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Forestry Emerald Ash Borer – Industry Note July 2012
EAB Treatments for Ash Lumber, Firewood, Logs, and Sawmill Residuals

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The information contained in this fact sheet describes the requirements and procedures for kiln sterilization, fumigation, composting, and heat treatment methods that can be used to treat green lumber, logs, chips and other sawmill residuals, and firewood that meet the requirements for shipping out of an Emerald Ash Borer (EAB) quarantine area. If ash wood products are not treated using one of these above methods, the products must be processed into:

- chips and other sawmill residuals less than 1" in two dimensions (typical pulpwood chips)
- debarked (removing all bark plus an additional ½" of material)
- wane free lumber (no edges or corners with bark or lack of wood)

Since these methods are fairly straight forward, this fact sheet covers the treatments that are more technically involved including kiln sterilization, fumigation, composting, and heat treatments which have specific procedures and schedules that must be followed in order to meet APHIS and the State Entomology's Office requirements. Treatment methods become important when applying for certificates or when receiving ash materials from an EAB quarantined area. These treatment schedules, if required, will be written into your compliance agreement. Compliance agreements are NOT required when:

- Ash wood products (logs, lumber, chips, and hardwood firewood) are moved within the Kentucky Quarantine Zone.
- The handling of ash wood products is completed outside the quarantine area (i.e. cutting, hauling, milling, etc.).
- Ash materials are moved from a non-quarantined area outside of the quarantined area to inside of the quarantine area.

Kiln Sterilization Treatment Schedule

(Used primarily for treating green lumber)

Treatment: T404-b-4 Kiln Sterilization

Note: When using this treatment method for interstate movement (i.e. moving ash wood products from the Kentucky quarantine area to another state) the process will need to be certified by APHIS PPQ personnel. This should be done before the first treatment; otherwise the process will have to be repeated after being certified.

Dry Bulb temperatures	Wet Bulb depression	Relative humidity	Moisture content	Thickness of lumber	Exposure time
140^{0}F	7^{0}F	82%	13.8%	1 inch	3 hrs
				2 inches	5 hrs
				3 inches	7 hrs
130^{0}F	16^{0}F	60%	9.4%	1 inch	10 hrs
				2 inches	12 hrs
				3 inches	14 hrs

1) After kiln drying, the wood will be checked with a moisture meter to verify the wood is at or below the appropriate moisture content listed above. Two readings will be taken per stack of wood: one near the top of the stack and one near the bottom of the stack. These reading will be recorded in a computer database along with the date and time. This database information will be supplied to USDA, APHIS, PPQ on a monthly basis.
2) If the wood does not meet moisture content guidelines, it will NOT be in compliance unless it undergoes additional kiln drying and can then demonstrate that the moisture requirement has been met.

Fumigation Treatment Schedule

(Used primarily for treating veneer logs)

Treatment: T404-b-1-1 MB at NAP-tarpaulin or chamber

Temperature	Dosage Rate ($lb/1{,}000\ ft^3$)	Minimum Concentration Readings (ounces) At:			
		0.5 hr	2 hr	4 hr	16 hr
70ºF or above	3 lbs	36	30	27	25
40-69ºF	5 lbs	60	51	46	42

1) The fumigation must be performed by a licensed fumigator.
2) The licensed fumigator must have a fumigator compliance agreement with United States Department of Agriculture, Animal and Plant Health Inspection Service, Plant Protection and Quarantine.
3) Review the treatment schedule for specific fumigation guidelines.

Heat Treatment Schedule

(Used for primarily for treating firewood for EAB)

Treatment: T314-a Heat treatment

Note: When using this treatment method for interstate movement (i.e. moving ash wood products from the Kentucky quarantine area to another state) the process will need to be certified by APHIS PPQ personnel. This should be done before the first treatment; otherwise the process will have to be repeated after being certified.

1) Heat treatment procedures may employ steam, hot water, kilns, or any other method that raises the temperature of the center of the wood to at least 140°F (60°C) and maintains the center temperature for at least 60 minutes.
2) Facilities, temperature monitors and temperature sensors will be approved by CPHST (Center for Plant Health and Science Technology) prior to a compliance agreement being initated.
3) Compliance agreements must contain a diagram of the treatment facility to include at a minimum: dimensions, capacity, circulation fans, heat input location, and door locations.
4) The temperature monitoring equipment (thermocouples, temperature data loggers etc) must be accurate to within +/- 0.5 °C (0.9 °F) at the treatment temperature, capable of collecting temperature data at least once every five (5) minutes and recording or storing data for 30 days. The temperature monitoring equipment must also be calibrated (by a source that can provide accreditation such as NIST) prior to facility certification tests and a minimum of once an annually thereafter. In addition, if a permanent temperature recording system is used, the system must be recalibrated when any part or portion of the system is repaired or replaced.
5) Temperature monitoring equipment must be able to provide a record of the treatment that identifies each sensor and indicates time and temperature.
6) Internal wood temperatures shall be obtained and verified by sensors located in the larger pieces of firewood at representative locations within the stack. The number of temperature sensing elements required per load will vary with the size of the load. The minimum requirement is four (4) sensors – one (1) for measuring air temperature and three (3) for measuring internal wood temperature. For loads greater than 5,000 ft3 (142 m3) of wood, a minimum of one additional sensor for measuring internal wood temperature must be provided for each additional 2,000 ft^3. For example, a load of 9,000 ft3 would require a total of six (6) sensors (one ambient air temperature sensor and five [3 + 2 additional sensors]). At least one sensor shall be placed in a large firewood piece in a portion of the load furthest away from initial heat circulation. Sensors will be placed in the wood in pre-drilled holes to measure core wood temperature. Probes are to be sealed into each hole with putty (electricians putty is recommended) to prevent reading ambient air temperature. Other recording arrangements may be considered if approved by CPHST.
7) Begin treatment when all the temperature sensors reach the threshold temperature of 140°F (60° C). Treatment will be complete when all temperature probe readings are at or above the threshold temperature for the entire 60 minutes.
8) Temperature equipment will be certified by USDA APHIS PPQ personnel at regular intervals (suggested monthly) except in those cases where a facility is inactive in excess of 2 months. Certification will occur before production activities resume.

Composting Requirements

(used to treat hardwood and bark chips, nuggets, and mulch material
that are larger than 1.00 inch (2.54 cm) in any dimension)
Treatment: Adapted from the Gypsy Moth Manual

Compost using the following procedure:

1) Compost piles must be a minimum of 200 cubic yards.
2) Internal temperature at a depth of 18 inches must reach 140^{O}F (60^{o}C) for four consecutive days.
3) Using a front end loader or a bulldozer, remover the outer layer of the compost pile to a depth of three feet.
4) Start a second compost pile using the recently removed cover material as a core.
5) Move the core material from the first compost pile and place on the second compost pipe as a cover at least three feet deep.
6) Allow the second compost pile to remain undisturbed until the temperature reaches 140^{0}F (60^{o}C for at least four continuous days.)
7) Remove the second compost pile and use as fully composted material.

This procedure will allow continuous operation. After the first compost pile is "turned" to become the second compost pile, a new "first" compost pile can be started.

For additional information:

- Kentucky's Office of the State Entomologist at the University of Kentucky - official quarantine areas, movement of firewood Compliance Agreements: 859.257.5838 - ***http://www.uky.edu/Ag/NurseryInspection/eab.html***
- Quarantine in KY as it relates to forest industry: Forestry EAB Industry Fact Sheets at the University of Kentucky Forestry Extension web site: ***www.ukforestry.org***
- all aspects of EAB and the quarantine in Kentucky: ***http://pest.ca.uky.edu/EXT/EAB/welcome.html***
- overall information on the emerald ash borer insect: ***www.emeraldashborer.info/***
- USDA Treatment Manual: ***http://www.aphis.usda.gov/import_export/plants/manuals/ports/downloads/treatment.pdf***

Ammerman 2009. Updated 2012. University of Kentucky, Department of Forestry Extension, Lexington, Kentucky 40546. www.ukforestry.org