

**MISSOURI**  
DEPARTMENT OF  
NATURAL RESOURCES

**MISSOURI AIR CONSERVATION COMMISSION**

**PERMIT TO CONSTRUCT**

Under the authority of RSMo 643 and the Federal Clean Air Act the applicant is authorized to construct the air contaminant source(s) described below, in accordance with the laws, rules and conditions as set forth herein.

Permit Number: **11 2 0 1 6 - 0 0 6**

Project Number: 2016-04-049  
Installation Number: 091-0072

Parent Company: TFP Holdings, LLC

Parent Company Address: 3772 US Highway 160, West Plains, MO 65775

Installation Name: Timberland Forest Products

Installation Address: 3772 US Highway 160, West Plains, MO 65775

Location Information: Howell County, S22, T23N, R9W

Application for Authority to Construct was made for the construction of six (6) new charcoal kilns. This review was conducted in accordance with Section (5), Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required*.

Standard Conditions (on reverse) are applicable to this permit.

Standard Conditions (on reverse) and Special Conditions are applicable to this permit.

Prepared by  
Kathy Kolb  
New Source Review Unit

Director of Designee  
Department of Natural Resources

**NOV 17 2016**

Effective Date

**STANDARD CONDITIONS:**

Permission to construct may be revoked if you fail to begin construction or modification within two years from the effective date of this permit. Permittee should notify the Enforcement and Compliance Section of the Air Pollution Control Program if construction or modification is not started within two years after the effective date of this permit, or if construction or modification is suspended for one year or more.

You will be in violation of 10 CSR 10-6.060 if you fail to adhere to the specifications and conditions listed in your application, this permit and the project review. In the event that there is a discrepancy between the permit application and this permit, the conditions of this permit shall take precedence. Specifically, all air contaminant control devices shall be operated and maintained as specified in the application, associated plans and specifications.

You must notify the Enforcement and Compliance Section of the Department's Air Pollution Control Program of the anticipated date of start up of this (these) air contaminant source(s). The information must be made available within 30 days of actual startup. Also, you must notify the Department's regional office responsible for the area within which you are located within 15 days after the actual start up of this (these) air contaminant source(s).

A copy of the permit application and this permit and permit review shall be kept at the installation address and shall be made available to Department's personnel upon request.

You may appeal this permit or any of the listed special conditions to the Administrative Hearing Commission (AHC), P.O. Box 1557, Jefferson City, MO 65102, as provided in RSMo 643.075.6 and 621.250.3. If you choose to appeal, you must file a petition with the AHC within 30 days after the date this decision was mailed or the date it was delivered, whichever date was earlier. If any such petition is sent by registered mail or certified mail, it will be deemed filed on the date it is mailed. If it is sent by any method other than registered mail or certified mail, it will be deemed filed on the date it is received by the AHC.

If you choose not to appeal, this certificate, the project review and your application and associated correspondence constitutes your permit to construct. The permit allows you to construct and operate your air contaminant sources(s), but in no way relieves you of your obligation to comply with all applicable provisions of the Missouri Air Conservation Law, regulations of the Missouri Department of Natural Resources and other applicable federal, state and local laws and ordinances.

The Air Pollution Control Program invites your questions regarding this air pollution permit. Please contact the Construction Permit Unit using the contact information below.

Contact Information:  
Missouri Department of Natural Resources  
Air Pollution Control Program  
P.O. Box 176  
Jefferson City, MO 65102-0176  
(573) 751-4817

The regional office information can be found at the following website:  
<http://dnr.mo.gov/regions/>

**SPECIAL CONDITIONS:**

The permittee is authorized to construct and operate subject to the following special conditions:

*The special conditions listed in this permit were included based on the authority granted the Missouri Air Pollution Control Program by the Missouri Air Conservation Law (specifically 643.075) and by the Missouri Rules listed in Title 10, Division 10 of the Code of State Regulations (specifically 10 CSR 10-6.060). For specific details regarding conditions, see 10 CSR 10-6.060 paragraph (12)(A)10. "Conditions required by permitting authority."*

Timberland Forest Products  
Howell County, S22, T23N, R9W

1. **Superseding Condition**
  - A. The conditions of this permit supersede Special Conditions 2 found in the previously issued construction permit 062012-005 issued by the Air Pollution Control Program. Special Condition 2.C. lists requirements that are already stated in 10 CSR-6.330.
  
2. **Charcoal Kiln Processing Requirements**
  - A. Timberland Forest Products shall not simultaneously operate more than three (3) kilns during the burn cycle in the bank of six kilns known as Kiln 13 - Kiln 18.
  
  - B. Timberland Forest Products shall maintain a daily log for each charcoal kiln that includes start-up time, cool-down time, and re-light time to demonstrate compliance with Special Conditions 2.A.
  
3. **Control Device Requirements**
  - A. Timberland Forest Products shall control emissions from the charcoal kilns (EU13-EU18) using thermal oxidizer (CD-11/EP-29) as specified in the permit application. The afterburner shall be operated and maintained in accordance with the manufacturer's specifications, which shall be kept on site.
  
  - B. Timberland Forest Products shall continuously monitor and record the temperature of the thermal oxidizer (CD-11/EP-29) any time the charcoal kilns (EU13-EU18) are in operation.
  
  - C. Timberland Forest Products shall ensure that the temperature of the thermal oxidizer (CD-11/EP-29) is maintained within the normal operating range established in the emissions test reports that were provided with the application. Emission test reports (October 23, 2013) indicate that a minimum average temperature of 1438°F over a three hour time period in the lower chamber must be maintained to ensure continued compliance.
  
  - D. Timberland Forest Products may propose to use a lower minimum temperature than the one stated in Special Condition 3.C by submitting

**SPECIAL CONDITIONS:**

The permittee is authorized to construct and operate subject to the following special conditions:

subsequent testing to the Director of the Air Pollution Control Program as allowed by 10 CSR 10-6.330(E)8. Upon approval by the Director, an alternate temperature control plan may be implemented.

- E. Timberland Forest Products shall maintain an operating and maintenance log for the thermal oxidizer (CD-11/EP-29) which shall include the following:
  - 1) Incidents of malfunction, with impact on emissions, duration of event, probable cause, and corrective actions; and
  - 2) Maintenance activities, with inspection schedule, repair actions, and replacements, etc.
  
- 4. **Fuel Requirements**  
Thermal oxidizer (CD-11/EP-29) shall be fueled exclusively by propane.
  
- 5. **Record Keeping and Reporting Requirements**
  - A. Timberland Forest Products shall maintain all records required by this permit for not less than five years and shall make them available immediately to any Missouri Department of Natural Resources' personnel upon request. These records shall include MSDS for all materials used.
  
  - B. Timberland Forest Products shall report to the Air Pollution Control Program's Compliance/Enforcement Section, P.O. Box 176, Jefferson City, MO 65102, no later than ten days after the end of the month during which any record required by this permit shows an exceedance of a limitation imposed by this permit.
  
- 6. **Haul Road Watering**
  - A. Timberland Forest Products shall water haul roads whenever conditions exist which would cause visible fugitive emissions to enter the ambient air beyond the property boundary.
  
  - B. Watering may be suspended when the ground is frozen, during periods of freezing conditions when watering would be inadvisable for traffic safety reasons, or when there will be no traffic on the roads.
  
- 7. **Performance Testing**
  - A. Timberland Forest Products shall conduct performance tests on the thermal oxidizer (CD-11/EP-29) with three kilns burning simultaneously sufficient to demonstrate compliance with the emission rates of Particulate Matter (PM), Volatile Organic Compounds (VOCs) and Carbon Monoxide

**SPECIAL CONDITIONS:**

The permittee is authorized to construct and operate subject to the following special conditions:

- (CO) set forth in 10 CSR 10-6.330. VOC emissions shall be calculated as pounds of VOC per hour, not reported on a carbon or propane basis. In conjunction with the performance test, Timberland Forest Products shall also establish a MHDR for charcoal production of the new kiln system. The MHDR of the new kiln system shall be equal to or less than 0.9375 tons per hour.
- B. These tests shall be performed within 60 days after achieving the maximum production rate of the installation, but not later than 180 days after initial start-up for commercial operation and shall be conducted in accordance with the proposed stack test plan outlined in this Special Condition and the performance testing and compliance procedures in 10 CSR 10-6.330 (3)(F).
- C. Timberland Forest Products shall test the kiln system between 90 and 100% of the maximum process/production rate, which equates to 0.8437 and 0.9375 tons per hour for the thermal oxidizer (CD-11/EP-29) kiln system. If the kiln system is tested at a rate less than 90% of the maximum production rate, then 110% of the tested rate shall become the maximum allowable production rate. Timber Forest Products has the option of conducting future testing in order to increase the maximum allowable production rate under the authority of this permit, not to exceed 0.9375 tons per hour. The process/production rate shall be the average production rate conducted during compliance testing.
- D. Testing shall be conducted during periods of representative conditions, not to include periods of startup, shutdown, or malfunction. A description of the representative conditions for the performance tests is listed in 10 CSR 10-6.330 (3)(F).
- E. A completed Proposed Test Plan Form (enclosed) must be submitted to the Air Pollution Control Program 30 days prior to the proposed test date so that the Air Pollution Control Program may arrange a pretest meeting, if necessary, and assure that the test date is acceptable for an observer to be present. The Proposed Test Plan may serve the purpose of notification and must be approved by the Director prior to conducting the required emission testing.
- F. An electronic copy of a written report of the performance test results shall be submitted to the Director within 30 days of completion of any required testing. The report must include legible copies of the raw data sheets, analytical instrument laboratory data, and complete sample calculations from the required U.S. EPA Method for at least one sample run.
- G. The test report is to fully account for all operational and emission parameters addressed both in the permit conditions as well as in any other applicable state or federal rules or regulations.
- H. Actual conditions under which performance testing is conducted shall be recorded as stipulated in 10 CSR 10-6.330 (3)(F) and this Special Condition throughout each of the test runs. These conditions are to

**SPECIAL CONDITIONS:**

The permittee is authorized to construct and operate subject to the following special conditions:

include all relevant process/production parameters, all parameters relating to the status of emission controls, and all parameters set forth in 10 CSR 10-6.330 (3)(F). This data is to be included in the emissions test report. In addition, the report shall include emission factors for PM, VOCs and CO which shall be determined using emission rates and recorded charcoal production rates that have occurred during testing. No maintenance or upgrade of emission control efficiency shall be undertaken during emission testing.

- I. Emission testing results, in "mass of pollutant/volume of air," shall be reported for the pollution source airstream, free from any extraneous source of dilution air. Potential dilution air streams shall either be sealed off prior to testing or else be measured by appropriate EPA test methods and subtracted from the total airflow at the sampling location. Failure to account for dilution air can lead to cancellation of testing and/or a violation notice for "circumvention".
  - J. Timberland Forest Products shall receive approval from the Air Pollution Control Program prior to any changes in the process or throughput allowed at this installation other than that which is tested at the time of the performance test.
8. Timberland Forest Products shall submit revised calculations of the potential to emit to the Permitting Unit of the Air Pollution Control Program, within 30 days of submitting the test results report, if the emissions tested exceed any of the emission rates stated in Table 2.

REVIEW OF APPLICATION FOR AUTHORITY TO CONSTRUCT AND OPERATE  
SECTION (5) REVIEW

Project Number: 2016-04-049  
Installation ID Number: 091-0072  
Permit Number: 11 2016 - 006

Installation Address:  
Timberland Forest Products  
3772 US Highway 160  
West Plains, MO 65775

Parent Company:  
TFP Holdings, LLC  
3772 US Highway 160  
West Plains, MO 65775

Howell County, S22, T23N, R9W

REVIEW SUMMARY

- Timberland Forest Products has applied for authority to construct six (6) new charcoal kilns.
- The application was deemed complete on August 8, 2016.
- HAPs of concern from this process are methanol, Polycyclic Organic Matter (POM) and other HAPs from the kiln pyrolysis and fume combustion. HAPs of concern from this process are below major source level and individual SMALs.
- None of the New Source Performance Standards (NSPS) apply to the installation.
- None of the NESHAPs apply to this installation. None of the currently promulgated MACT regulations apply to the proposed equipment.
- The thermal oxidizer is being used to control the PM, PM<sub>10</sub>, PM<sub>2.5</sub>, CO, HAPs, and VOC emissions from the six kilns (#13–18) in this permit.
- This review was conducted in accordance with Section (5) of Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required*. Potential emissions of all pollutant are below de minimis levels.
- This installation is located in Howell County, an attainment area for all criteria pollutants.
- This installation is on the List of Named Installations found in 10 CSR 10-6.020(3)(B), Table 2. The installation is classified as item number 25. Charcoal production facilities. The installation's major source level is 100 tons per year and fugitive emissions are counted toward major source applicability.

- Ambient air quality modeling was not performed since potential emissions of the application are below de minimis levels.
- Emissions testing is required for the thermal oxidizer as a part of this permit. Testing may be required as part of other state, federal or applicable rules.
- An amended operating permit application is required for this installation within 30 days of equipment startup.
- Approval of this permit is recommended with special conditions.

### INSTALLATION DESCRIPTION

Timberland Forest Products, located in West Plains, Missouri, produces pallets and rough lumber for market and pallet manufacturing. Timberland produces a broad selection of standard hardwood pallets and skids; sawmill products such as railroad ties, grade lumber, and flooring; and wood byproducts such as mulch, firewood, and hardwood lump charcoal. The charcoal is made in twelve charcoal kilns which can produce up to 1.6 tons of charcoal per hour overall. Kilns # 1-6 operate as one charcoal kiln system known as (EP-06A). The emissions from these kilns are controlled by one thermal oxidizer (EP-06B). Kilns # 7-12 and thermal oxidizer (CD-10) operate as one charcoal kiln system known as (EP-18).

The following New Source Review permits have been issued to Timberland Forest Products from the Air Pollution Control Program:

Table 1: Permit History

Permit Number	Description
032002-008	Installation of six charcoal kilns and one thermal oxidizer afterburner
072005-043	Installation of nine charcoal kilns and three thermal oxidizer afterburners <sup>a</sup>
062012-005	Installation of six charcoal kilns and one thermal oxidizer afterburner
122014-001	Installation of a firewood kiln and sawdust burner
022015-010	Charcoal packaging

<sup>a</sup>Never constructed

### PROJECT DESCRIPTION

This project is to construct six new steel charcoal kilns. Pollutants emitted by the kilns will be controlled by a new thermal oxidizer. This project will result in increased emissions due to charcoal production, storage, packaging and hauling. The new kilns (#13-18) will be constructed to the same dimensions (25 x 45 feet) as the existing kilns. The thermal oxidizer will be constructed to the same design specifications as the



existing thermal oxidizers. The thermal oxidizer (afterburner) will use propane to maintain a minimum temperature of 1438°F (average temperature over a three hour period) in the lower chamber. The average tested temperature in the upper part of the stack averaged 1497°F suggesting that oxidation of emissions continued in the stack. Emission due to propane combustion are included in the emission rate from the stack testing since the propane contribution cannot be separated from the kiln gas contribution during testing.

There are six kilns in a series that is controlled by one thermal oxidizer. Only three of the six kilns will be operating at a time while the other three are cooling. The MHDR is based on loading the kilns with 135 tons of wood slabs resulting with 30 tons of charcoal. A batch takes approximately four days (96 hours), resulting in a MHDR of charcoal of 0.9375 tons per hour. Likewise the MHDR of loading wood slabs would be 4.22 per tons per hour.

There will be an increase in the packaging portion of the facility with the addition of these new six kilns as well as increased in haul road emissions in the delivery of slabs, shipping of finished charcoal and vehicular activity of loading and unloading the kilns.

#### EMISSIONS/CONTROLS EVALUATION

Emissions from the six charcoal kilns (#13-18) will be controlled by a propane-fired thermal oxidizer (CD-29). Emission factors for this project were determined by prior stack testing performed on units of similar design and capacity. According to Missouri State Rule 10 CSR 10-6.330, *Restriction of Emissions from Batch-Type Charcoal Kilns*, new charcoal kilns may operate without initial performance testing if three (3) separate and similar systems have successfully demonstrated compliance with the emission limit requirements of the rule. Timber Forest Products submitted two emissions test reports for testing that was performed on similar units having six (6) operating charcoal kilns equipped with a thermal oxidizer controls of the same design and capacities as those proposed for this project. The testing was performed on two (2) afterburners: located in at this site on August 26, 2003 and another on October 23, 2013. Results of this testing were used to develop the emission factors and control efficiencies for PM<sub>10</sub>, NO<sub>x</sub>, VOCs, and CO. The test results have been reviewed and approved by the Air Pollution Control Program's Testing Oversight Unit. In two memos dated October 22, 2003 and January 31, 2014, the Air Pollution Control Program's Testing Oversight Unit determined that no more than three of the six kilns may operate simultaneously, and that all the kilns must be exhausted to the thermal oxidizer (afterburner) at all times. The afterburners met the negotiated Best Available Control Technology (BACT) standards incorporated in the Missouri Regulation 10 CSR 10-6.330.

The MHDR for the 6-kiln system (3 kilns burning at a time) is determined from the time expected for a batch of minimum duration. Assuming a maximum production of 30 tons per kiln (approximately 135 total tons of slabs) and a minimum batch length of 96 hours (4 days), the MHDR for the system will be 0.9375 tons per hour. The wood slab MHDR was calculated to be 4.22 tons per hour.

Pollutant emissions from the charcoal kiln/afterburner system (CD-29) will consist of filterable and condensable PM, CO, VOCs, NO<sub>x</sub>, SO<sub>2</sub>, GHG, and HAPs. The emission factors are derived from emission rates and production data obtained during the source testing previously conducted at West Plains' facility. Sulfur dioxide (SO<sub>2</sub>) emissions have been calculated AP-42, *Compilation of Air Pollutant Emission Factors*, Fifth Edition, Section 1.6 *Wood Residue Combustion in Boilers* (September 2003) Table 1.6-2. The SO<sub>x</sub> emissions were calculated using 24 mmBTU/cord as the heating value of red oak and the weight of red oak being 3,760 lbs/cord.

Potential emission of the all the HAPs was calculated using the wood boiler emission factors and scaled based upon VOC and PM ratio from the current stack test and AP-42, *Compilation of Air Pollutant Emission Factors*, Fifth Edition, Section 1.6 *Wood Residue Combustion in Boilers* (September 2003). Potential emission of the all of the individual HAPs were found to be below the SMAL.

CO<sub>2</sub> emissions were calculated using the most recent stack data test report stating that CO<sub>2</sub> average concentration was 14.31 % of the dry flow volume. Using the mass emission rate calculation, CO<sub>2</sub>, GHG (mass) and GHG (CO<sub>2</sub>e) emissions were determined.

Emissions from the wood slab delivery are based on the rate of charcoal production and the quantity of wood required for the production. In general, 4.5 tons of wood are required to produce one ton of raw charcoal. Therefore, to produce 0.9375 tons per hour of charcoal, 4.2 tons per hour of wood slabs are required. A semi-truck will deliver wood slabs an average of 1,400 feet on unpaved roads to storage areas throughout the property. Wood slabs will be transferred by truck from their storage location to staging areas near the kilns. The distance of travel will average 2,132 feet on unpaved surfaces. A loader will transfer wood slabs from the staging area to the charcoal kilns. The distance traveled is approximately 115 feet on paved and unpaved surfaces (vehicular activity). For this short distance, emissions are calculated using the unpaved road equations.

Charcoal hauling emission calculations are based on the charcoal production rate of 0.9375 tons per hour. A loader loaded with charcoal from the kilns will haul the material approximately 400 feet on an unpaved surface to the charcoal storage shed. Charcoal stored in the storage shed will be shipped via loader over approximately 400 unpaved feet to the packaging facility. Emission point EP-07, Raw Charcoal Storage, includes particulate matter emissions from vehicular activity of the loader and two drop points at the charcoal storage shed. The loader will bring a load of charcoal from the kilns and deposit the load in the storage shed (one drop point). The loader will pick up the charcoal from the pile, travel approximately 400 feet on unpaved and unload at the packaging facility (second drop point).

There will be an increase in packaging emissions. These emissions were calculated using similar factors as calculated in Permit No. 022015-010. Particulate emissions from the conveying, screening, and bagging operations were calculated using emission factors obtained from the EPA's online emission factor database (WebFIRE). There are

no emission factors for the processing of lump charcoal, so emission factors from similar operations (SCC 3-05-016-07 Raw Material Transfer/Conveying, SCC 3-05-011-07 Cement Loading, and SCC 3-05-025-11 Screening Sand/Gravel) were used. Since there were no emission factors listed for PM or PM<sub>2.5</sub>, a particle size distribution was obtained from AP-42, Appendix B, Table B.2.2, Category 3. The particle size distribution for PM<sub>10</sub> is 51% of PM, and the particle size distribution for PM<sub>2.5</sub> is 15% of PM.

Particulate emissions from the conveying, screening, and bagging operations are controlled by a baghouse. A capture efficiency of 95% was given to each piece of equipment EP-23 through EP-28 due to the use of canopy hoods over each emission point. The hoods draw in exhaust air using the negative pressure created by a 15hp motor. The control efficiency of the baghouse is 99%. The use of the baghouse is required per Special Condition 2 of Permit # 022015-010.

The emission factors used in the analysis of the haul roads (EP-04 & EP-06), and the charcoal vehicular activity (EP-02) were obtained from the following Sections of AP-42: Section 13.2.2 *Unpaved Roads* (November 2006) and Section 13.2.3 *Paved Roads* (January 2011).

The following Table 2 provides an emissions summary for this project. Existing actual emissions were taken from the installation's 2015 EIQ. Existing Potential Emissions were taken from Permit 022015-010 (See note 1 below). Potential emissions of the application represent the potential of the new equipment, assuming continuous operation (8760 hours per year).

This project was submitted within two years of Permit No. 022015-010 and the emissions from that permit and this project were added together.

After review the previous permits, Permit #062012-005 (Kilns #7-12) and the initial Permit #032002-008, the NOx emissions were over calculated resulting in an annual NOx limits for the equipment permitted under Permit #062012-005. Permit 062012-005 did not correctly use the stack test emissions average from the test conducted August 26, 2003. Permit #032002-008 used "industry" emission factors and required testing. The stack test results were never used to amend that permit's PTE, therefore the facility's existing potential to emit is inflated. Therefore the existing facility's PTE was recalculated in order to be more representative of the facility's PTE. The NOx limit as a result at the recalculations is no longer needed since the PTE of the project is now 7.01 tpy. Therefore, Special Conditions 2A. and 2.B. of Permit 062012-005 have been superseded. Special Condition 2.C. of Permit # 06-062012-005 was also superseded since it is already required by 10 CSR 10-6.330.

Table 2: Emissions Summary (tpy)

Pollutant	Regulatory De Minimis Levels	Existing Potential Emissions <sup>1</sup>	Existing Actual Emissions (2015 EIQ)	Potential Emissions 2014-12-006 022015-010 Project <sup>5</sup>	Potential Emissions 2016-04-049 (this project)	Combined Project PTE	New Installation PTE
PM	25.0	18.0	N/A	8.43	12.96	21.39	39.39
PM <sub>10</sub>	15.0	11.31	21.94	4.15	5.58	9.73	21.04
PM <sub>2.5</sub>	10.0	7.58	15.6	1.19	1.93	3.12	10.70
SO <sub>x</sub>	40.0	12.04	0.13	N/A	5.90	5.90	17.94
NO <sub>x</sub>	40.0	18.92	25.08	N/A	6.08	6.08	25.00
VOC	40.0	0.60	0.42	N/A	0.04	0.04	0.64
CO	100.0	8.98	6.79	N/A	0.08	0.08	9.06
CO <sub>2</sub>	N/A	N/D	N/A	N/A	12,616.16	12,616.16	N/D
Methanol <sub>2</sub>	10.0	0.21	N/A	N/A	0.002	0.002	0.312
Methane	N/A	0.15	N/A	N/A	0.10	0.10	0.25
POM <sup>3</sup>	10.0	1.3E-05	N/A	N/A	2.94E-04	2.94E-04	3.07D-04
GHG (CO <sub>2</sub> e)	75,000 / 100,000	N/D	N/A	N/A	12,618.68	12,618.68	N/D
GHG (mass)	0.0 / 100.0 / 250.0	N/D	N/A	N/A	12,616.26	12,616.26	N/D
HAPs <sup>4</sup>	10.0/25.0	0.04	0.11	N/A	0.054	0.054	0.094

N/A = Not Applicable; N/D = Not Determined

<sup>1</sup>These emissions existed prior to Permit No. 022015-010. The existing emissions were recalculated for this project to reflect emission rates from the August 26, 2003 stack test. Greenhouse gases were not calculated and are not expected to exceed those calculated for this project.

<sup>2</sup>Methanol's SMAL and major source level is 10 tons/yr.

<sup>3</sup>Major source level is 10 tons per year; SMAL for POM is 0.01 tons per year.

<sup>4</sup>Potential emission of the all the HAPs was calculated using the wood boiler emission factors and scaled based upon VOC and PM ratio for particulate HAPs from the current stack test and AP-42 Chapter 1.6. Potential emission of the all of the individual HAPs were found to be below the SMAL.

### PERMIT RULE APPLICABILITY

This review was conducted in accordance with Section (5) of Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required*. Potential emissions of all pollutants are below de minimis levels.

## APPLICABLE REQUIREMENTS

Timberland Forest Products shall comply with the following applicable requirements. The Missouri Air Conservation Laws and Regulations should be consulted for specific record keeping, monitoring, and reporting requirements. Compliance with these emission standards, based on information submitted in the application, has been verified at the time this application was approved.

## GENERAL REQUIREMENTS

- *Submission of Emission Data, Emission Fees and Process Information, 10 CSR 10-6.110*
  - Per 10 CSR 10-6.110(4)(B)2.B(II) and (4)(B)2.C(II) a full EIQ is required for the first full calendar year the equipment (or modifications) approved by this permit are in operation.
- *Operating Permits, 10 CSR 10-6.065*
- *Restriction of Particulate Matter to the Ambient Air Beyond the Premises of Origin, 10 CSR 10-6.170*
- *Restriction of Emission of Visible Air Contaminants, 10 CSR 10-6.220*
- *Restriction of Emission of Odors, 10 CSR 10-6.165*

## SPECIFIC REQUIREMENTS

- *Restriction of Emission of From Batch-Type Charcoal Kilns, 10 CSR 10-6.330*

## STAFF RECOMMENDATION

On the basis of this review conducted in accordance with Section (5), Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required*, it is recommended that this permit be granted with special conditions.

## PERMIT DOCUMENTS

The following documents are incorporated by reference into this permit:

- The Application for Authority to Construct form, dated April 21, 2016, received April 25, 2016, designating TFP Holdings, LLC as the owner and operator of the installation.

## APPENDIX A

### Abbreviations and Acronyms

<b>%</b> .....	percent	<b>m/s</b> .....	meters per second
<b>°F</b> .....	degrees Fahrenheit	<b>Mgal</b> .....	1,000 gallons
<b>acfm</b> .....	actual cubic feet per minute	<b>MW</b> .....	megawatt
<b>BACT</b> .....	Best Available Control Technology	<b>MHDR</b> .....	maximum hourly design rate
<b>BMPs</b> .....	Best Management Practices	<b>MMBtu</b> ...	Million British thermal units
<b>Btu</b> .....	British thermal unit	<b>MMCF</b> .....	million cubic feet
<b>CAM</b> .....	Compliance Assurance Monitoring	<b>MSDS</b> .....	Material Safety Data Sheet
<b>CAS</b> .....	Chemical Abstracts Service	<b>NAAQS</b> ..	National Ambient Air Quality Standards
<b>CEMS</b> .....	Continuous Emission Monitor System	<b>NESHAPs</b>	National Emissions Standards for Hazardous Air Pollutants
<b>CFR</b> .....	Code of Federal Regulations	<b>NO<sub>x</sub></b> .....	nitrogen oxides
<b>CO</b> .....	carbon monoxide	<b>NSPS</b> .....	New Source Performance Standards
<b>CO<sub>2</sub></b> .....	carbon dioxide	<b>NSR</b> .....	New Source Review
<b>CO<sub>2e</sub></b> .....	carbon dioxide equivalent	<b>PM</b> .....	particulate matter
<b>COMS</b> .....	Continuous Opacity Monitoring System	<b>PM<sub>2.5</sub></b> .....	particulate matter less than 2.5 microns in aerodynamic diameter
<b>CSR</b> .....	Code of State Regulations	<b>PM<sub>10</sub></b> .....	particulate matter less than 10 microns in aerodynamic diameter
<b>dscf</b> .....	dry standard cubic feet	<b>ppm</b> .....	parts per million
<b>EIQ</b> .....	Emission Inventory Questionnaire	<b>PSD</b> .....	Prevention of Significant Deterioration
<b>EP</b> .....	Emission Point	<b>PTE</b> .....	potential to emit
<b>EPA</b> .....	Environmental Protection Agency	<b>RACT</b> .....	Reasonable Available Control Technology
<b>EU</b> .....	Emission Unit	<b>RAL</b> .....	Risk Assessment Level
<b>fps</b> .....	feet per second	<b>SCC</b> .....	Source Classification Code
<b>ft</b> .....	feet	<b>scfm</b> .....	standard cubic feet per minute
<b>GACT</b> .....	Generally Available Control Technology	<b>SDS</b> .....	Safety Data Sheet
<b>GHG</b> .....	Greenhouse Gas	<b>SIC</b> .....	Standard Industrial Classification
<b>gpm</b> .....	gallons per minute	<b>SIP</b> .....	State Implementation Plan
<b>gr</b> .....	grains	<b>SMAL</b> .....	Screening Model Action Levels
<b>GWP</b> .....	Global Warming Potential	<b>SO<sub>x</sub></b> .....	sulfur oxides
<b>HAP</b> .....	Hazardous Air Pollutant	<b>SO<sub>2</sub></b> .....	sulfur dioxide
<b>hr</b> .....	hour	<b>tph</b> .....	tons per hour
<b>hp</b> .....	horsepower	<b>tpy</b> .....	tons per year
<b>lb</b> .....	pound	<b>VMT</b> .....	vehicle miles traveled
<b>lbs/hr</b> .....	pounds per hour	<b>VOC</b> .....	Volatile Organic Compound
<b>MACT</b> .....	Maximum Achievable Control Technology		
<b>µg/m<sup>3</sup></b> .....	micrograms per cubic meter		

The maximum hourly design rate for the kiln system is based on the minimum batch length of an 6 kiln system (allowing for only 3 kilns in the burn phase at a time) to be 96 hrs

The maximum charcoal production from a kiln is 30 tons. Therefore the MHDR for the system is 0.9375 tons/hour.

$$\begin{aligned} \text{Amount of charcoal produced per kiln} &= 30 \text{ tons/kiln} \\ & \quad 3 \text{ kilns} \\ & \quad 4 \text{ days} = 96 \text{ hours} \\ \text{MHDR} &= 0.9375 \text{ tons/hour} \end{aligned}$$

The emission factors used in this permit are based on the stack results that was conducted October 23, 2013 by Shell Engineering. These emission factors are not consistent to the emission factors used in the 2013 EIQ. During the test, the average charge to each kiln was 108.3 bundles of slab (approximately 134.3 tons) and yields were 31.8, 32.1, and 32.7 tons of charcoal per kiln, totally 96.6 tons. The overall length of the burn phase of the 3 kilns was not stated in stack test results and it is assumed to be 4 days as stated by Timberland Forest Products in an email dated 8/10/2016 from Chris Oravec that the burn time is 4-5 days. 31.8 + 32.1 + 32.7 = 96.6 tons of charcoal / 96 hours = 1.00625 tons/hour. Therefore, the MHDR of the stack test result is 1.00625 tons per hour.

Emission Factors for 6 kilns and one afterburner as tested 10/23/2013

Pollutant	Average Emission Rate (lb/hr)
PM Filterable	0.112
PM Condensable	0.127
CO	0.0203
Nox	1.49
VOC	0.00899
PM <sub>10</sub>	0.239
PM <sub>2.5</sub>	0.239

Emission Factors for one set of 6 kilns and on afterburner

Pollutant	Emission Factor (lb/ton)	Control Efficiency	MHDR	Emission Rate (lb/hr)	Potential Emissions (tons/yr)
PM <sub>10</sub> total	0.237516		0.9375	0.222670807	0.975298137
PM <sub>2.5</sub> total	0.237516		0.9375	0.222670807	0.975298137
PM filterable	0.111304		0.9375	0.104347826	0.457043478
PM condensable	0.126211		0.9375	0.118322981	0.518254658
CO	0.020174		0.9375	0.018913043	0.08283913
NOx	1.480745		0.9375	1.388198758	6.080310559
VOC	0.008934		0.9375	0.008375776	0.036685901
Methanol	150 uncontrolled	99.978%	0.9375	0.031359375	0.137354062
HAP/POM	0.0095 uncontrolled	99.978%	0.9375	1.98609E-06	8.69909E-06
Methane	110 uncontrolled	99.978%	0.9375	0.022996875	0.100726312
Sox	0.025		4.21875	1.346409574	5.897273936
CO <sub>2</sub>	3072.429		0.9375	2880.402342	12616.16226
GHGmass					12616.26298
GHG CO <sub>2</sub> eq					12618.68041
Total HAPs (POM+Methanol)					0.137362762

These emission factors assume that all filterable PM is PM2.5.

The methanol factor is from AP-42, Table 10.7-2. The control efficiency for methanol can be assumed to equal the VOC control efficiency established in the testing, which is 99.9777%.

POM emission factor of 0.0095 is from AP-42 Table 10.7-2, September, 1995

CO<sub>2</sub> emission factor is calculated from stack test results

Sample Calculation:

$$\text{PM}_{10} \text{ filterable EF} = 0.0.239 \text{ lb/hr} / 1.00625 \text{ tons/hr} = 0.2375 \text{ lb/ton}$$

The minimum operating temperature established in the testing for adequate CO destruction was 1438°F. This is documented in the DNR letter dated 1/31/2014

Sox emission

$$\begin{aligned} \text{Heating value of red oak} &= 24 \text{ mmBTU/cord} \\ \text{Weight of red oak/cord} &= 3760 \text{ lbs/cord} \\ 3760/24 &= 156.6667 \text{ lb/mmBTU} \\ \text{AP-42 1.6 emission factor for wood combustion} &= 0.025 \text{ lb/mmBTU} \\ \text{MHDR of wood slabs} &= 4.21875 \text{ tons per hour} \\ \text{Maximum heat input} &= 53.85638 \text{ mmbtu/hr} \\ \text{Hourly emissions} &= 1.34641 \text{ lb/hr} \\ \text{tons per year} &= 5.897274 \text{ tpy} \end{aligned}$$



**Timberland Charcoal Greenhouse Gas Calculations**

$$E_a \text{ lb/hr} = C_a \text{ mL/m}^3 \times M_w \text{ g/gmole} \times \text{gmole}/24.06 \text{ L} \times \text{lb}/453.6 \text{ g} \times \text{L}/10^3 \text{ mL} \times Q_s \text{ ft}^3/\text{min} \times \text{m}^3/35.31 \text{ ft}^3 \times 60 \text{ min/hr}$$

$$E_a \text{ lb/hr} = 143,100 \text{ mL/m}^3 \times 44 \text{ g/gmole} \times \text{gmole}/24.06 \text{ L} \times \text{lb}/453.6 \text{ g} \times \text{L}/10^3 \text{ mL} \times 3136 \text{ ft}^3/\text{min} \times \text{m}^3/35.31 \text{ ft}^3 \times 60 \text{ min/hr}$$

3074.349 lb/hr

3074.349

\*Interpolation of 22.414 at 0°C (32°F); 24.65 at 25°C (77°F)  $y = y_a + (y_b - y_a)(x - x_a / x_b - x_a)$

$$= 22.414 + 924.65 - 22.414 \times \{(68 - 32) / (77 - 32)\}$$

$$= 24.054$$

\*Reference Wikipedia

$C_a$  Concentration of analyte mL/m<sup>3</sup> (ppmV) Stack test CO<sub>2</sub> 14.31%

$E_a$  Analyte emission rate lb/hr

$M_w$  Molecular weight of analyte g/gmole

$$\text{CO}_2 = 44 = [12 + 2(16)]$$

$Q_s$  Stack flow rate, dry standard conditions 3,136 dsfm from the test data report

Production rate during stack test = 96.6 tons / 96 hours = 1.00625 tons/hour

Production rate during normal operation = 0.9375 tons/hr

$$3074.35 \text{ lb/hr} / 1.00625 \text{ tons/hr} = 3072.429 \text{ lb CO}_2/\text{ton charcoal}$$

$$3072.429 \text{ lb/ton} \times 0.9375 \text{ tons/hr} \times 8760/2000 = 12616.16 \text{ tons/yr CO}_2$$

$$\text{GHG} = \text{CO}_2 + \text{CH}_4 = 12616.26 \text{ tons / year}$$

$$\text{GHG (CO}_2\text{e)} = \text{CO}_2 + (25 \times \text{CH}_4) = 12618.68 \text{ tons/year}$$

Methane multiplier is 25

**Appendix B - Calculations**  
**Timberland Forest Products Six New Kilns 091-0072**  
**Kiln Construction Permit Application 2016-04-049**

**EP-02 Unload Kilns**

**Emission Factors** MHDR = 0.9375 tons/ hour

According to AP-42, Chapter 13.2.4 - Aggregate Handling and Storage Piles, November 2006, the particulate matter emission factors for material handling drop operations can be estimated from the following equation:

$$E = k (0.0032) \times (U/5)^{1.3} / (M/2)^{1.4}$$

Where:

k = particle size multiplier =	<table border="1"><tr><td>0.74</td></tr></table>	0.74	dimensionless (PM-30 or TSP)
0.74			
	<table border="1"><tr><td>0.35</td></tr></table>	0.35	dimensionless (PM-10)
0.35			
	<table border="1"><tr><td>0.053</td></tr></table>	0.053	dimensionless (PM-2.5)
0.053			
U = mean wind speed (mph) =	<table border="1"><tr><td>10</td></tr></table>	10	default value
10			
M = material moisture content (%) =	<table border="1"><tr><td>0.7</td></tr></table>	0.7	default value
0.7			

$E_{PM} = 0.74 \times 0.0032 \times (10/5)^{1.3} / (0.7/2)^{1.4} =$	<table border="1"><tr><td><b>0.0254</b></td></tr></table>	<b>0.0254</b>	lb/ton
<b>0.0254</b>			
$E_{PM10} = 0.35 \times 0.0032 \times (10/5)^{1.3} / (0.7/2)^{1.4} =$	<table border="1"><tr><td><b>0.0120</b></td></tr></table>	<b>0.0120</b>	lb/ton
<b>0.0120</b>			
$E_{PM2.5} = 0.053 \times 0.0032 \times (10/5)^{1.3} / (0.7/2)^{1.4} =$	<table border="1"><tr><td><b>0.0018</b></td></tr></table>	<b>0.0018</b>	lb/ton
<b>0.0018</b>			

**Potential to Emit (PTE)**

	Potential to Emit (lb / hour)			Potential to Emit (tons / yr)		
	PM	PM <sub>10</sub>	PM <sub>2.5</sub>	PM	PM <sub>10</sub>	PM <sub>2.5</sub>
<b>EP-02 Unload Kilns</b>	<b>0.0238</b>	<b>0.0112</b>	<b>0.0017</b>	<b>0.10</b>	<b>0.05</b>	<b>0.007</b>

Unload kilns and store charcoal in storage bins before transporting to the charcoal packaging facility

**PM**

Emission Point	Description	MHDR (tph)	Bottlenecked MHDR (tph)	Emission Factor (lb/ton)	Control Device	Capture Efficiency (%)	Control Efficiency (%)	Uncontrolled PTE (tpy)	Controlled PTE (tpy)
EP-22	Receiving Hopper	7.5	0.9375	0.275	None	0%	0%	1.13	1.13
EP-23	Conveyor	7.5	0.9375	0.353	None	0%	0%	1.45	1.45
EP-24	Conveyor	7.5	0.9375	0.353	Baghouse	95%	99%	1.45	0.09
EP-25	Screen	7.5	0.9375	0.510	Baghouse	95%	99%	2.09	0.12
EP-26	Conveyor	4.5	0.9375	0.353	Baghouse	95%	99%	1.45	0.09
EP-27	Conveyor	4.5	0.9375	0.353	Baghouse	95%	99%	1.45	0.09
EP-28	Charcoal Packaging	4.5	0.9375	0.235	Baghouse	95%	99%	0.97	0.06
EP-29	Fines Conveyor	3	0.9375	0.353	Baghouse	95%	99%	1.45	0.09
EP-30	Trailer Loading	3	0.9375	0.353	None	0%	99%	1.45	1.45
<b>Total</b>								<b>12.88</b>	<b>4.55</b>

**PM<sub>10</sub>**

Emission Point	Description	MHDR (tph)	Bottlenecked MHDR (tph)	Emission Factor (lb/ton)	Control Device	Capture Efficiency (%)	Control Efficiency (%)	Uncontrolled PTE (tpy)	Controlled PTE (tpy)
EP-22	Receiving Hopper	7.5	0.9375	0.14	None	0%	0%	0.57	0.57
EP-23	Conveyor	7.5	0.9375	0.18	None	0%	0%	0.74	0.74
EP-24	Conveyor	7.5	0.9375	0.18	Baghouse	95%	99%	0.74	0.04
EP-25	Screen	7.5	0.9375	0.26	Baghouse	95%	99%	1.07	0.06
EP-26	Conveyor	4.5	0.9375	0.18	Baghouse	95%	99%	0.74	0.04
EP-27	Conveyor	4.5	0.9375	0.18	Baghouse	95%	99%	0.74	0.04
EP-28	Charcoal Packaging	4.5	0.9375	0.12	Baghouse	95%	99%	0.49	0.03
EP-29	Fines Conveyor	3	0.9375	0.18	Baghouse	95%	99%	0.74	0.04
EP-30	Trailer Loading	3	0.9375	0.18	None	0%	99%	0.74	0.74
<b>Total</b>								<b>6.57</b>	<b>2.32</b>

**PM<sub>2.5</sub>**

Emission Point	Description	MHDR (tph)	Bottlenecked MHDR (tph)	Emission Factor (lb/ton)	Control Device	Capture Efficiency (%)	Control Efficiency (%)	Uncontrolled PTE (tpy)	Controlled PTE (tpy)
EP-22	Receiving Hopper	7.5	0.9375	0.0412	None	0%	0%	0.17	0.17
EP-23	Conveyor	7.5	0.9375	0.0529	None	0%	0%	0.22	0.22
EP-24	Conveyor	7.5	0.9375	0.0529	Baghouse	95%	99%	0.22	0.01
EP-25	Screen	7.5	0.9375	0.0765	Baghouse	95%	99%	0.31	0.02
EP-26	Conveyor	4.5	0.9375	0.0529	Baghouse	95%	99%	0.22	0.01
EP-27	Conveyor	4.5	0.9375	0.0529	Baghouse	95%	99%	0.22	0.01
EP-28	Charcoal Packaging	4.5	0.9375	0.0353	Baghouse	95%	99%	0.14	0.01
EP-29	Fines Conveyor	3	0.9375	0.0529	Baghouse	95%	99%	0.22	0.01
EP-30	Trailer Loading	3	0.9375	0.0529	None	0%	99%	0.22	0.22
<b>Total</b>								<b>1.93</b>	<b>0.68</b>

**Summary**

Pollutant	Uncontrolled PTE (tpy)	Controlled PTE (tpy)
PM	12.88	4.55
PM10	6.57	2.32
PM2.5	1.93	0.68

\*Particle size distribution from AP-42 Appendix B.2 Table B.2.2 Category 3, Mechanically Generated Aggregate

**Timberland Forest Products 6 New Kilns Site ID091-0072  
Kiln Construction Permit Application 2018-04-049**

**Project Emissions Summary**

	Potential to Emit (tons / yr)											GHG (mass)	GHG CO2e	Total HAPS <sup>1</sup>
	PM	PM <sub>10</sub>	PM <sub>2.5</sub>	CO	NO <sub>x</sub>	SO <sub>x</sub>	VOC	Methanol	POM	Methane	CO <sub>2</sub>			
EP-31 Kilns 13-18 Afterburner #3	0.46	0.98	0.98	0.083	6.080	5.897	0.037	0.002	2.94E-04	0.101	12616.162	12616.263	12618.680	0.054
EP-22 thru 30 Charcoal Packaging	4.55	2.32	0.68											
EP-32 Charcoal unloading from kilns to shed	0.10	0.05	0.007											
EP-33 Slab Receiving Haul Road	2.01	0.57	0.067											
EP-34 Slab Storage to Staging	3.06	0.87	0.103											
EP-35 Staging to kiln	0.84	0.24	0.028											
EP-36 Kiln to Storage Shed	0.65	0.18	0.022											
EP-37 Shed to Charcoal Packaging	0.65	0.18	0.022											
EP-38 CP finished product to Hwy	0.64	0.18	0.021											
<b>Project Total PTE</b>	<b>12.96</b>	<b>5.58</b>	<b>1.928</b>	<b>0.08</b>	<b>6.08</b>	<b>5.90</b>	<b>0.037</b>	<b>0.002</b>	<b>2.94E-04</b>	<b>0.101</b>	<b>12616.162</b>	<b>12616.263</b>	<b>12618.680</b>	<b>0.053914</b>

Recommend replacing EP-07 with EP-32 for the entire facility  
Recommend replacing EP-08 with EP-36 for the entire facility

<sup>1</sup>Total HAPS from AP-42 and NACSI wood boiler, scaled based upon kiln tested VOC and filterable PM

	Potential to Emit (tons / yr)											GHG (mass)	GHG CO2e	Total HAPS <sup>1</sup>
	PM	PM <sub>10</sub>	PM <sub>2.5</sub>	CO	NO <sub>x</sub>	SO <sub>x</sub>	VOC	Methanol	HAP/POM	Methane	CO <sub>2</sub>			
Project 2018-04-049 PTE	12.96	5.58	1.93	0.08	6.08	5.90	0.04	0.002	2.94E-04	0.10	12616.16	12616.26	12618.68	0.054
Project 2014-12-008/Permit 020015-010 PTE	8.43	4.15	1.19											
<b>Combined Projects Total PTE</b>	<b>21.39</b>	<b>9.73</b>	<b>3.118</b>	<b>0.08</b>	<b>6.08</b>	<b>5.90</b>	<b>0.04</b>	<b>0.002</b>	<b>2.94E-04</b>	<b>0.1007263</b>	<b>12616.1623</b>	<b>12616.26</b>	<b>12618.68041</b>	<b>0.054</b>

Facility haul roads for all kilns	12.63	3.41	0.40
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When reviewing this project it was noted that there were no haul roads associated with the charcoal kilns. EP-08 was the vehicular activity for delivering charcoal from the kilns to the storage shed and should be replaced with EP-36 from the haul road spreadsheet. EP-07 was designated as a storage bin according to the current EIQ. It should be replaced with EP-32 (drop point equation). Wind erosion was not calculated as stated in the EIQ because the shed is covered and protected from the weather.

Truck Type	We* (tons)	Wf* (tons)
semi	15	40
Loader	26	31
type		
type		

truck type row must sum to 100% per each act

135 tons slabs
30 ton char

Charcoal MHDR= 0.9375 tph  
Wood Slab MHDR = 4.219  
burn time

1=empty  
2=full  
3=both

Activity	MHDR		Truck Types				We*	Wf*
	(tons/hr)	(trips/hr)	semi	Loader	type	type		
EP-33 Slab Receiving Haul Road	4.219	0.169	100%				15	40
EP-34 Slab Storage to Staging	4.219	0.169	100%				15	40
EP-35 Staging to kiln	4.219	0.844		100%			26	31
EP-36 Kiln to Storage Shed	0.9375	0.188		100%			26	31
EP-37 Shed to Charcoal Packaging	0.9375	0.188		100%			26	31
EP-38 CP finished product to Hwy	0.9375	0.038	100%				15	40
		0.000					0	0
		0.000					0	0
		0.000					0	0

Road Segment ID	1	2	3	4	5	6	7	8
D one way (feet)	1400	2132	115	400	400	2000		
D one way (miles)	0.265	0.404	0.022	0.076	0.076	0.379		
EP-33 Slab Receiving Haul Road	3							
EP-34 Slab Storage to Staging		3						
EP-35 Staging to kiln			3					
EP-36 Kiln to Storage Shed				3				
EP-37 Shed to Charcoal Packaging					3			
EP-38 CP finished product to Hwy						3		

Activities

	27.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000
EP-33 Slab Receiving Haul Road	0.000	27.500	0.000	0.000	0.000	0.000	0.000	0.000
EP-34 Slab Storage to Staging	0.000	0.000	28.500	0.000	0.000	0.000	0.000	0.000
EP-35 Staging to kiln	0.000	0.000	0.000	28.500	0.000	0.000	0.000	0.000
EP-36 Kiln to Storage Shed	0.000	0.000	0.000	0.000	28.500	0.000	0.000	0.000
EP-37 Shed to Charcoal Packaging	0.000	0.000	0.000	0.000	0.000	27.500	0.000	0.000
EP-38 CP finished product to Hwy	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
W	27.50	27.50	28.50	28.50	28.50	27.50	0.00	0.00
Surface	Unpaved	Unpaved	Unpaved	Unpaved	Unpaved	Unpaved	Unpaved	Unpaved

W

E(PM2.5) (lbs/VMT):	0.29174	0.29174	0.29647	0.29647	0.29647	0.29174	0.00000	0.00000
E(PM10) (lbs/VMT):	2.91738	2.91738	2.96465	2.96465	2.96465	2.91738	0.00000	0.00000
E(PM30) (lbs/VMT):	10.25933	10.25933	10.42556	10.42556	10.42556	10.25933	0.00000	0.00000
Eext(PM2.5) (lbs/VMT):	0.20781	0.20781	0.21118	0.21118	0.21118	0.20781	0.00000	0.00000
Eext(PM10) (lbs/VMT):	2.07814	2.07814	2.11181	2.11181	2.11181	2.07814	0.00000	0.00000
Eext(PM30) (lbs/VMT):	7.30802	7.30802	7.42643	7.42643	7.42643	7.30802	0.00000	0.00000
EP-33 Slab Receiving Haul Road	0.089489	0	0	0	0	0	0	0
EP-34 Slab Storage to Staging	0	0.136278	0	0	0	0	0	0
EP-35 Staging to kiln	0	0	0.036754	0	0	0	0	0
EP-36 Kiln to Storage Shed	0	0	0	0.028409	0	0	0	0
EP-37 Shed to Charcoal Packaging	0	0	0	0	0.028409	0	0	0
EP-38 CP finished product to Hwy	0	0	0	0	0	0.028409	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
MHDR	0.089489	0.136278	0.036754	0.028409	0.028409	0.028409	0	0

MHDR

	EP-33	EP-34	EP-35	EP-36	EP-37	EP-38		
PTE PM2.5 (lb/hr)	0.0261	0.0398	0.0109	0.0084	0.0084	0.0083	0	0
PTE PM10 (lb/hr)	0.2611	0.3976	0.1090	0.0842	0.0842	0.0829	0	0
PTE PM30 (lb/hr)	0.9181	1.3981	0.3832	0.2962	0.2962	0.2915	0	0
PTE PM2.5 (tons/yr)	0.07	0.10	0.03	0.02	0.02	0.02	0	0
PTE PM10 (tons/yr)	0.57	0.87	0.24	0.18	0.18	0.18	0	0
PTE PM30 (tons/yr)	2.01	3.06	0.84	0.65	0.65	0.64	0	0

PTE (lb/hr)  
PTE (tons/yr)

pte (tpy) controlled  
0.26 pm2.5  
2.23 pm10  
7.85 pm

undocumented watering control	pm2.5	41%
	pm10	50%
	pm	50%

ivity

Haul Road ID No.:	1	2	3	4	5	6	7	8
W (tons):	27.50	27.50	28.50	28.50	28.50	27.50	0.00	0.00
s (%):	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3
P (days):	105	105	105	105	105	105	105	105
E(PM2.5) (lbs/VMT):	0.2917	0.2917	0.2965	0.2965	0.2965	0.2917	0.0000	0.0000
E(PM10) (lbs/VMT):	2.9174	2.9174	2.9647	2.9647	2.9647	2.9174	0.0000	0.0000
E(PM30) (lbs/VMT):	10.2593	10.2593	10.4256	10.4256	10.4256	10.2593	0.0000	0.0000
Eext(PM2.5) (lbs/VMT):	0.2078	0.2078	0.2112	0.2112	0.2112	0.2078	0.0000	0.0000
Eext(PM10) (lbs/VMT):	2.0781	2.0781	2.1118	2.1118	2.1118	2.0781	0.0000	0.0000
Eext(PM30) (lbs/VMT):	7.3080	7.3080	7.4264	7.4264	7.4264	7.3080	0.0000	0.0000

E =  $k (s/12)^a * (W/3)^b$  where:  
 E = size-specific emission factor (lb/VMT)  
 s = surface material silt content (%)  
 W = mean vehicle weight (tons)

**Constants for Equation**

Particle Size	k(lb/VMT)	Constant	
		a	b
PM2.5	0.15	0.9	0.45
PM10	1.5	0.9	0.45
PM30	4.9	0.7	0.45

Eext =  $E[(365-P)/365]$  where E is defined above and:  
 Eext = annual size-specific emission factor extrapolated for natural mitigation (lb/VMT)  
 P = number of days in a year with at least 0.01 inch of precipitation

Activity	MHDR		Truck Types				We*	Wf*
	(tons/hr)	(trips/hr)	semi	Loader	type	type		
EP-32 Slab Receiving Haul Road	8.438	0.338	100%				15	40
EP-33 Slab Storage to Staging	8.438	0.338	100%				15	40
EP-34 Staging to kiln	8.438	1.688		100%			26	31
EP-35 Kiln to Storage Shed	1.6130	0.323		100%			26	31
EP-36 Shed to Charcoal Packaging	1.6130	0.323		100%			26	31
EP-37 CP finished product to Hwy	1.6130	0.065	100%				15	40
		0.000					0	0
		0.000					0	0
		0.000					0	0

Truck Type	We (tons)	Wf (tons)
semi	15	40
Loader	26	31
type		
type		

truck type row must sum to 100% per each activity

135 tons slabs
30 ton char

This is the calculation for haul roads for the 12 existing kilns

Facility charcoal MHDR = 1613	16130
Facility slab MHDR = 4.219 x 2 =	8.4375

- 1=empty
- 2=full
- 3=both

Road Segment ID	1	2	3	4	5	6	7	8
D one way (feet)	1400	2132	115	400	400	2000		
D one way (miles)	0.265	0.404	0.022	0.076	0.076	0.379		
EP-32 Slab Receiving Haul Road	3							
EP-33 Slab Storage to Staging		3						
EP-34 Staging to kiln			3					
EP-35 Kiln to Storage Shed				3				
EP-36 Shed to Charcoal Packaging					3			
EP-37 CP finished product to Hwy						3		

Activities

EP-32 Slab Receiving Haul Road	27.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000
EP-33 Slab Storage to Staging	0.000	27.500	0.000	0.000	0.000	0.000	0.000	0.000
EP-34 Staging to kiln	0.000	0.000	28.500	0.000	0.000	0.000	0.000	0.000
EP-35 Kiln to Storage Shed	0.000	0.000	0.000	28.500	0.000	0.000	0.000	0.000
EP-36 Shed to Charcoal Packaging	0.000	0.000	0.000	0.000	28.500	0.000	0.000	0.000
EP-37 CP finished product to Hwy	0.000	0.000	0.000	0.000	0.000	27.500	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
W	27.50	27.50	28.50	28.50	28.50	27.50	0.00	0.00
Surface	Unpaved	Unpaved	Unpaved	Unpaved	Unpaved	Unpaved	Unpaved	Unpaved

W

W Surface

E(PM2.5) (lbs/VMT):	0.23088	0.23088	0.23462	0.23462	0.23462	0.23088	0.00000	0.00000
E(PM10) (lbs/VMT):	2.30879	2.30879	2.34620	2.34620	2.34620	2.30879	0.00000	0.00000
E(PM30) (lbs/VMT):	8.55245	8.55245	8.69102	8.69102	8.69102	8.55245	0.00000	0.00000
Eext(PM2.5) (lbs/VMT):	0.16446	0.16446	0.16713	0.16713	0.16713	0.16446	0.00000	0.00000
Eext(PM10) (lbs/VMT):	1.64462	1.64462	1.67127	1.67127	1.67127	1.64462	0.00000	0.00000
Eext(PM30) (lbs/VMT):	6.09215	6.09215	6.19086	6.19086	6.19086	6.09215	0.00000	0.00000
EP-32 Slab Receiving Haul Road	0.178977	0	0	0	0	0	0	0
EP-33 Slab Storage to Staging	0	0.272557	0	0	0	0	0	0
EP-34 Staging to kiln	0	0	0.073509	0	0	0	0	0
EP-35 Kiln to Storage Shed	0	0	0	0.048879	0	0	0	0
EP-36 Shed to Charcoal Packaging	0	0	0	0	0.048879	0	0	0
EP-37 CP finished product to Hwy	0	0	0	0	0	0.048879	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
MHDR	0.178977	0.272557	0.073509	0.048879	0.048879	0.048879	0	0

MHDR

MHDR

	EP-32	EP-33	EP-34	EP-35	EP-36	EP-37
PTE PM2.5 (lb/hr)	0.0413	0.0629	0.0172	0.0115	0.0115	0.0113
PTE PM10 (lb/hr)	0.4132	0.6293	0.1725	0.1147	0.1147	0.1129
PTE PM30 (lb/hr)	1.5307	2.3310	0.6389	0.4248	0.4248	0.4180
PTE PM2.5 (tons/yr)	0.11	0.16	0.04	0.03	0.03	0.03
PTE PM10 (tons/yr)	0.90	1.38	0.38	0.25	0.25	0.25
PTE PM30 (tons/yr)	3.35	5.10	1.40	0.93	0.93	0.92

PTE (lb/hr)  
PTE (tons/yr)

pte (tpy) controlled  
0.40 pm2.5  
3.41 pm10  
12.63 pm

undocumented watering control	pm2.5	41%
	pm10	50%
	pm	50%

	Charcoal	Slab tph
MHDR of 2012-01-017/062012-005	0.893	not stated
Design rate 2001-12-005/032002-008	0.72	not stated
	1.613	



Haul Road/Haul Truck/Material Hauled Information								
Haul Road ID No.:	1	2	3	4	5	6	7	8
W (tons)	27.50	27.50	28.50	28.50	28.50	27.50	0.00	0.00
sL (g/m <sup>2</sup> ):								
P:	105	105	105	105	105	105	105	105
N:	365	365	365	365	365	365	365	365
Haul Road - Max Hourly VMT Rate and Emission Factor Calculations								
E(PM <sub>2.5</sub> )(lbs/VMT):								
E(PM <sub>10</sub> )(lbs/VMT):								
E(PM <sub>30</sub> )(lbs/VMT):								
Eext(PM <sub>2.5</sub> )(lbs/VMT):								
Eext(PM <sub>10</sub> )(lbs/VMT):								
Eext(PM <sub>30</sub> )(lbs/VMT):								

$E = k(sL)^{0.91} * (W)^{1.02}$  where:

E = particulate emission factor (having units matching the units of k)

k = particle size multiplier for particle size range and units of interest

sL = road surface silt loading (grams per square meter) (g/m<sup>2</sup>)

W = average weight (tons) of the vehicles traveling the road

Table 13.2.1-1 PARTICLE SIZE MULTIPLIERS FOR PAVED ROAD EQUATION

Particle Size Range	k (lbs/VMT)
PM2.5	0.00054
PM10	0.0022
PM15	0.0027
PM30	0.011

$E_{ext} = [k(sL)^{0.91} * (W)^{1.02}](1-P/(4N))$  where:

k, sL, W and S are as defined above and

E<sub>ext</sub> = annual average emission factor in the same units as k

P = number of "wet" days with at least 0.01 inch of precipitation during the averaging period

N = number of days in the averaging period (365 for annual)

The equations retain the quality rating of A (D for PM2.5), if applied within the range of source conditions that were Silt loading:

0.03-400 g/m<sup>2</sup>

0.04-570 grains/square foot (ft<sup>2</sup>)

Mean vehicle weight:

1.8-38 megagrams (Mg)

2.0-42 tons

Mean vehicle speed:

1-88 kilometers per hour (kph)

1-55 miles per hour (mph)

The upper 95% confidence levels of equation 1 for PM10 is best described with equations using an exponent of 1.14

$E_{95\%} = k(sL)^{1.14} * (W)^{1.19}$

E<sub>95%</sub>(PM<sub>2.5</sub>)(lbs/VMT):

E<sub>95%</sub>(PM<sub>10</sub>)(lbs/VMT):

**PM**

Emission Point	Description	MHDR (tph)	Bottlenecked MHDR (tph)	Emission Factor (lb/ton)	Control Device	Capture Efficiency (%)	Control Efficiency (%)	Uncontrolled PTE (tpy)	Controlled PTE (tpy)
EP-21	Receiving Hopper	7.5	2.5375	0.275	None	0%	0%	3.05	3.05
EP-22	Conveyor	7.5	2.5375	0.353	None	0%	0%	3.92	3.92
EP-23	Conveyor	7.5	2.5375	0.353	Baghouse	95%	99%	3.92	0.23
EP-24	Screen	7.5	2.5375	0.510	Baghouse	95%	99%	5.67	0.34
EP-25	Conveyor	4.5	2.5375	0.353	Baghouse	95%	99%	3.92	0.23
EP-26	Conveyor	4.5	2.5375	0.353	Baghouse	95%	99%	3.92	0.23
EP-27	Charcoal Packaging	4.5	2.5375	0.235	Baghouse	95%	99%	2.62	0.16
EP-28	Fines Conveyor	3	2.5375	0.353	Baghouse	95%	99%	3.92	0.23
EP-29	Trailer Loading	3	2.5375	0.353	None	0%	99%	3.92	3.92
<b>Total</b>								<b>34.87</b>	<b>12.32</b>

**PM<sub>10</sub>**

Emission Point	Description	MHDR (tph)	Bottlenecked MHDR (tph)	Emission Factor (lb/ton)	Control Device	Capture Efficiency (%)	Control Efficiency (%)	Uncontrolled PTE (tpy)	Controlled PTE (tpy)
EP-21	Receiving Hopper	7.5	2.5375	0.14	None	0%	0%	1.56	1.56
EP-22	Conveyor	7.5	2.5375	0.18	None	0%	0%	2.00	2.00
EP-23	Conveyor	7.5	2.5375	0.18	Baghouse	95%	99%	2.00	0.12
EP-24	Screen	7.5	2.5375	0.26	Baghouse	95%	99%	2.89	0.17
EP-25	Conveyor	4.5	2.5375	0.18	Baghouse	95%	99%	2.00	0.12
EP-26	Conveyor	4.5	2.5375	0.18	Baghouse	95%	99%	2.00	0.12
EP-27	Charcoal Packaging	4.5	2.5375	0.12	Baghouse	95%	99%	1.33	0.08
EP-28	Fines Conveyor	3	2.5375	0.18	Baghouse	95%	99%	2.00	0.12
EP-29	Trailer Loading	3	2.5375	0.18	None	0%	99%	2.00	2.00
<b>Total</b>								<b>17.78</b>	<b>6.28</b>

**PM<sub>2.5</sub>**

Emission Point	Description	MHDR (tph)	Bottlenecked MHDR (tph)	Emission Factor (lb/ton)	Control Device	Capture Efficiency (%)	Control Efficiency (%)	Uncontrolled PTE (tpy)	Controlled PTE (tpy)
EP-21	Receiving Hopper	7.5	2.5375	0.0412	None	0%	0%	0.46	0.46
EP-22	Conveyor	7.5	2.5375	0.0529	None	0%	0%	0.59	0.59
EP-23	Conveyor	7.5	2.5375	0.0529	Baghouse	95%	99%	0.59	0.04
EP-24	Screen	7.5	2.5375	0.0765	Baghouse	95%	99%	0.85	0.05
EP-25	Conveyor	4.5	2.5375	0.0529	Baghouse	95%	99%	0.59	0.04
EP-26	Conveyor	4.5	2.5375	0.0529	Baghouse	95%	99%	0.59	0.04
EP-27	Charcoal Packaging	4.5	2.5375	0.0353	Baghouse	95%	99%	0.39	0.02
EP-28	Fines Conveyor	3	2.5375	0.0529	Baghouse	95%	99%	0.59	0.04
EP-29	Trailer Loading	3	2.5375	0.0529	None	0%	99%	0.59	0.59
<b>Total</b>								<b>5.23</b>	<b>1.85</b>

**Summary**

Pollutant	Uncontrolled PTE (tpy)	Controlled PTE (tpy)
PM	37.16	14.62
PM10	18.44	6.94
PM2.5	5.31	1.93

\*Particle size distribution from AP-42 Appendix B.2 Table B.2.2 Category 3, Mechanically Generated Aggregate

After reviewing the previous permits, 062012-005 (Kilns #7-12) and the initial 032002-008, the emissions were grossly over calculated resulting in annual Nox limits and SOx limits.

Permit 062012-005 did not correctly use the stack test emissions average from the test conducted August 26, 2003  
 Permit 032002-008 used "industry" emission factors and required testing. The stack test results were never used to amend this permit's PTE, therefore the facility's existing potential to emit is inflated.

Per my calculations using the stack test results from August 26, 2003, the following would be more representative of the facility's PTE

Emission Factors for 6 kilns and one afterburner as tested 8/26/2003

Pollutant	Average Emission Rate (lb/hr)	MHDR	Control Efficiency	TPY (6 Kilns) tpy	TPY (12 Kilns) tpy
PM Filterable	0.153	1.613		0.67014	1.34028
PM Condensable	0.312	1.613		1.36656	2.73312
CO	0.34	1.613		1.4892	2.9784
Nox	1.6	1.613		7.008	14.016
VOC	0.018	1.613		0.07884	0.15768
PM10	0.465	1.613		2.0367	4.0734
PM2.5	0.465	1.613		2.0367	4.0734
SOx	1.34641	1.613		5.897274	11.79455
Methanol	150 uncontrolled lb/ton	1.613	99.98%		0.211948
HAP/POM	0.0095 uncontrolled lb/ton	1.613	99.98%		1.34E-05
Methane	110 uncontrolled lb/ton	1.613	99.98%		0.155429
Total HAPS (POM+Methanol)					0.211962

SOx emissions for the 12 existing kilns will be 2x the amount calculated for this project 2016-04-049

The methanol factor is from AP-42, Table 10.7-2. The control efficiency for methanol can be assumed to equal the VOC control efficiency established in the testing, which is 99.98%.

POM emission factor of 0.0095 is from AP-42 Table 10.7-2, September, 1995

	Charcoal tph	Slab tph		
MHDR of 2012-01- 017/062012- 005	0.893	not stated	8/26/2003 Stack test Efficiency	99.98%
Design rate 2001-12- 005/032002- 008	0.72	not stated		
	1.613		tph	

Facility PTE Recalculated

	Project/Permit #				Facility 's	Facility 's
	2001-12-005 032002-008	2012-01-017 062012-005	2014-07-003 122014-001	2014-12-006 022015-010	Haul Roads associated with 12 kilns	PTE <sup>1</sup>
PM	0.67014	0.67014	4.03	8.43	12.63	18.00
PM10	2.0367	2.0367	3.83	4.15	3.41	11.31
PM2.5	2.0367	2.0367	3.1	1.19	0.40	7.58
SOx	5.89727394	5.89727394	0.25	N/A		12.04455
NOX	7.008	7.008	4.9	N/A		18.916
VOC	0.07884	0.07884	0.44	N/A		0.59768
CO	1.4892	1.4892	6	N/A		8.9784
HAPs	Combined	1.3423E-05	0.04	N/A		0.040013
CO2	N/D	N/D	N/D	N/A		
GHG mass	N/D	N/D	N/D	N/A		
GHG CO2e	N/D	N/D	1,950	N/A		
Methonal	Combined	0.2119482				0.211948
Methane	Combined	0.15542868				0.155429

<sup>1</sup>The facility's PTE exclude Permit # 2014-12-006 since these PTEs are included in this project due to the two projects are within two years of each other.





Jeremiah W. (Jay) Nixon, Governor • Harry D. Bozoian, Director

## DEPARTMENT OF NATURAL RESOURCES

[dnr.mo.gov](http://dnr.mo.gov)

**NOV 17 2016**

Mr. Chris Caron  
Vice President, General Manager  
Timberland Forest Products  
3772 US Highway 160  
West Plains, MO 65775

RE: New Source Review Permit - Project Number: 2016-04-049

Dear Mr. Caron:

Enclosed with this letter is your permit to construct. Please study it carefully and refer to Appendix A for a list of common abbreviations and acronyms used in the permit. Also, note the special conditions on the accompanying pages. The document entitled, "Review of Application for Authority to Construct," is part of the permit and should be kept with this permit in your files. Operation in accordance with these conditions, your new source review permit application and with your amended operating permit is necessary for continued compliance. The reverse side of your permit certificate has important information concerning standard permit conditions and your rights and obligations under the laws and regulations of the State of Missouri.

This permit may include requirements with which you may not be familiar. If you would like the department to meet with you to discuss how to understand and satisfy the requirements contained in this permit, an appointment referred to as a Compliance Assistance Visit (CAV) can be set up with you. To request a CAV, please contact your local regional office or fill out an online request. The regional office contact information can be found at the following website: <http://dnr.mo.gov/regions/>. The online CAV request can be found at <http://dnr.mo.gov/cav/compliance.htm>.

If you were adversely affected by this permit decision, you may be entitled to pursue an appeal before the administrative hearing commission pursuant to Sections 621.250 and 643.075.6 RSMo. To appeal, you must file a petition with the administrative hearing commission within thirty days after the date this decision was mailed or the date it was delivered, whichever date was earlier. If any such petition is sent by registered mail or certified mail, it will be deemed filed on the date it is mailed; if it is sent by any method other than registered mail or certified mail, it will be deemed filed on the date it is received by the administrative hearing commission, whose contact information



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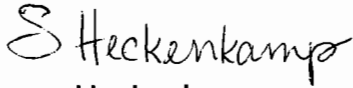
Mr. Chris Caron  
Page Two

is: Administrative Hearing Commission, United States Post Office Building, 131 West High Street, Third Floor, P.O. Box 1557, Jefferson City, Missouri 65102, phone: 573-751-2422, fax: 573-751-5018, website: [www.ao.mo.gov/ahc](http://www.ao.mo.gov/ahc).

If you have any questions regarding this permit, please do not hesitate to contact Kathy Kolb, at the Department of Natural Resources' Air Pollution Control Program, P.O. Box 176, Jefferson City, MO 65102 or at (573) 751-4817. Thank you for your attention to this matter.

Sincerely,

AIR POLLUTION CONTROL PROGRAM



Susan Heckenkamp  
New Source Review Unit Chief

SH:kkj

Enclosures

c: Southeast Regional Office  
PAMS File: 2016-04-049

Permit Number: