The records of consumption/production shall be kept on a daily basis. Hours of operation shall be determined by monitoring and maintaining an operations log. [R307-401-8]
II.B.1.b	Visible emissions from the following emission points shall not exceed the following values: A. All screens - 10% opacity B. All conveyor transfer points - 10% opacity C. All baghouses - 10% opacity D. All buildings enclosing crushers - 10% opacity E. All crushers - 15% F. All other points - 20% opacity. Opacity observations of emissions from stationary sources shall be conducted according to 40 CFR 60, Appendix A, Method 9. [R307-401-8]

II.B.1.c	The owner/operator shall apply water to storage piles to maintain the opacity limits as required in this AO. [R307-401-8]
II.B.1.d	The owner/operator shall not operate Kiln #1 until the replacement scrubber for Kiln #1 has been approved in accordance with R307-401-8. [R307-401-8]
II.B.1.e	The owner/operator shall route all emissions from the primary crusher building through the primary crusher baghouse prior to venting to the atmosphere. [R307-401-8]
II.B.1.f	The owner/operator shall vent all process streams and exhaust air from Kiln #3 to a wet scrubber shall control process streams from Kiln #3 prior to venting to the atmosphere. This requirement shall apply at all times except during Allowed Maintenance Activities as outlined in Appendix E. Maintenance activities are expected to occur on a quarterly basis and will not exceed 40 hours per year (10 hours per quarter). [R307-401-8]
II.B.1.g	The owner/operator shall vent all process streams and exhaust air from Kiln #4 through the wet scrubber prior to venting to the atmosphere. This requirement shall apply at all times except during Allowed Maintenance Activities as outlined in Appendix E. Maintenance activities are expected to occur on a quarterly basis and will not exceed 40 hours per year (10 hours per quarter). [R307-401-8]

II.B.1.h	The owner/operator shall not emit more than the following rates and concentrations from the indicated emissions unit(s): Scrubber Tunnel Kiln #3 NO_x: 1-hr average 4.70 lb/hr PM_{10}: 1-hr average 8.66 lb/hr $PM_{2.5}$: 1-hr average 8.66 lb/hr SO_2: 1-hr average 8.09 lb/hr Total Fluorides: 1-hr average 1.77 lb/hr Scrubber Tunnel Kiln #4 NO_x: 1-hr average 6.40 lb/hr PM_{10}: 1-hr average 3.97 lb/hr $PM_{2.5}$: 1-hr average 3.97 lb/hr SO_2: 1-hr average 5.87 lb/hr Total Fluorides: 1-hr average 3.25 lb/hr Line #3 Baghouse (dry filterable particulate only) PM_{10}: 1-hr average 0.18 lb/hr Maximum Concentration: 0.016 grains/dscf $PM_{2.5}$: 1-hr average 0.18 lb/hr Maximum Concentration: 0.016 grains/dscf Line #4 Baghouse (dry filterable particulate only) PM_{10}: 1-hr average 0.34 lb/hr Maximum Concentration: 0.016 grains/dscf $PM_{2.5}$: 1-hr average 0.34 lb/hr Maximum Concentration: 0.016 grains/dscf Primary Crusher Baghouse Vent (dry filterable particulate only) PM_{10}: 1-hr average 0.56 lb/hr Maximum Concentration: 0.010 grains/dscf $PM_{2.5}$: 1-hr average 0.56 lb/hr Maximum Concentration: 0.010 grains/dscf Brick Slip Line Baghouse (dry filterable particulate only) PM_{10}: 1-hr average 0.0007 lb/hr Maximum Concentration: 0.005 gr/dscf $PM_{2.5}$: 1-hr average 0.0007 lb/hr Maximum Concentration: 0.005 gr/dscf [R307-401-8]
II.B.1.h.1	Initial Test The owner/operator shall conduct an initial stack test on the brick slip manufacturing line within 180 days after startup. [R307-165-2]
II.B.1.h.2	To demonstrate compliance with the emission limitations above, the owner/operator shall conduct emission testing (stack testing) as outlined below. [R307-401-8]
II.B.1.h.3	Test Frequency The owner/operator shall conduct subsequent PM_{10} and $PM_{2.5}$ emission tests for all units within three years after the date of the most recent emission test. NO_x and SO_2 emissions from Kiln #3 and Kiln #4 shall be tested annually. Total fluoride emissions from Kiln #3 and Kiln #4 shall be tested within five years after the date of the most recent emission test. The Director may require the owner/operator to perform an emission test at any time. [R307-165-2, R307-401-8]

II.B.1.h.4	Notification At least 30 days prior to conducting an emission test, the owner/operator shall submit a source test protocol to the Director. The source test protocol shall include: A. The date, time, and place of the proposed test B. The proposed test methodologies C. The stack to be tested D. The procedures to be used E. Any deviation from an EPA-approved test method F. Explanation of any deviation from an EPA-approved test method. If directed by the Director, the owner/operator shall attend a pretest conference. [R307-165-2, R307-401-8]
II.B.1.h.5	Testing The owner/operator shall conduct testing according to the approved source test protocol. The Director may reject emission test data if the test did not follow the approved source test protocol or if Director was not provided an opportunity to have an observer present at the test. [R307-165-5, R307-401-8]
II.B.1.h.6	Test Conditions The owner/operator shall conduct all tests while the source is operating at the maximum production or combustion rate at which the source will be operated unless otherwise specified in the approved source test protocol. During the tests, the owner/operator shall burn fuels or combinations of fuels, use raw materials, and maintain process conditions representative of normal operations. In addition, the owner/operator shall operate under any other relevant conditions that the Director specifies. [R307-165-4, R307-401-8]
II.B.1.h.7	Standard Conditions & Emission Limit Parameters A. Temperature - 68 degrees Fahrenheit (293 K) B. Pressure - 29.92 in Hg (101.3 kPa) C. Concentration (ppmdv) - 3% oxygen, dry basis D. Averaging Time - As specified in the applicable test method. [40 CFR 60 Subpart A, 40 CFR 63 Subpart A, R307-401-8]
II.B.1.h.8	Reporting Within 60 days after completing an emission test, the owner/operator shall submit a copy of the test results to the Director. [R307-401-8]
II.B.1.i	Test Methods When performing emission testing, the owner/operator shall use the appropriate EPA-approved test methods as acceptable to the Director. Acceptable test methods for pollutants are listed below. [R307-401-8]

II.B.1.i.1	$PM_{2.5}$ Total $PM_{2.5}$ = Filterable $PM_{2.5}$ + Condensable $PM_{2.5}$ Filterable $PM_{2.5}$ 40 CFR 60, Appendix A, Method 5; 40 CFR 51, Appendix M, Method 201A or other EPA-approved testing method as acceptable to the Director. If other approved testing methods are used which cannot measure the $PM_{2.5}$ fraction of the filterable particulate emissions, all of the filterable particulate emissions shall be considered $PM_{2.5}$. Condensable $PM_{2.5}$ 40 CFR 51, Appendix M, Method 202 or other EPA-approved testing method as acceptable to the Director. [R307-401-8]
II.B.1.i.2	PM_{10} Total PM_{10} = Filterable PM_{10} + Condensable PM_{10} Filterable PM_{10} 40 CFR 60, Appendix A, Method 5; 40 CFR 51, Appendix M, Method 201; Method 201A; or other EPA-approved testing method as acceptable to the Director. If other approved testing methods are used which cannot measure the PM_{10} fraction of the filterable particulate emissions, all of the filterable particulate emissions shall be considered $PM_{10.}$ Condensable PM_{10} 40 CFR 51, Appendix M, Method 202 or other EPA-approved testing method as acceptable to the Director. Filterable PM_{10} 40 CFR 60, Appendix A, Method 5; 40 CFR 51, Appendix M, Method 201; Method 201A; or other EPA-approved testing method as acceptable to the Director. If other approved testing methods are used which cannot measure the PM_{10} fraction of the filterable particulate emissions, all of the filterable particulate emissions shall be considered $PM_{10.}$ [R307-401-8]
II.B.1.i.3	NO_x 40 CFR 60, Appendix A, Method 7; Method 7E; or other EPA-approved testing method as acceptable to the Director. [R307-401-8]
II.B.1.i.4	SO_2 40 CFR 60, Appendix A, Method 6 or 6C or other EPA-approved method as acceptable to the Director. [R307-165]
II.B.1.i.5	Total Fluorines 40 CFR 60, Appendix A, Method 13B; 40 CFR 60, Appendix A, Method 2 shall be used to determine the volumetric flow rate; or other EPA-approved testing method as acceptable to the Director. [R307-401-8]
II.B.1.j	The moisture content of the clay shall be maintained at an average of no less than 4.0% by weight. The moisture content shall be tested if directed by the Director using the appropriate ASTM method. [R307-401-8]
II.B.2	**Fuels**
II.B.2.a	The owner/operator shall only use natural gas as a fuel and propane as a backup fuel in the kilns. [R307-401-8]

II.B.3	**Monitoring - General Process**
II.B.3.a	The owner/operator shall install, calibrate, maintain, and operate a monitoring device for the continuous measurement of the change in pressure through the baghouse and scrubbers. A. The minimum pressure drop in inches/w.g. for the baghouse and scrubbers shall be as follows: 1) Primary crusher baghouse with polyester felt 2.0 with PTFE membrane 0.4 2) Kiln #3 scrubber 0.1 3) Kiln #4 scrubber 2.0 The monitoring device must be certified by the manufacturer to be accurate within plus or minus 5% of the w.g. design measuring device and must be calibrated on an annual basis in accordance with the manufacturer's instructions. When the scrubber(s) are in operation, the pressure drop shall be within the limits specified above except during start-up and shut-down of the scrubber(s). When the primary crusher baghouse is in operation, the pressure drop shall be within the limits specified above, except during a period of ten crusher operating days following the filter media replacement B. Monitoring: Once per operating day for each scrubber, ISB shall verify that the differential pressure is within the permitted range. All pressure gauges shall be located such that an inspector/operator can safely read the indicator at any time C. Record Keeping: Results of the change in pressure shall be recorded on a daily basis. Continuous recording for the monitoring device is not required. [R307-401-8]

II.B.3.b	The owner/operator shall install, calibrate, maintain, and operate a monitoring device for the continuous measurement of the pH of the scrubbing solution through each scrubber. A. The pH range for the scrubbers shall be as follows: 1) Kiln #3 5-9 2) Kiln #4 5-9 The monitoring device must be certified by the manufacturer to be accurate within plus or minus 5% of the design pH and must be calibrated on an annual basis in accordance with the manufacturer's instructions. When the scrubber(s) are in operation, the pH shall be within the ranges specified above except during start-up and shut-down of the scrubber(s) B. Monitoring: Once per operating day for each scrubber, ISB shall verify that the pH is within the permitted range. All meters shall be located such that an inspector/operator can safely read the indicator at any time C. Record Keeping: Results of the pH shall be recorded on a daily basis. Continuous recording for the monitoring device is not required. [R307-401-8]
II.B.3.c	The owner/operator shall install, calibrate, maintain, and operate a monitoring device for the continuous measurement of the flow rate of the scrubbing solution through each scrubber. A. The minimum scrubbing liquid flow rate in gallons per minute (gpm) for the scrubbers shall be as follows: 1) Kiln #3 200 2) Kiln #4 600 The monitoring device must be certified by the manufacturer to be accurate within plus or minus 5% of the design scrubbing liquid flow rate and must be calibrated on an annual basis in accordance with the manufacturer's instructions. When the scrubber(s) are in operation, the scrubbing liquid flow rate shall be no less than the flow rates specified above except during start-up and shut-down of the scrubber(s) B. Monitoring: Once per operating day for each scrubber, ISB shall verify that the liquid flow rate is within the permitted range. All flow gauges shall be located such that an inspector/operator can safely read the indicator at any time C. Record Keeping: Results of the scrubbing liquid flow rate shall be recorded on a daily basis. Continuous recording for the monitoring device is not required. [R307-401-8]

II.B.4	**VOC and HAP Limitations**
II.B.4.a	The plant-wide emissions of VOCs from the brick manufacturing plant and associated operations shall not exceed 14.87 tons per rolling 12-month period for VOCs. Compliance with the limitation shall be determined on a rolling 12-month total. Based on the twentieth day of each month, a new 12-month total shall be calculated using data from the previous 12 months. The VOC emissions shall be determined by maintaining a record of VOC-emitting materials used each month. The record shall include the following data for each material used: A. Name of the VOC-emitting material, such as paint, adhesive, solvent, thinner, reducers, chemical compounds, toxics, isocyanates, etc. B. Density of each material used (pounds per gallon) C. Percent by weight of all VOC in each material used D. Gallons of each VOC-emitting material used E. The amount of VOC emitted monthly by each material used shall be calculated by the following procedure: $VOC = \frac{\%\ VOC\ by\ Weight}{(100)} \times [Density\ \frac{(lb)}{(gal)}] \times Gal\ Consumed \times \frac{1\ ton}{2000\ lb}$ F. The amount of VOC emitted monthly from all materials used. G. The amount of VOCs reclaimed for the month shall be similarly quantified and subtracted from the quantities calculated above to provide the monthly total VOC emissions. [R307-401-8]

II.B.4.b	The plant-wide emissions of HAPs from the brick manufacturing plant and associated operations shall not exceed: 7.2 tons per rolling 12-month period for HCl 6.7 tons per rolling 12-month period for HF 7.0 tons per rolling 12-month period for miscellaneous HAPs 20.9 tons per rolling 12-month period for all HAPs combined Compliance with the limitation shall be determined on a rolling 12-month total. Based on the twentieth day of each month, a new 12-month total shall be calculated using data from the previous 12 months. Compliance with HF and HCl limitations listed above shall be determined through a method of mass balance. The mass balance plan approved by the Director was submitted by ISB on October 22, 2009. If ISB submits any additional revised mass balance methods for determining annual emissions to the Director for approval, the plan shall include, at a minimum, the following: A. Proposed test methods and test frequency for determining the weight of the elemental fluorine contained in the clays used to manufacture brick B. Proposed test methods and test frequency for determining the weight of the elemental fluorine contained in the finished product C. Calculation method of determining emissions of HCL and HF which will demonstrate compliance with the HCl and HF emission limitations listed above The miscellaneous HAP emissions shall be determined by maintaining a record of HAP-emitting materials used each month. The record shall include the following data for each material used: D. Name of the HAP-emitting material, such as paint, adhesive, solvent, thinner, reducers, chemical compounds, toxics, isocyanates, etc. E. Density of each material used (pounds per gallon) F. Percent by weight of all HAP in each material used G. Gallons of each HAP-emitting material used H. The amount of HAP emitted monthly by each material used shall be calculated by the following procedure: $HAP = \frac{\%\ HAP\ by\ Weight}{(100)} \times [Density\ (\frac{lb}{gal})] \times Gal\ Consumed \times \frac{1\ ton}{2000\ lb}$ I. The amount of HAPs emitted monthly from all materials used J. The amount of HAPs reclaimed for the month shall be similarly quantified and subtracted from the quantities calculated above to provide the monthly total VOC emissions. [R307-401-8]

II.B.5	**Conditions on Haul Roads**
II.B.5.a	All roads and other operational areas that are used by mobile equipment shall be sprayed with water to control fugitive dust. Treatment shall be applied of sufficient frequency and quantity to maintain the surface material in a condition such that fugitive emissions are minimized, unless the ambient temperature could result in freezing conditions. The opacity shall not exceed 20% during all times of equipment operation. Records of water treatment shall be kept for all periods when the plant is in operation. The records shall include the following items: A. Date; B. Number of treatments made; C. Rainfall received, if any, and approximate amount; and D. Time of day treatments were made. Records of treatment shall be made available to the Director upon request and shall include a period of five years ending with the date of the request. Records shall be maintained in accordance with Condition I.4 of this AO. [R307-309]
II.B.5.b	The owner/operator shall abide by a fugitive dust control plan acceptable to the Director for control of dust from haul roads. Monitoring: Records of water applications shall serve as monitoring. Adherence to the most recently approved fugitive dust control plan shall be monitored to demonstrate that appropriate measures are being implemented to control fugitive dust. Recordkeeping: Records of fugitive dust mitigation measures shall be kept for all periods. The records shall contain, at a minimum, the date and time of water applications, the number of treatments made, the dilution ratio, the quantity applied, any rainfall received, and the approximate amount. Records shall be maintained in accordance with Condition I.4 of this AO. [R307-309]

PERMIT HISTORY

This Approval Order shall supersede (if a modification) or will be based on the following documents:

Supersedes	AO DAQE-AN104230019-25 dated June 2, 2025
Is Derived From	NOI dated August 26, 2025

ACRONYMS

The following lists commonly used acronyms and associated translations as they apply to this document:

40 CFR	Title 40 of the Code of Federal Regulations
AO	Approval Order
BACT	Best Available Control Technology
CAA	Clean Air Act
CAAA	Clean Air Act Amendments
CDS	Classification Data System (used by Environmental Protection Agency to classify sources by size/type)
CEM	Continuous emissions monitor
CEMS	Continuous emissions monitoring system
CFR	Code of Federal Regulations
CMS	Continuous monitoring system
CO	Carbon monoxide
CO_2	Carbon Dioxide
CO_2e	Carbon Dioxide Equivalent - Title 40 of the Code of Federal Regulations Part 98, Subpart A, Table A-1
COM	Continuous opacity monitor
DAQ/UDAQ	Division of Air Quality
DAQE	This is a document tracking code for internal Division of Air Quality use
EPA	Environmental Protection Agency
FDCP	Fugitive dust control plan
GHG	Greenhouse Gas(es) - Title 40 of the Code of Federal Regulations 52.21 (b)(49)(i)
GWP	Global Warming Potential - Title 40 of the Code of Federal Regulations Part 86.1818-12(a)
HAP or HAPs	Hazardous air pollutant(s)
ITA	Intent to Approve
LB/YR	Pounds per year
MACT	Maximum Achievable Control Technology
MMBTU	Million British Thermal Units
NAA	Nonattainment Area
NAAQS	National Ambient Air Quality Standards
NESHAP	National Emission Standards for Hazardous Air Pollutants
NOI	Notice of Intent
NO_x	Oxides of nitrogen
NSPS	New Source Performance Standard
NSR	New Source Review
PM_{10}	Particulate matter less than 10 microns in size
$PM_{2.5}$	Particulate matter less than 2.5 microns in size
PSD	Prevention of Significant Deterioration
PTE	Potential to Emit
R307	Rules Series 307
R307-401	Rules Series 307 - Section 401
SO_2	Sulfur dioxide
Title IV	Title IV of the Clean Air Act
Title V	Title V of the Clean Air Act
TPY	Tons per year
UAC	Utah Administrative Code
VOC	Volatile organic compounds

Appendix A

[Note: The Mass Balance Plan immediately following this note was initially submitted on March 4, 1999, revised March 11, 1999, and incorporated into the Approval Order DAQE-296-99, issued April 15, 1999. As part of the implementation of the Plan, an Initial Mass Balance was submitted on January 15, 2002. Addendum No. 1 (see Appendix B) was submitted June 1, 2006 (revised September 11, 2006) to calculate hydrogen fluoride (HF) emissions from the total fluoride (TF) mass balance emissions results. Addendum No. 2 dated June 26, 2009 (see Appendix C), is responsive to the AO issued November 12, 2008, which requires that hydrogen chloride (HCl) emissions also be included in the Mass Balance Plan.]

MASS BALANCE PLAN
TO CALCULATE FLUORIDE AND SULFUR DIOXIDE ANNUAL
AVERAGE EMISSIONS FROM INTERSTATE BRICK COMPANY (ISB) TUNNEL KILNS

1.0 INTRODUCTION

The purpose of this mass balance plan is to provide a clear and detailed method for ISB to perform compliance monitoring of annual emissions of fluoride and SO_2 from the tunnel kilns at the ISB facility in West Jordan, Utah. The resulting calculated emissions will be used to determine compliance with the annual-average hourly limits for SO_2 and fluorides contained in the permit. An overview of the plan elements is presented in the next section.

1.1 PLAN OVERVIEW

The plan contains five basic elements:

1. Determination of the Maximum Brick Emissions (MBE) from the Brick Material During Firing

The MBE are the difference between the elemental fluorine/sulfur content in the dried brick just prior to firing and the elemental fluorine/sulfur content remaining in the brick after firing. The MBE are determined through laboratory testing of companion pieces of individual sample bricks, which have been split into four pieces and labeled. Two pieces are tested as dry brick for sulfur and fluorine, and two pieces are fired in the tunnel kiln and then tested for sulfur and fluorine. The calculations used to determine MBE are run on the companion samples for each pollutant. Using the MBE results to calculate emissions without adjustment would over-predict actual emissions.

2. Determination of Emissions Generation Factors to Adjust the MBE

In order to determine the relationship between the MBE and the actual generation of emissions, stack testing will be performed at the kiln exhaust at the same time as the brick samples are being fired. The following two emissions generation factors are determined for each tunnel kiln:

a. Kiln Factor: The kiln factor is the numeric factor which will be applied in the mass balance calculations to the MBE so the calculated emissions correspond to the actual emissions generated by the brick being fired in the specific kiln. Typically, the actual emissions measured by the stack test are between 70% to 90% of the emissions predicted by the MBE.

b. Top Set Factor: This factor indicates any difference in MBE results for brick samples placed on the top of the brick package during firing, compared to the average MBE results of bricks placed randomly throughout the brick package on the kiln car. The purpose of determining the Top Set Factor is to increase the efficiency of the MBE testing by eliminating the requirement to test a large number of sample bricks placed throughout the brick package.

3. Determination of Tunnel Kiln Scrubber Efficiencies

Simultaneous source testing at the inlet and outlet of the tunnel kiln wet scrubbers will be utilized as the initial scientific basis for determining the emission control efficiencies that will be used in the mass balance calculations. Engineering judgment will be used to temper the measured efficiencies based on an understanding of the process and knowledge about the emissions control equipment.

4. Calculation of Annual Average Emissions and Comparison to Permit Limits

The calculations will consist of the following broad steps:

a. An emission factor (lbs of pollutant/ton of fired brick) for each clay mix fired in a specific kiln will be calculated utilizing the MBE of each clay mix, the Kiln Factor, the Top Set Factor, and the Scrubber Efficiency.

b. The total annual emissions of SO_2 and fluoride from each kiln will be calculated by multiplying the emission factor of each clay mix by that clay mix's annual usage rate and summing the results for clay mixes fired in each kiln.

c. The annual-average hourly rate will be calculated by dividing the annual emissions of each kiln by the kiln's hours of operation during the year.

d. Comparison to permit limits and documentation of the results is the final step in the process.

5. Frequency of the Various Mass Balance Activities

Sections 2 through 6 of this document present the detailed steps involved in the performance of these elements.

1.2 BACKGROUND

The variability of elemental sulfur and fluorine contents in the clays used to make brick has been an understood phenomenon during the past decade. The SO_2 emission factor data historically available from EPA's Compilation of Air Pollutant Emission Factors (AP-42) that would be applicable to the scrubber inlet loading at ISB (a natural gas kiln without controls) has ranged from negligible (April 1973 and October 1986) to 5.1 lbs/ton of fired brick (August 1997). The final report for the AP-42 August 1997 Section 11.3 (Brick and Structural Clay Products Manufacturing) states, "Because of highly variable percentages of sulfur in raw materials, SO_2 emission can be more accurately estimated using mass balance procedures." However, there are currently no mass balance procedures which have been approved by the United States Environmental Protection Agency (EPA).

The Ceramic Center at Clemson University has prepared a laboratory procedure detailing the Pyrohydrolysis Method for Fluorine Determination in Clays and Fired Ceramics (Revised June 1998). The Clemson document has an appendix containing Clemson's draft Recommended Practice for Brick Industry Compliance Monitoring Using Mass Balance Techniques (September 1995). These documents are currently being reviewed by the Brick Industry Association prior to submittal to the EPA and are included in Appendix A of the mass balance plan on file at the DAQ. Many of the concepts presented in the Clemson documents have been utilized for this mass balance plan; however, in an effort to provide more clarity, some terms have been redefined, and the concepts have been presented in a different format.

In addition to the fact that there are no approved mass balance plans, and further complicating the situation, is the fact that ISB is a unique brick manufacturing plant. Much of ISB's current production consists of relatively small volumes of special or custom bricks in terms of color, size, design, and other specifications. Other more typical brick plants produce fewer types of brick in relatively larger production runs. ISB currently uses 12 different basic clay mixes to make up approximately 37 different brick products. Currently all but one of the basic mixes are fired in both of the existing kilns.

2.0 TESTING BRICK TO DETERMINE MAXIMUM BRICK EMISSIONS

This section describes the methods for determining the MBE for each basic mix in each kiln on an ongoing basis. The MBE are the difference between the elemental fluorine/sulfur content in the dried brick just prior to firing and the elemental fluorine/sulfur content remaining in the brick after firing. This net fluorine/sulfur loss during firing is expressed in terms of mass of pollutant/mass of fired brick.

Because ISB currently uses 12 different basic clay mixes to make up approximately 37 different brick products, some simplifying assumptions are required so that the mass balance method does not become overly complex and difficult to accomplish. In order to create the different brick products from the 12 basic clay mixes, small amounts of additives such as manganese are included in certain bricks, and there are variations in the firing temperatures and firing regimes of the different brick products. For the purpose of this mass balance plan, it is assumed that each of the 12 basic clay mixes will have the same MBE in a particular kiln, regardless of differing additives or firing regimes. During all mass balance testing which is performed, the basic clay mix, the name of the brick product, and the kiln in which the brick was fired will be recorded. This information will provide data to help re-evaluate this simplifying assumption, if required, at some future date.

2.1 SAMPLE COLLECTION OF DRY BRICK AND FIRED BRICK

Samples of brick to be analyzed will be prepared and collected in the following manner:

1. Starting with bricks that have been processed through the normal brick drying process and are ready to be fired, divide each dry brick into four pieces. Mark each piece with the date, the mix number, kiln number, and a sample ID number unique to each brick.

2. Remove two pieces of each sample brick, place in individual Ziplock bags, and set aside. (These will later be sent out to be tested as dry brick.)

3. Place the remaining two pieces of each sample brick on the kiln car and fire in the normal fashion in the tunnel kiln. The location to place the sample brick on the kiln car depends on whether or not the Top Set Factor is being determined. If the testing includes determination of the Top Set Factor, then there is a specific procedure for placement of the samples (see Section 3.2). If the testing does not include determination of the Top Set Factor, then the brick samples can be "top set" i.e., placed conveniently on the top of the brick package.

4. After firing, the sample brick pieces should be removed from the kiln car, allowed to cool, then placed in Ziplock bags and packaged with the companion samples of dry brick previously collected.

a. One piece of dry brick and one piece of fired brick from each sample brick should be packaged together and sent to the laboratory for fluorine testing. A chain-of-custody document should be filled out, including at a minimum the following information: the date, the mix number, the kiln number, the identifying mark unique to that sample brick, and the brick product name.

b. One piece of dry brick and one piece of fired brick from each sample brick should be packaged together and sent to the laboratory for sulfur testing. A chain of custody document should be filled out, including at a minimum the following information: the date, the mix number, the kiln number, the identifying mark unique to that sample brick, and the brick product name.

5. Send the samples to be analyzed by laboratories which are capable of performing the methods described below. Be sure to include copies of pertinent pages from this mass balance plan, or otherwise ensure that the laboratory understands and complies with both the required methods and the reporting requirements.

2.2 LOSS ON IGNITION (LOI) TESTING

All samples will be tested for LOI following the Pyrohydrolysis test method presented by Clemson, of the mass balance plan on file at the DAQ. This method generally follows the American Society for Testing and Materials (ASTM) Method C831 (Ignition Loss, Second Alternative Procedure) with a modification to the testing temperature and the time at maximum temperature.

LOI is the percent loss in weight between the dry brick and the fired brick and is generally about 6%. Measurement of the LOI is required in order to report the fluorine/sulfur measured in the dry brick on a fired weight basis.

2.3 LABORATORY TEST METHOD FOR FLUORIDE

Testing for fluoride in the dry brick and fired brick samples will be accomplished using the Pyrohydrolysis test method presented by Clemson in Appendix A of the mass balance plan on file at the DAQ. The Pyrohydrolysis method has similarities to ASTM C169 (a procedure for measuring fluoride in glass ceramics) but was developed specifically for the analysis of clay-based ceramics. In the Pyrohydrolysis method, a vanadium pentoxide catalyst is mixed with the pulverized sample, which is placed in a preheated tube furnace. Steam is used to help liberate fluorine from the sample. The fluorine determination is made using an ion-specific electrode (ISE).

At a minimum, the following will be reported for each sample:

- Sample ID, sample date, clay mix number, kiln number
- LOI
- fluorine content in the dry brick sample (wt F/wt sample)
- fluorine content in the dry brick sample - fired weight basis (wt F/fired wt)
- fluoride MBE

2.4 LABORATORY TEST METHOD FOR SULFUR

Testing for sulfur in the dry brick and fired brick samples will be accomplished using a method similar to ASTM D5016 (Sulfur in Ash from Coal and Coke using High-Temperature Tube Furnace Combustion Method with Infrared Absorption). No ASTM method has been published specifically for determining the sulfur content of clay and clay-based ceramics. The laboratory furnace shall be of the resistance type, such as the LECO Model SC 32, or the LECO Model SC 444. Appendix B of the mass balance plan on file at the DAQ includes a copy of correspondence with the LECO Corporation regarding their laboratory equipment designed for the quantitative analysis of sulfur, as well as a copy of ASTM D5016.

At a minimum, the following will be reported for each sample:

- Sample ID, sample date, clay mix number, kiln number
- LOI
- sulfur content in the dry brick sample (wt S/wt sample)
- sulfur content in the dry brick sample - fired weight basis (wt S/fired wt)
- sulfur MBE

2.5 MBE CALCULATIONS

The MBE for any set of companion samples (dried brick & fired brick pieces of the same sample brick) are calculated as follows:

$$\mathbf{MBE = C_{dry} - C_{fired}} \qquad \textbf{[Eqn. 2.5]}$$

Where:

Cdry = fluorine/sulfur content in the dry brick sample [lbs/ton fired brick]

Cfired =fluorine/sulfur content in the fired brick sample [lbs/ton fired brick]

The MBE represent the maximum amount of elemental fluorine or sulfur that would be emitted by the sample.

3.0 EMISSIONS GENERATION FACTORS

In order to determine the relationship between the MBE and the actual emissions at the kiln exhaust, stack testing will be performed at the kiln exhaust at the same time as the brick samples are being fired. The results are used to determine the Kiln Factor. The Top Set Factor is determined by analyzing the MBE of sample bricks placed on the top of the kiln car compared to the average MBE for brick samples placed randomly throughout the kiln car profile.

3.1 DETERMINING KILN FACTORS

Emissions generation factors for the kilns will be determined by performing the following United States EPA 40 CFR 60, Appendix A, Reference Method (RM) source tests on the kiln exhaust at the same time as the brick samples are being fired:

- Sample Location - RM 1
- Airflow - RM 2
- Gas Analysis for CO2, excess air, molecular weight of stack gases - RM 3
- Moisture content in stack gases - RM 4
- SO_2 - RM 6, 6A, 6B, or 6C
- Fluoride - RM 13B Determination of total fluoride emissions from stationary sources (specific ion electrode method)

The source tests will consist of three one hour test runs. Results will be reported as the average of the three test runs.

The Kiln Factor for each pollutant will be determined by the following formula:

Kiln Factor = RM / MBE **[Eqn. 3.1]**

Where:

MBE = average elemental fluoride/sulfur MBE [lbs of pollutant/ton fired brick] of the sample brick fired during the stack test.

RM = average total fluoride/sulfur dioxide emission rate from stack test [lbs of pollutant/ton fired brick]

The kiln factor for fluoride is expected to be less than one, whereas the kiln factor for sulfur dioxide is expected to be less than two because the molecular weight of SO_2 is approximately two times that of sulfur.

3.2 DETERMINING TOP SET FACTORS

The Top Set Factor indicates any difference in MBE results for brick samples placed on the top of the brick package during firing, compared to the average MBE results of bricks placed randomly throughout the brick package. The purpose of determining the Top Set Factor is to increase the efficiency of MBE testing by eliminating any requirement to test a large number of sample bricks placed throughout the brick package.

According to Clemson, testing at other facilities has indicated, in most cases, that there is little variation in MBE related to the placement of the sample bricks on the kiln car, i.e., the Top Set Factor was equal to 1.0. It is anticipated that if there is a Top Set Factor significantly different from 1.0, it may be a function of the characteristics of the kiln or the design of the kiln car brick package (the design of the stack of bricks on the kiln car), rather than the clay mix.

The procedure to determine the Top Set Factor was patterned after Clemson, Appendix A, page A-17, of the mass balance plan on file at the DAQ. A statistically designed test matrix for sampling one kiln car, with sample bricks located from side to side and top to bottom of the brick package, will be formulated. The sampling scheme will be arranged as follows:

1. The number of samples will be computed using 95% confidence limits for test data based on the "Student's t-Test" as determined by using the test vendor's standard deviation for the test method being employed. The minimum number of sample bricks will be three. Each sample brick will be labeled and divided into companion samples for fluorine and sulfur testing as described in Section 2.1.

2. A grid will be made of the brick package profile from side to side (i.e., in the horizontal plane), and another grid will be made of the brick package profile from top to bottom (i.e., in the vertical plane). Each grid position will be assigned a number. Sample positions will be selected based on use of a random number table. The samples will include at least one sample brick located on top of the brick package (a Top Set sample). Each piece of the sample bricks will be marked with its grid position number. The dried brick companion sample pieces will be manually removed from the kiln car after drying. The brick package will then be fired in the tunnel kiln. After firing, the fired companion samples will be removed, and all samples will be sent to the laboratories to be tested according to the methods specified in Section 2.

After all samples have been tested for fluorine and sulfur and the MBE calculated, the Top Set Factor for each pollutant is calculated as follows:

$$\textbf{Top Set Factor} = (MBE_{Top\ Set}) / (MBE_{Whole\ Car}) \qquad \textbf{[Eqn. 3.2]}$$

Where:

$MBE_{Top\ Set}$ = average MBE of Top Set sample bricks [lbs of pollutant/ton fired brick]

$MBE_{Whole\ Car}$ = average MBE of all sample bricks on the car [lbs of pollutant/ton fired brick]

4.0 SCRUBBER EFFICIENCIES

4.1 SCRUBBER PERFORMANCE BACKGROUND

The purpose of determining the scrubber efficiency is to select a single control efficiency number for each kiln that will be representative of actual scrubber operation throughout the year. This parameter was described as the "annual average scrubber efficiency" in the intent to approve DAQE-726-98 dated October 14, 1998. The scrubber efficiency chosen should be a reasonable number that does not result in a gross underestimation or overestimation of the emissions. The selection of a scrubber efficiency based solely upon the latest source test performed by the methods listed above may provide misleading results when utilized as part of the mass balance method for estimating annual average emissions. A brief discussion in support of this statement follows, and additional detailed information can be found in a letter dated February 4, 1999, from SECOR to Mr. Nando Meli, of the DAQ.

The packed tower scrubber installed on Kiln #3 in October 1995 provides an example in support of the use of engineering judgment along with source testing. The October 31, 1995, source test of the new packed tower scrubber outlet on Kiln #3 demonstrated a scrubber control efficiency of 99.7% for sulfur dioxide at that particular point in time. The test procedure appeared to be valid, and the results probably constituted a valid data point representing the specific circumstances of October 31, 1995.

The scrubber vendor indicated prior to the 1995 source test that the predicted control efficiency for SO_2 would be approximately 95%, but that the actual performance depended on many things. He stated further that the vendor was not willing to guarantee a specific control efficiency in the challenging process environment at a brick plant.

A source test of the Kiln #3 scrubber on October 28, 1998, resulted in a control efficiency for sulfur dioxide of 93%. Both source tests utilized the reference methods proposed in this document, appeared to have been valid tests, and were accepted as valid by the DAQ upon review.

It is helpful to consider that because of a regulatory deadline, the October 31, 1995, source test of the Kiln #3 scrubber was conducted within hours of the startup of the brand-new scrubber. The condition of the packing and scrubber nozzles was pristine, and the recirculating scrubber liquid had not reached an equilibrium with regard to the concentration of pollutants. Therefore, the results of this test, while probably representative of the scrubber performance at the time of the test, are far from representative of the reasonably achievable control performance of a packed tower scrubber at ISB.

The selection of an annual average scrubber efficiency of 94% would perhaps be more representative of the year round performance of the scrubber rather than blindly choosing 99.7% control efficiency for the first three years of operation of the scrubber, or mechanically choosing 96.3%, which is the average of the two source tests.

The scientific test methods for measuring scrubber efficiency are specified in Section 4.2, and a prescription for the use of engineering judgment in determining the annual average scrubber efficiency is presented in Section 4.3.

4.2 REFERENCE METHODS FOR SOURCE TESTING

Scrubber control efficiencies for fluorides and sulfur dioxide from each kiln will be determined by using a combination of EPA Reference Method (RM) source testing and engineering judgment. Simultaneous scrubber inlet and scrubber outlet testing will be conducted. It is recommended, but not required, that brick samples be fired to determine the MBE of any clay mix at the same time the source test is conducted. The following EPA Reference Methods will be used:

- Sample Location - RM 1
- Airflow - RM 2
- Gas Analysis for CO2, excess air, molecular weight of stack gases - RM 3
- Moisture content in stack gases - RM 4
- SO_2 - RM 6, 6A, 6B, or 6C
- Fluoride - RM 13B Determination of total fluoride emissions from stationary sources (specific ion electrode method)

The source tests will consist of three one-hour test runs. Results will be reported as the average of the three test runs.

4.3 DETERMINING SCRUBBER EFFICIENCIES

In order to determine scrubber efficiencies, source testing will be performed utilizing the reference methods listed in Section 4.2. All available source tests for each scrubber will be carefully reviewed and analyzed. Scrubber efficiency shall be measured by EPA RM testing. Any scrubber efficiency that is selected and utilized in the mass balance plan that is different than the scrubber efficiency measured by EPA RM testing shall require justification to DAQ.

The proposed use of a scrubber efficiency higher than 96% will require detailed justification but not approval by DAQ. The risk is to the facility, in that it may under-report emissions. The use of a scrubber efficiency lower than 90% will require detailed justification from ISB and approval by the DAQ.

As long as the control efficiency measured in the most recent reference method test for a particular scrubber is not lower than 90%, then a scrubber efficiency in the range of 90% to 96% can be selected and utilized in the mass balance plan without detailed justification or further approval by the DAQ.

5.0 ANNUAL AVERAGE EMISSIONS CALCULATIONS

Calculations will be performed separately for each pollutant. The calculations will consist of the following steps:

5.1 CALCULATION OF CLAY MIX EMISSION FACTORS

An emission factor (lbs of pollutant/ton of fired brick) for each clay mix fired in a specific kiln will be calculated utilizing the MBE of each clay mix, the Kiln Factor, the Top Set Factor, and the Scrubber Efficiency.

For each clay mix fired in each kiln, use the following three steps to calculate the emission factor:

1. The MBE of any top set bricks not part of the sample grid test described in Section 3.2 must be adjusted using the Top Set Factor for that particular kiln as follows:

   $$\mathbf{MBE_{TS,\ Mix\ nn,\ Kiln\ n} = (MBE_{Sample,\ Mix\ nn})(Top\ Set\ Factor_{Kiln\ n})} \qquad \textbf{[Eqn. 5.1A]}$$

   $$\mathbf{Normalized\ MBE = (MBE)/(Top\ Set\ Factor)} \qquad \textbf{[Eqn. 5.1A Rev]}$$

2. Calculate the average of all MBETS and average MBE determined in a sample grid test described in Section 3.2.

   $$\mathbf{MBE_{Avg,\ Mix\ nn,\ Kiln\ n} = (\Sigma\ MBE_{TS,\ Mix\ nn,\ Kiln\ n} + \Sigma\ MBE_{Grid\ Avg}) / (Number\ of\ Data\ Points)}$$
   [Eqn. 5.1B]

3. Calculate the emission factor (EF), in lbs of pollutant/ton of fired brick, for a particular clay mix as follows:

   $$\mathbf{EF_{Mix\ nn,\ Kiln\ n} = (MBE_{Avg,\ Mix\ nn,\ Kiln\ n})(Kiln\ Factor_{Kiln\ n})(1 - Scrubber\ Efficiency_{Kiln\ n})}$$
   [Eqn. 5.1C]

   Where:
   Scrubber efficiency = fractional scrubber efficiency (such as 0.94) determined in Section 4.3.

The emission factor for each clay mix run in each kiln is used in the next section to calculate annual emissions.

5.2 CALCULATION OF TOTAL ANNUAL EMISSIONS

Calculate the total annual emissions of SO_2 and fluoride, in lbs/year, from each kiln by multiplying the emission factor of each product by that product's annual throughput rate and summing the results for all brick products fired in each kiln.

$$\textbf{Annual Emissions}_{\textbf{Kiln n}} = \Sigma\ (\textbf{EF}_{\textbf{Mix nn, Kiln n}})(\textbf{Clay Mix Throughput}_{\textbf{Mix nn, Kiln n}}) \qquad \textbf{[Eqn. 5.2]}$$

5.3 CALCULATION OF ANNUAL AVERAGE HOURLY RATE

Calculate the actual annual-average hourly rate for each pollutant, in lbs of pollutant/hour, by dividing the annual emissions of each kiln by the kiln's hours of operation during the year, as follows:

$$\textbf{Annual-average}_{\textbf{Kiln n}} = (\textbf{Annual Emissions}_{\textbf{Kiln n}}) / (\textbf{Operating Hours}_{\textbf{Kiln n}}) \qquad \textbf{[Eqn. 5.3]}$$

5.4 COMPARISON TO PERMIT LIMITS AND DOCUMENTATION

Comparison to permit limits and documentation of the results are the final steps in the process. The current permit document should be reviewed to confirm the annual average hourly limits for each kiln. The annual average emission rates calculated by the mass balance method should be lower than the permit limits.

Document the calculations and the comparison to the permit limits. Include the date of the final results and the name of the person who performed the calculations.

6.0 TESTING FREQUENCY

ISB submitted a previous version of this mass balance plan to the DAQ on December 1, 1994. That initial plan was based on a similar intent to this document, although it did not contain detailed specifications for the test methods. During 1995 and 1996, many of the basic clay mixes utilized in the two existing kilns were tested for MBE. The actual methods used to collect the samples and conduct laboratory analysis for fluoride and sulfur were very similar to, or identical to, the methods specified in the current document. Companion samples of dry brick and fired brick were tested for fluoride by Clemson using the Pyrohydrolysis method, and for sulfur by Mission Clay Products using a LECO Model SC 32 sulfur determinator.

Kiln Factors and Top Set Factors have not yet been determined. Sufficient data exists to determine the scrubber efficiency for the Kiln #3 scrubber, but neither the Kiln Factor nor the Scrubber Efficiency for Kiln #4 can be determined until the proposed new scrubber is installed. The lack of an approved kiln exhaust/scrubber inlet location that meets the requirements of EPA RM1 at Kiln #4 precludes Kiln Factor and Scrubber Efficiency testing until an approvable test location is installed during the installation of the new scrubber.

6.1 MBE TESTING

Within the 24 months following issuance of the AO based on intent to approve DAQE-726-98, ISB will perform MBE testing for all of the clay mixes/kiln combinations which have not previously been tested. Because some of the clay mix/kiln combinations are not run every year, a shorter time frame would not be reasonable.

Any new clay mixes, or existing clay mixes which have been significantly changed, will be tested for MBE during its first year of production. The definition of a significant change that would trigger the requirement for new MBE testing of an existing clay mixture is as follows:

A significant change is when greater than 30% of the ingredients of an existing clay mix, on a weight basis, have been changed.

Retesting for the MBE of the clay mixes, which represent 15% of the number of clay mix/kiln combinations, will be performed during each year. For instance, if there are 23 different clay mix/kiln combinations, 3 clay mix/kiln combinations will be tested each year on a rotating basis (23 X 0.15 = 3.45 which rounds to 3).

The MBE testing activities listed above can be satisfied by either top set brick testing or by the grid matrix testing, which is performed to determine the Top Set Factor.

6.2 TOP SET FACTOR TESTING

Within the 12 months following issuance of the AO, ISB will perform a total of four Top Set Factor tests (two in each of the existing kilns). If the resulting Top Set Factor values for a kiln are in the range of 0.90 to 1.10, or if the Top Set Factor values are outside of this range but are within plus or minus 10% of each other, then there is no additional requirement for Top Set Factor testing for that kiln. The average value of the results will be utilized as the Top Set Factor for that kiln.

If the Top Set Factor values are not within the ranges specified above, then Top Set Factor testing for the basic clay mixes that make up 50% of the facility's production throughput will be performed at the rate of two the clay mixes tested per year until all of clay mixes are tested.

6.3 KILN FACTOR TESTING

During the first two regularly scheduled compliance tests for each kiln following the issuance of the AO, Kiln Factor testing will be performed, except in the case where the AO has been issued and source testing is performed on the existing Kiln #4, which does not have a valid kiln exhaust test location. The requirement can be satisfied by either top set brick testing or by the grid matrix testing, which is performed to determine the Top Set Factor.

After the Kiln Factor for a kiln has been determined, there is no additional Kiln Factor testing requirement, unless a significant change has been made to the kiln itself, in which case Kiln Factor testing with be performed during the next regularly scheduled compliance test.

6.4 SCRUBBER EFFICIENCY TESTING

During the first two regularly scheduled compliance tests for each kiln following the issuance of the AO, Scrubber Efficiency testing will be performed, except in the case where the AO has been issued and source testing is performed on the existing Kiln #4, which does not have a valid kiln exhaust test location.

After the Scrubber Efficiency has been determined, there is no additional Scrubber Efficiency testing requirement, unless a significant change has been made to the scrubber itself, in which case Scrubber Efficiency testing with be performed during the next regularly scheduled compliance test.

6.5 CALCULATIONS AND COMPARISON TO PERMIT LIMITS

Annual calculations will be performed, at a minimum, after the end of every calendar year and will be available for inspection no later than February 15, covering the preceding year.

Mass Balance Plan

TO CALCULATE FLUORIDE AND SULFUR DIOXIDE ANNUAL AVERAGE EMISSIONS FROM ISB TUNNEL KILNS

Addendum No. 1 to the Mass Balance Plan (Revised September 11, 2006)
To Calculate Hydrogen Fluoride Emissions
Interstate Brick Company (ISB), West Jordan Facility

1.0 INTRODUCTION

This is Addendum No. 1 to ISB's Mass Balance Plan, which currently is used for the purpose of demonstrating compliance with the annual average limits for SO_2 and total fluoride (TF) emissions from the Line 3 and Line 4 brick-making kilns. This addendum specifies how the Mass Balance Plan (the Plan) will also be used for demonstrating compliance with the new hydrogen fluoride (HF) emissions limits from these same sources. The Plan was initially submitted on March 4, 1999, revised on March 11, 1999, and incorporated into the AO DAQE-296-99, issued on April 15, 1999. As part of the implementation of the Plan, an Initial Mass Balance was submitted on January 15, 2002. The 2002 Initial Mass Balance included a correction to one formula in the Plan document, which is repeated in this addendum to the Plan.

The Environmental Protection Agency's Compilation of Emission Factors (AP-42) indicates in Section 11.3 Brick and Structural Clay Product Manufacturing (8/97) that it is acceptable to create an emission factor to convert between TF and HF emitted by brick kilns, based on simultaneous source tests for these two pollutants. However, the AP-42 emission factor was only given an "E rating" (low confidence for use by other facilities) because there was only a single source test from a single facility available. In order to determine a valid site-specific conversion factor between TF and HF emitted from ISB's brick kilns, simultaneous TF (Method 13B) and HF (Method 26A) testing was performed August 23–25, 2005. This testing established the relative rate of HF emissions compared to TF emissions at the facility.

This approach is a much better choice than changing source test requirements at the facility from Method 13B to Method 26A, because the somewhat complex Mass Balance Plan has been built around a substantial set of historical Method 13B tests, some of which included simultaneous sampling of the brick.

The ratio established between TF and HF was 2.9:1. In other words, for every 2.9 lbs of TF measured in the stack by Method 13B, 1.0 lb of HF was measured in the stack by Method 26A.

Therefore, facility mass rate emissions (lbs/hr, tons/yr, etc.) resulting from the Plan calculations for TF can be converted to HF in a simple calculation, as follows:

HF Mass Emissions = TF Mass Emissions / 2.9 [Eqn. Addendum 01]

If over 30% of the number of clay mixes have been replaced with new or significantly changed clay (as defined in Section 6.1 of the Plan) since August 2005, then the TF:HF ratio shall be recalculated by performing new stack testing. The stack testing shall consist of simultaneous TF and HF testing on one of the kiln stacks (either kiln can be chosen).

Example: If there are 23 different clay mixes used at the facility, 30% of the number of clay mixes would be 7 clay mixes. Starting the count in August 2005 (when the last TF:HF ratio testing was performed), once 7 clay mixes have been significantly changed (as defined in Section 6.1 of the Plan), then a new TF:HF ratio test should be scheduled during the next regularly scheduled compliance source test of one of the kilns.

As noted in the introductory paragraph, Equation 5.1A in the Plan has been corrected to the following:

Normalized MBE = (MBE) / (Top Set Factor)   [Eqn. 5.1A Rev]

Please refer to the Mass Balance plan in Appendix A for a more detailed explanation regarding the use of this equation.

Appendix C

Addendum No. 2 to the Mass Balance Plan
June 26, 2009
Method to Calculate Hydrogen Chloride Emissions
Interstate Brick Company (ISB), West Jordan Facility

This is Addendum No. 2 to ISB's Mass Balance Plan, which currently is used for the purpose of demonstrating compliance with the annual average limits for sulfur dioxide (SO_2), total fluoride (TF), and hydrogen fluoride (HF) emissions from the Line 3 and Line 4 brick-making kilns. This addendum specifies how the Mass Balance Plan (the Plan) will also be used for demonstrating compliance with hydrogen chloride (HCl) emissions limits recently added to the approval order (AO) from these same sources. The Plan was initially submitted on March 4, 1999, revised March 11, 1999, and incorporated into the Approval Order DAQE-296-99, issued April 15, 1999. As part of the implementation of the Plan, an Initial Mass Balance was submitted on January 15, 2002. Addendum No. 1 was submitted June 1, 2006 (revised September 11, 2006) to calculate HF emissions from the TF mass balance emissions results. Addendum No. 2 is responsive to the AO issued November 12, 2008, which requires that hydrogen chloride (HCl) emissions also be included in the Mass Balance Plan.

There is comparatively little data and information regarding HCl emissions from brick kilns in the literature, compared to the information available for HF. The U.S. Environmental Protection Agency's Compilation of Emission Factors (AP-42), in Section 11.3 Brick and Structural Clay Product Manufacturing (8/97), has one emission factor for uncontrolled HCl emissions of 0.17 lbs/ton fired ware. However, the AP-42 emission factor was only given an "E rating" (low confidence for use by other facilities). In addition, ISB's two kilns are controlled by wet scrubbers, therefore the use of this uncontrolled emission factor would require estimating the emissions control efficiency with respect to HCl for each scrubber.

Fortunately, ISB has conducted two source tests on each kiln for controlled emissions of HCl from each kiln's scrubber stack. The results, expressed in pounds of HCl emitted per ton of fired ware, are presented in the following table:

Scrubber Outlet Tested	**June 2004 Test (Lbs-HCl/Ton Fired Ware)**	**August 2005 Test (Lbs-HCl/Ton Fired Ware)**
Kiln No. 3	0.06	0.060
Kiln No. 4	0.01	0.008

These data tend to indicate that HCl emissions from the kilns are not greatly variable. This idea is further reinforced by the fact that the AP-42 uncontrolled emission factor of 0.17 lbs/ton, if controlled in the 65% to 94% range (a reasonable level of HCl control performance for wet scrubbers such as ISB's) would result in outlet emissions in the 0.06 to 0.01 lb/ton range. While it is not really legitimate to use these inlet and outlet numbers from totally different sources to calculate a control efficiency, this trial calculation does serve to illustrate that these emission factors are within the same order of magnitude.

ISB's HCl emission calculation utilizes the highest measured HCl emission factor from each kiln, as follows:

HCl Emissions (lbs) = Fired Ware (tons) X EF (lbs HCl/ton) [Eqn. Addendum 02]
Where:

Fired Ware is the weight of brick produced
0.06 lbs HCl/Ton Fired Ware, for Kiln No. 3
0.01 lbs HCl/Ton Fired Ware, for Kiln No. 4

There are no ongoing requirements for additional source testing for HCl as part of this Mass Balance Plan. However, if additional credible technical information regarding HCl emissions at ISB becomes available, this information should be evaluated by ISB. If ISB determines that the emission factors above should be adjusted, ISB shall submit a written revision to the Mass Balance Plan, along with the supporting technical information, to the Utah DAQ for approval.

Appendix D

Fugitive Dust Control Plan

March 6, 2012

Company Location

This plan applies to the approximate 173 acre Interstate Brick Plant site at 9,780 South, 5,200 West, West Jordan UT, 84081 located at 4,491,500 m Northing, 413,500 m Easting, UTM Zone 12 UTM Datum: NAD27

Objective of the Fugitive Dust Control Plan

The purpose of this plan is so ISB's fugitive dust control practices will comply with and be in accordance with Utah Administrative Code R307-309, Nonattainment and Maintenance Areas for PM10: Fugitive Emissions and Fugitive Dust.

The objective of this plan is to comply with R307-309-4, Fugitive Emissions: "Fugitive Emissions from any source shall not exceed 15% opacity", and the General Requirement for Fugitive Dust, R307-309-5: "opacity caused by fugitive dust shall not exceed: (a) 10% at the property boundary; and (b) 20% on site", as measured by and in accordance with EPA Method 9.

Fugitive Dust Control Plan

This plan addresses the following applicable operations as listed in R307-309-6:

Applicable R307-309-6 item	Interstate Brick Applicable areas	Applicable R307-309-6 (2) method	Specific Plan Actions
(a) Material Storage;	Piles of clay located in the clay pile storage area and loader mixing area: Raw clay storage piles, Brick body mix storage piles, and Select Clay piles. Raw clay clays are mined off site and delivered by truck to the plant site. Brick body mix storage piles formed by blending raw clays. Select clay storage piles are made from un-used clay from the plant intended for recycle.	(a) Wetting or watering (f) Wind breaks	The Water truck shall be available anytime activity is taking place and treatment is needed and shall maintain the surface as per the opacity requirements of R307-395-5 The southwest and northwest side of the clay piles and the clay mixing and storage area is bounded by a berm that is vegetated on the southwest and northwest facing sides. Vegetation shall be maintained.

Applicable R307-309-6 item	Interstate Brick Applicable areas	Applicable R307-309-6 (2) method	Specific Plan Actions
(b) Material Handling and transfer;	Wheel loaders transport Select clay from the plant up to the clay storage and loader mixing area. Wheel loaders transporting Raw clay from the Raw clay storage piles to the brick mix pile locations. Wheel loaders transporting brick mix piles to the Apron Feeder that feeds the crusher. Wheel loaders transporting brick mix from the brick mix storage piles to the Apron feeder that feeds the crusher.	(a) Wetting or watering (f) Wind breaks	The Water truck shall be available anytime activity is taking place and treatment is needed and shall maintain the surface as per the opacity requirements of R307-395-5 The southwest and northwest side of the clay piles and the clay mixing and storage area is bounded by berm that is vegetated on the southwest and northwest facing sides. Vegetation shall be maintained
(b) Material Handling and transfer;	Conveying crushed blended brick mix clays from the crusher building to the screening plant. Conveying clay from the screening plant to brick manufacturing plants.	(m) conveyor systems (n) boots on drop points	Clay transported from the crusher to the grinding plant, and from the grinding plant to the clay manufacturing plants, will be on covered conveyor belts, with covered drop points. The dust collector associated with the crusher shall be used any time clay crushing is taking place. The Apron feeder is enclosed with a roof and walls on 3 sides.
(c) Material processing;	Using wheel loaders to blend raw clays together and form brick mix clay piles.	(a) Wetting or watering	The water truck shall keep the wheel loader work area wetted as necessary whenever this work is taking place.
(d) Road ways and yard areas;	The haul road from the company gate to the clay storage piles. The Wheel loader working area where raw clays are blending into brick mixes and where brick mixes are transported to the crusher.	(h) reducing vehicular speed (k) Paving or cleaning roadways	Speed limit signs indicating a maximum speed of 15 mph shall be posted and maintained along the haul road from the entrance to the property to the clay piles. The water truck shall water the paved road rinsing it of dust whenever necessary.
(e) Material loading and dumping;	The top of the berm where clay truck discharge clay on top of the raw clay storage piles.	(h) reducing vehicular speed	Speed limit signs indicating a maximum speed of 15 mph shall be posted and maintained on top of the clay pile berm.

Applicable R307-309-6 item	Interstate Brick Applicable areas	Applicable R307-309-6 (2) method	Specific Plan Actions
	The Apron feeder inlet where wheel loaders feed the crusher.	(a) Wetting or watering	The water truck shall keep the top of the raw clay pile berm wetting as needed when pushing operations are happening. Three edges of the Apron feeder are bounded by walls and a roof encloses the feeder.
(f) hauling of materials;	Trucks bringing clay from the property entrance, over the truck scale and to the raw clay storage pile berm.	(h) reducing vehicular speed (k) Paving or cleaning roadways	Speed limit signs indicating a maximum speed of 15 mph shall be posted and maintained along the haul road from the entrance to the property to the clay piles. The water truck shall water the paved road rinsing it of dust whenever necessary.
(g) Drilling, blasting, and pushing operations	No drilling or blasting occurs on this site. Pushing operations consists of pushing off clay from the top of the bank over the edge of the pile with a loader from where clay delivery trucks discharge their load.	N/A (a) Wetting or watering	N/A The water truck shall water the paved road rinsing it of dust whenever necessary.
(h) Clearing and leveling	Clearing, Not applicable to this site. Leveling: includes pushing clay that has been dumped from clay delivery trucks off the top of the raw clay storage pile berm.	N/A (a) Wetting or watering	N/A The water truck shall keep the top of the clay pile berm wetted as necessary whenever clay trucks are dumping loads of clay.
(i) earth moving and excavation	No earthmoving or excavation regularly happens at this on this property.	N/A	N/A
(j) exposed surfaces;	The northeastern faces of the raw clay storage piles and other freestanding clay piles.		
(k) any other source of fugitive dust	The paved road from the property gate to the clay pile area. The haul roads and property outside the clay pile storage area.	(q) reducing production	Clay truck deliveries shall be suspended or not scheduled on n days when mud could be spread from the clay pile storage area onto the paved road ways.

Applicable R307-309-6 item	Interstate Brick Applicable areas	Applicable R307-309-6 (2) method	Specific Plan Actions
		(aa) Preventing, to the maximum extent possible, material from being deposited onto any paved road other than a designated deposit site (z) cleaning materials that may cause fugitive dust off roads promptly	The water truck will rinse the haul road as soon as possible of mud, if any accumulates. The water truck will rinse the haul road as soon as possible of mud if any accumulates.

Additional Plan Requirements

Water truck log

A water truck log shall be kept in the truck and maintained by the water truck operator. The log will state the date of each water truck usage event. For each usage event it will indicate: the total number of water tank fill-ups, the areas (corresponding to the areas listed above) treated and frequency of treatments, the general conditions.

Other Requirements:

R307-309-7. Storage, Hauling and Handling of Aggregate Materials: See plan above.

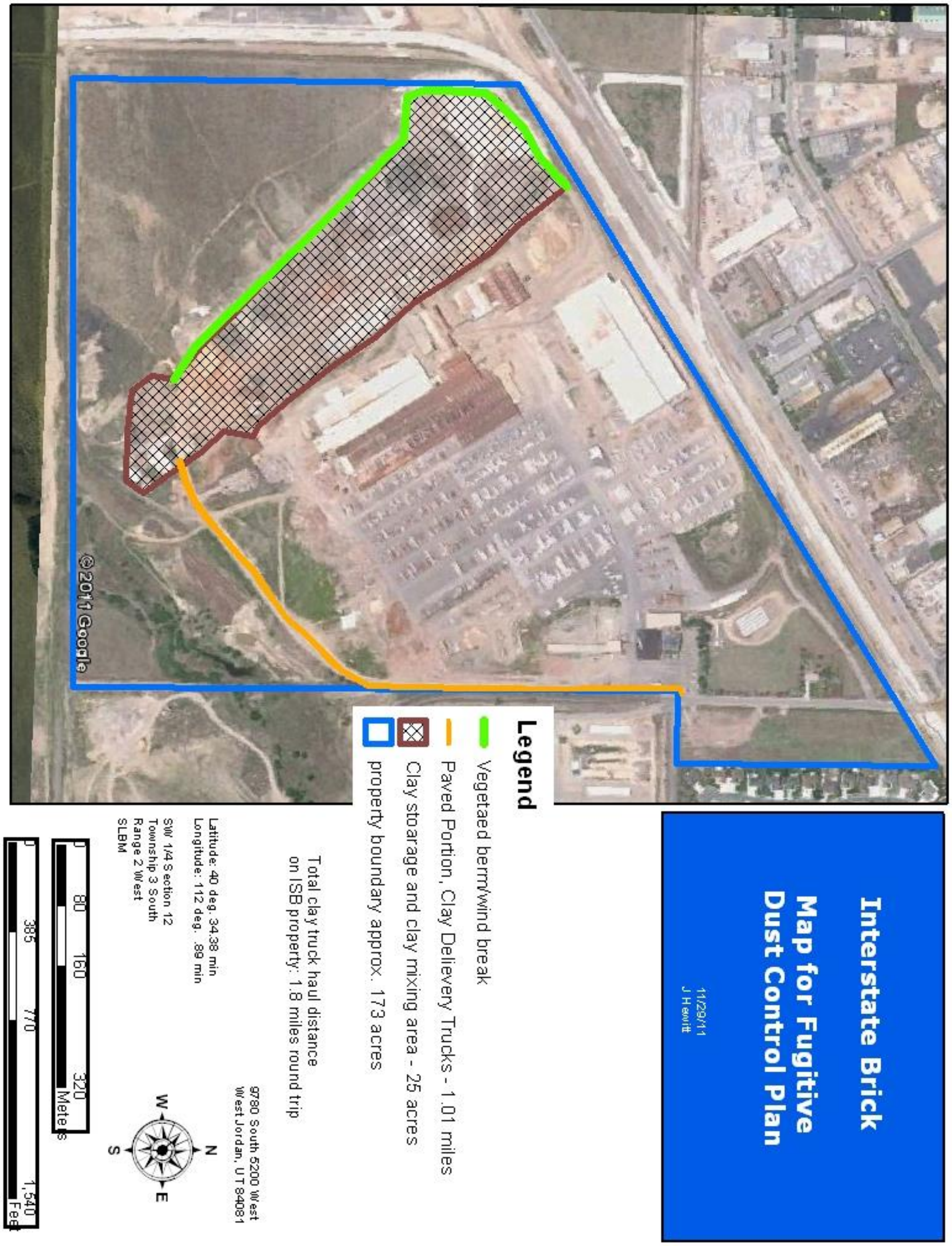
R307-309-8. Construction and Demolition Activities (shall be followed if any applicable activities occur) – Any person engaging in clearing or leveling of land with an area of one-quarter acre or more, earthmoving, excavating, construction, demolition, or moving trucks or construction equipment over cleared land or access haul roads shall prevent, to the maximum extent possible, material from being deposited onto any paved road other than a designated deposit site. Any person who deposits materials that may create fugitive dust on a public or private paved road shall clean the road promptly.

R307-309-9 Roads. – see above, Fugitive Dust Control Plan.

R307-309-10. Mining Activities **-** No mining activities occur at this location

R307-309-11. Tailing Piles and Ponds – there are no tailings piles or ponds associated with fugitive dust generation at this site.

Map of Facility



Appendix E

Allowed Maintenance Activities

Introduction

This amendment is to allow for operational maintenance activities as part of the approved air permit for Interstate Brick. These activities are necessary to ensure the continuous and efficient operation of the facility while maintaining compliance with all applicable air quality standards and emission limits.

Scope of Amendment

The permit amendment includes the following changes:

- Addition of Maintenance Provisions: Operation maintenance activities will be permitted under specific conditions including, scheduled inspections, repairs, and adjustments to equipment that may impact emissions.
- Duration and Frequency of Maintenance: Maintenance activities are expected to occur on a quarterly basis and will not exceed 40 hours per year (10 hours per quarter).

Maintenance Activities

Operation maintenance activities include the following:

- Scrubber packing removal and replacement
- De-calcification of the following:
    - Vents/Ductwork
    - Thermal Couples
    - Ph Probes
    - Mist Eliminator
    - Screens
    - Sprayers
    - Recirculation pump & piping

Emissions Control

During maintenance activities, the facility will ensure that emissions do not exceed the limits specified in the original permit. Temporary operational changes will not result in air quality violations.

Reporting and Documentation

- Maintenance Logs: A log will be kept of scheduled maintenance activities, including dates, equipment serviced, and any changes made that could affect emissions.
- Emission Monitoring: Any monitoring required during scheduled maintenance will follow the procedures outlined in the original permit. If scheduled maintenance activities lead to temporary emissions changes, those will be documented and reported as specified in the permit.