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**west virginia department of environmental protection**

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**ENGINEERING EVALUATION / FACT SHEET**

**BACKGROUND INFORMATION**

Application No.: R13-2164D  
Plant ID No.: 029-00017  
Applicant: The Homer Laughlin China Company  
Facility Name: Newell Facility  
Location: Hancock County  
NAICS Code: 327110  
Application Type: Class II Administrative Update  
Received Date: August 11, 2014  
Engineer Assigned: Steven R. Pursley, PE  
Fee Amount: \$300.00  
Date Received: August 13, 2014  
Complete Date: September 2, 2014  
Due Date: October 31, 2014  
Applicant Ad Date: August 21, 2014  
Newspaper: *East Liverpool Review*  
UTM's: Easting: 533.25 km      Northing: 4,496.7 km      Zone: 17  
Description: Application to change operating parameters, control equipment, and equipment location.

**DESCRIPTION OF CHANGES**

**OPERATING PARAMETER CHANGES**

Over time, changes in customer demand have increased the size and complexity of the shape of dinnerware that The Homer Laughlin China Company (HLC) manufactures. These items require increased glaze application amounts and larger kiln furniture, which requires increased crankwash application amounts. As a result, HLC needs to increase permitted glaze consumption.

Although all glaze operations spray the same glazes on the same types of ware, multiple methods of emissions calculations have been used in previous permits. With this application, HLC has applied a consistent method of calculation over all glazing operations.

This method of calculation also allows compliance to be determined by monitoring specific gravity alone (currently some, but not all, sources have to monitor both specific gravity AND solids content). HLC is also requesting that all permitted glaze usage rates and capacities on individual sources be consistent.

## EQUIPMENT LOCATION CHANGES

HLC plans to relocate the No. 4 Sweitzer Spray Machine, Source ID 005-06, to a new location at the upper plant. The machines existing booth will be replaced with a new, more efficient design. The machine designation will be changed to #5 Spray Booth D.

## CONTROL EQUIPMENT CHANGES

In 2008 a Carter Environmental Model 130 EHS wet scrubber was installed upstream of Control Device ID 00W (Sinter Laminate Filter) on Source ID 005-0B. This was done to facilitate reclaiming glaze as the use of the Sinter Laminate Filter prohibits the reclaim of glaze. This wet scrubber, which was never part of the permit, has a particulate control efficiency of 98.9%. HLC proposes to eliminate the Sinter Laminate Filter and permit the wet scrubber.

In 2006 Scrubber 00N on Source ID 009-01 was replaced with a cartridge type collector. This change was never reflected in a permit.

## CORRECTION OF EQUIPMENT DESIGNATION INCONSISTENCIES

Current and accurate equipment designations (which may not agree with prior permits) are used in this application and will be reflected in the new permit.

## ESTIMATE OF EMISSIONS BY REVIEWING ENGINEER

In order to determine PM emissions from the glaze operations the following mass balance formula was used:

$\text{lb PM} = \text{glaze mix usage} \times \text{density of glaze} \times \text{lb solids per lb glaze} \times (1 - \text{transfer eff.}) \times (1 - \text{settling factor})$ . Then a control efficiency for the filters was accounted for. The control efficiency ranged from 96.4% to 98.9% depending on the particular filter. All emissions were based on a 31 gallon per hour usage and a specific gravity of 1.9 for the crank wash and 1.8 for all other glazes.

To determine HAP emissions, the PM emission rate was multiplied by the percent speciated HAP content.

PM emissions from the equipment modified by this permit should be as follows:

Source	lb/hr	tpy
005-06	0.52	2.26
005-0A	0.52	2.26
005-0E	0.52	2.26
005-02	0.26	1.13
005-03	0.26	1.13
005-0F	0.26	1.13
005-0D	0.26	1.13
005-08	0.52	2.26
005-09	0.52	2.26
005-07	0.52	2.26
005-0B	0.26	1.13
009-01	0.14	0.62
009-002	0.47	2.06
<b>Total</b>	<b>5.03</b>	<b>21.89</b>

Annual HAP emissions from the equipment modified by this permit should be as follows:

Source	Co	Cr	Ni	Mn	Cd	Se
005-06	0.03	0.05	0.03	0.02	0.01	0.01
005-0A	0.03	0.05	0.03	0.02	0.01	0.01
005-0E	0.03	0.05	0.03	0.02	0.01	0.01
005-02	0.02	0.03	0.02	0.01	0.01	0.01
005-03	0.02	0.03	0.02	0.01	0.01	0.01
005-0F	0.02	0.03	0.02	0.01	0.01	0.01

005-0D	0.02	0.03	0.02	0.01	0.01	0.01
005-08	0.03	0.05	0.03	0.02	0.01	0.01
005-09	0.03	0.05	0.03	0.02	0.01	0.01
005-07	0.03	0.05	0.03	0.02	0.01	0.01
005-0B	0.02	0.03	0.02	0.01	0.01	0.01
<b>Total</b>	<b>0.28</b>	<b>0.45</b>	<b>0.28</b>	<b>0.17</b>	<b>0.11</b>	<b>0.11</b>

The above HAP numbers are all rounded up. Actual total HAPs will be 1.02 tpy.

PM emissions based on the existing permit (emissions taken directly from the engineering evaluations for R13-2164B and R13-2164C) are as follows:

Source	lb/hr	tpy
005-06	0.43	1.90
005-0A	0.38	1.68
005-0E	0.38	1.68
005-02	1.40	6.12
005-03	0.38	1.68
005-0F	1.27	5.5
005-0D	1.16	5.08
005-08	0.90	3.92
005-09	0.81	3.56
005-07	0.90	3.92
005-0B	0.21	0.58
009-01	0.58	2.51
009-002	0.58	2.51
<b>Total</b>	<b>9.38</b>	<b>40.64</b>

As can be seen from the above, permitted PM emissions will be reduce by 4.35 pounds per hour and 18.75 tons per year. It should be noted that if existing emissions are

calculated using the existing parametric limits and the new, consistent calculation method, existing PM emissions equal 35.29 tpy. Which still results in a reduction of 13.4 tpy.

## REGULATORY APPLICABILITY

The facility proposed to be permitted under this application No. R13-2164D is subject to the following state regulations:

45CSR7 To Prevent and Control Particulate Matter Air Pollution from Manufacturing Process Operations.

The coating operations (ware glazing and crank wash) at the facility are affected by this permitting action and are subject to the Particulate Matter emission limits of §45-7-4.1. The combined process weight rate of the thirteen booths is 14.91 pounds per hour (conservatively based on the weight of the greenware alone, type a source). Total calculated emissions from the 13 combined booths is 5.03 pounds per hour.

45CSR13 Permits for Construction, Modification, Relocation and Operation of Stationary Sources of Air Pollutants, Notification Requirements, Temporary Permits, General Permits, and Procedures for Evaluation.

The wishes to make several substantive changes to it's existing permit. Since these changes do not result in an increase of emissions of more than 6 pounds per hour and 10 tons per year, the changes can be made as a Class II Administrative Update. As required under §45-13-8.3 ("Notice Level A"), HLC placed a Class I legal advertisement in a "newspaper of general circulation in the area where the source is . . . located." The ad ran on August 21, 2014 in the *East Liverpool Review* and the affidavit of publication for this legal advertisement was submitted on August 29, 2014.

45CSR22 Air Quality Management Fee Program

Since the facility became a minor source in 2006 with the issuance of permit R13-2164B it is subject to 45CSR22.

## TOXICITY OF NON-CRITERIA REGULATED POLLUTANTS

Section 112(b) of the Clean Air Act (CAA) identifies 188 compounds as pollutants or groups of pollutants that EPA knows or suspects may cause cancer or other serious human health effects. The glazes used by the facility contain HAPs. However, the potential



HAP emissions from the facility are below the levels that define a major HAP source. Therefore, the facility is considered a minor (or area) HAP source, and no source-specific major source NESHAP or MACT standards apply. The following is a list of each HAP *potentially* emitted by the equipment subject to this modification in excess of 20 pounds/year (0.01 tons/year). All information comes directly from EPA's Health Effect Notebook which can be found at <http://www.epa.gov/ttn/atw/hlthef/hapindex.html>.

#### Cadmium Compounds:

*"The main sources of cadmium in the air are the burning of fossil fuels such as coal or oil and the incineration of municipal waste. The acute (short-term) effects of cadmium in humans through inhalation exposure consist mainly of effects on the lung, such as pulmonary irritation. Chronic (long-term) inhalation or oral exposure to cadmium leads to a build-up of cadmium in the kidneys that can cause kidney disease. Cadmium has been shown to be a developmental toxicant in animals, resulting in fetal malformations and other effects, but no conclusive evidence exists in humans. An association between cadmium exposure and an increased risk of lung cancer has been reported from human studies, but these studies are inconclusive due to confounding factors. Animal studies have demonstrated an increase in lung cancer from long-term inhalation exposure to cadmium. EPA has classified cadmium as a Group B1, probable human carcinogen."*

#### Chromium Compounds:

*"Chromium occurs in the environment primarily in two valence states, trivalent chromium (Cr III) and hexavalent chromium (Cr VI). Exposure may occur from natural or industrial sources of chromium. Chromium III is much less toxic than chromium (VI). The respiratory tract is also the major target organ for chromium (III) toxicity, similar to chromium (VI). Chromium (III) is an essential element in humans. The body can detoxify some amount of chromium (VI) to chromium (III).*

*The respiratory tract is the major target organ for chromium (VI) toxicity, for acute (short-term) and chronic (long-term) inhalation exposures. Shortness of breath, coughing, and wheezing were reported from a case of acute exposure to chromium (VI), while perforations and ulcerations of the septum, bronchitis, decreased pulmonary function, pneumonia, and other respiratory effects have been noted from chronic exposure. Human studies have clearly established that inhaled chromium (VI) is a human carcinogen, resulting in an increased risk of lung cancer. Animal studies have shown chromium (VI) to cause lung tumors via inhalation exposure."*

### Cobalt Compounds:

*“Cobalt is a natural element found throughout the environment. Acute (short-term) exposure to high levels of cobalt by inhalation in humans and animals results in respiratory effects, such as a significant decrease in ventilatory function, congestion, edema, and hemorrhage of the lung. Respiratory effects are also the major effects noted from chronic (long-term) exposure to cobalt by inhalation, with respiratory irritation, wheezing, asthma, pneumonia, and fibrosis noted. Cardiac effects, congestion of the liver, kidneys, and conjunctiva, and immunological effects have also been noted in chronically-exposed humans. Cobalt is an essential element in humans, as a constituent of vitamin B12. Human studies are inconclusive regarding inhalation exposure to cobalt and cancer, and the one available oral study did not report a correlation between cobalt in the drinking water and cancer deaths. EPA has not classified cobalt for carcinogenicity.”*

### Manganese Compounds:

*“Manganese is naturally ubiquitous in the environment. Manganese is essential for normal physiologic functioning in humans and animals, and exposure to low levels of manganese in the diet is considered to be nutritionally essential in humans. Chronic (long-term) exposure to high levels of manganese by inhalation in humans may result in central nervous system (CNS) effects. Visual reaction time, hand steadiness, and eye-hand coordination were affected in chronically-exposed workers. A syndrome named manganism may result from chronic exposure to higher levels; manganism is characterized by feelings of weakness and lethargy, tremors, a mask-like face, and psychological disturbances. Respiratory effects have also been noted in workers chronically exposed by inhalation. Impotence and loss of libido have been noted in male workers afflicted with manganism.*

*EPA has classified manganese as a Group D, not classifiable as to carcinogenicity in humans.”*

### Nickel Compounds:

*“Nickel occurs naturally in the environment at low levels. Nickel is an essential element in some animal species, and it has been suggested it may be essential for human nutrition. Nickel dermatitis, consisting of itching of the fingers, hands, and forearms, is the most common effect in humans from chronic (long-term) skin contact with nickel. Respiratory effects have also been reported in humans from inhalation exposure to nickel. Human and animal studies have reported an increased risk of lung and nasal cancers from exposure to nickel refinery dusts and nickel subsulfide. Animal studies of soluble nickel compounds (i.e., nickel carbonyl) have reported lung tumors. EPA has classified nickel*

*refinery dust and nickel subsulfide as Group A, human carcinogens, and nickel carbonyl as a Group B2, probable human carcinogen. “*

#### Selenium Compounds:

*“Selenium is a naturally occurring substance that is toxic at high concentrations but is also a nutritionally essential element. Hydrogen selenide is the most acutely toxic selenium compound. Acute (short-term) exposure to elemental selenium, hydrogen selenide, and selenium dioxide by inhalation results primarily in respiratory effects, such as irritation of the mucous membranes, pulmonary edema, severe bronchitis, and bronchial pneumonia. Epidemiological studies of humans chronically (long-term) exposed to high levels of selenium in food and water have reported discoloration of the skin, pathological deformation and loss of nails, loss of hair, excessive tooth decay and discoloration, lack of mental alertness, and listlessness. Epidemiological studies have reported an inverse association between selenium levels in the blood and cancer occurrence and animal studies have reported that selenium supplementation, as sodium selenate, sodium selenite, and organic forms of selenium, results in a reduced incidence of several tumor types. The only selenium compound that has been shown to be carcinogenic in animals is selenium sulfide, which resulted in an increase in liver tumors from oral exposure. EPA has classified elemental selenium as a Group D, not classifiable as to human carcinogenicity, and selenium sulfide as a Group B2, probable human carcinogen.”*

#### AIR QUALITY IMPACT ANALYSIS

Since this is minor modification to an existing minor source, as defined in 45CSR14, no modeling was performed.

#### MONITORING OF OPERATIONS

The permit will require the specific gravity and percent solids content of each glaze to be monitored and recorded. Additionally, the maximum flow rate and pressure drop across scrubber 00W will be monitored and recorded.

#### CHANGES TO PERMIT R13-2164C

The main changes to the permit are the replacement of conditions 4.1.4, 4.1.8-4.1.12, 4.1.14, 4.1.25-4.1.33 and 4.1.35-4.1.39 with new conditions 4.1.4 - 4.1.7. Additionally, Table 1.0 was updated, old conditions 4.1.5 and 4.1.6 (new conditions 4.1.7 and 4.1.8) were updated.



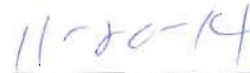
RECOMMENDATION TO DIRECTOR

Information supplied in the application indicates that compliance with all applicable regulations will be achieved. Therefore it is the recommendation of the writer that permit R13-2164D for a dinner ware manufacturing facility in Newell, Hancock County, be granted to The Homer Laughlin China Company.



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Steven R. Pursley, PE  
Engineer



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November 20, 2014