Suggested steps for modifications to Barriques coffee roasting process--

- Have a qualified technician inspect Barriques existing roasting equipment for proper operation. During the inspection, a portable combustion gas analyzer should be used to get readings of the roaster exhaust temperatures and emissions both before and after the catalytic converter for the presence of oxygen, carbon monoxide, nitrogen oxides (NOx), and volatile organic compounds (VOC). Readings should be taken at multiple points during a typical roasting cycle including the last minute of the cycle to get representative readings. These readings should be performed on both a typical roast cycle and a dark roast cycle.
- After the above steps have been completed, have a qualified technician install the new CDL catalytic converter and inspect Barriques roasting equipment for proper operation with the new converter. The afterburner needs to be properly adjusted to insure the exhaust gases are at the proper temperature and contain the required percentage of free oxygen when the fumes enter the catalytic converter. During the inspection, a portable combustion gas analyzer should be used to get readings of the exhaust temperatures and emissions both before and after the catalytic converter for the presence of oxygen, carbon monoxide, nitrogen oxides (NOx), and volatile organic compounds (VOC). Readings should be taken at multiple points during a typical roasting cycle including the last minute of the cycle to get representative readings. These readings should be performed on both a typical roast cycle and a dark roast cycle.
- Compare the test results with the old and new catalytic converter to help determine if the new catalytic converter is capable of reducing emission fumes and odors to an acceptable level.
- Install a monitoring device that is capable of digitally recording the temperatures in the afterburner assembly just before the new catalytic converter and just after the new catalytic converter as well as the pressure drop across the catalytic converter. This is to insure that the catalytic converter is operating within its design parameters.
- Roast coffee with the new catalytic converter operating for at least one month to allow nearby neighbors time to determine if the emission odor has been reduced to an acceptable level.
- If the nearby neighbors are satisfied with the reduction of emission fume odor, schedule the public hearing for the conditional use permit.
- If a number of nearby neighbors still feel that the use and enjoyment of their homes is still substantially impaired, Barriques needs to decide if they want to pursue alternative methods of reducing the exhaust odor or look at moving the coffee roasting operation to a new location that is further from the nearest residential area. If Barriques does not want to pursue either of these two options, schedule the public hearing for the conditional use permit but expect continued strong opposition to the coffee roasting by the nearby neighbors.

- If Barriques is interested in pursuing alternative methods of fume and odor reduction, continue with the steps suggested below.
- These next steps involve bypassing the existing afterburner setup to test a different method of reducing the coffee roasting fumes and odor.
- Install a high efficiency cyclone particle collector to replace the existing US Roasters cyclone. This will insure capture of the highest percentage of particulate matter in the roasting exhaust before the next step.
- Pass the exhaust gases through a wet scrubber to remove the remaining particulate matter and most of the exhaust fumes.
- Next, pass the roasting exhaust through a series of electrostatic precipitators to remove even more odor and VOC emissions from the exhaust. Use at least two electrostatic precipitators in series for this step. The more electrostatic precipitators in series, the cleaner the exhaust will become.
- Have a qualified technician inspect Barriques roasting equipment for proper operation after installing this new set of emission control equipment. During the inspection, a portable combustion gas analyzer should be used to get readings of the roaster exhaust temperatures and emissions both before the wet scrubber and after the electrostatic precipitators for the presence of oxygen, carbon monoxide, nitrogen oxides (NOx), and volatile organic compounds (VOC). Readings should be taken at multiple points during a typical roasting cycle including the last minute of the cycle to get representative readings. These readings should be performed on both a typical roast cycle and a dark roast cycle.
- Compare the results of these readings with the readings taken during operation of the old catalytic converter and the new catalytic converter.
- Roast coffee beans with the new equipment setup operating for one month to allow nearby neighbors time to determine if the emission odor has been reduced to an acceptable level.
- If the nearby neighbors are satisfied with the reduction of emission fume odor, schedule the public hearing for the conditional use permit.
- If a number of nearby neighbors still feel that the use and enjoyment of their homes is still substantially impaired, Barriques needs to decide if they want to pursue even more expensive alternative methods of reducing the exhaust odor or look at moving the coffee roasting operation to a new location that is further from the nearest residential area. If Barriques does not want to pursue either of these two options, schedule the public hearing for the conditional use permit but expect continued strong opposition to the coffee roasting by the nearby neighbors.

I am doubtful that a new catalytic convertor installed above the existing afterburner at Barriques will remove enough exhaust fumes and odor to satisfy the majority of nearby neighbors.

If the combination of the high efficiency cyclone and the electrostatic precipitators gets emissions down to a desirable level this would be the preferred and least costly setup for coffee roasting fume and odor removal.

Large coffee bean roasting operations and other large food processing operations sometimes use biological oxidation systems to bring fumes and odors down to an acceptable level. However, these systems are costly and work best in situations where the production is continuous as the bacteria and other organisms in the system prefer constant circulation of exhaust gases through the unit to feed the biological system to keep the biological organisms healthy and happy.

A biological oxidation system for a coffee bean roasting operation like Barriques would require an area in the roasting room approximately six feet by eight feet by 7 feet tall. This would be an expensive setup to install and it may be difficult to fit this equipment in the roasting room and still leave enough space for all the other roasting and packaging operations.

Even if Barriques is able to get the roasting fumes down to a level acceptable to the nearby neighbors, I think that moving the Barriques roasting operation to a new location further from any residential area may be the best option to choose in the long run. There are ongoing issues with customer parking, loading and unloading of coffee beans and space limitations of the existing roasting facility that will only get worse as Barriques looks to expand their sales of roasted coffee beans beyond their existing seven cafes and internet and wholesale sales.

Below are links to websites with information on emissions control and emissions testing:

DNR Fact Sheet - Dust, Smoke, and Fumes — Particle Matter Emissions
http://dnr.wi.gov/files/PDF/pubs/am/AM467.pdf

DNR Fact Sheet - Controlling Odors
http://dnr.wi.gov/files/PDF/pubs/am/AM462.pdf

DNR Administrative Code Chapter NR 429
http://docs.legis.wisconsin.gov/code/admin_code/nr/400/429.pdf

DNR Fact Sheet - Stack Testing Requirements
http://dnr.wi.gov/files/PDF/pubs/am/AM477.pdf

Tips for Hiring an Environmental Consultant
http://dnr.wi.gov/files/PDF/pubs/am/AM445.pdf

DNR List of Clean Air Consultants
http://dnr.wi.gov/files/pdf/pubs/am/am429.pdf

DNR Webpage - Complying with the Requirements
http://dnr.wi.gov/topic/smallbusiness/compliance.html

DNR Fact sheet - Recordkeeping: What's Involved and Why It's important
http://dnr.wi.gov/files/PDF/pubs/am/AM473.pdf

On May 31, 2016 I called Short, Elliot Henrickson Inc., a consulting firm in Madison, and talked to Patti Stickney. She gave me the name of the firm they use for stack testing. That contact information is as follows:

Environmental Technology & Engineering Corp.
13000 West Bluemound Road
Elm Grove, WI 53122
Phone - 262-784-2434
Contact: Michael Huenink or Chris Huenink

I called and talked with Chris Huenink on May 31, 2016 and it sounds like they would be capable of the doing the emissions testing for Barriques to determine the makeup of the roasting fumes before and after the catalytic converter. I told Chris that I would pass this information on to Matt Weygandt.

This document prepared by Ron Shutvet June 7, 2016