

Date: April 15, 2009

To: Linn County Board of Health

From: James Hodina, Air Quality Supervisor

Subject: Outdoor Wood Boiler Ordinance Update

This report summarizes Outdoor Wood Boiler Ordinance activities since March 19, 2009 and provides a summary of observations from the Air Quality Division. While a revised draft ordinance is not provided, a summary of key findings is presented for consideration by the Board of Health.

Summary of Activities

At the March 19, 2009 Linn County Board of Health meeting, the Board of Health took many public comments regarding the hardships what would be caused if the March 19, 2009 draft ordinance was adopted. In response, the Board of Health passed a motion directing Public Health staff to prepare an amendment that would include some form of grandfathering provisions. The Public Health Air Quality Division has conducted several activities to help formulate an approach that responds to the Board of Health's motions.

Several individual and small group meetings were held at Linn County Public Health including outdoor wood boiler owners, distributors, and community representatives. These meetings were very informative and productive. Detailed discussions about a variety of outdoor wood boilers including technical feasibility, operations, siting, and economics of outdoor wood boilers along with the various regulatory and public health aspects with siting outdoor wood boilers in residential and non-residential properties of Linn County.

The Air Quality Division hosted two Town Hall meetings to gather input from the public. The Air Quality Division made a presentation at the beginning of each meeting. Upon completion of the presentation, the floor was opened to questions and answers. On April 6, the floor was first given to those with individuals wanting to express concerns about outdoor wood boiler emission and public health. On April 7, the floor was given to those wanting to express owner concerns about the ordinance as proposed. Surveys were also distributed at the town hall meetings that several in attendance completed. Copies of these surveys are enclosed.

Throughout this period, many emails and letters have been received by the public expressing both concerns about the health aspects of outdoor wood boiler emissions and about how the draft ordinance would personally impact the owners. Copies of these emails are enclosed.

Summary of Public Input

Several opinions with differing points of view were shared throughout the process of gathering public input. While several concerns were expressed about the health aspects of wood boiler emissions (primarily regarding their neighbor's unit) the majority of the comments were about how the draft ordinance would unfairly impact the current owners of installed units. The Air Quality Division provides the following summary. The Board of Health is encouraged to read the written comments directly for a more complete review.

Many owners of outdoor wood boilers have made significant investments in their equipment, not only for the boiler itself but the associated equipment for splitting, transporting, and storing wood. While individual investments were largely reported between \$10,000 and \$20,000, a few reports of investments of \$50,000 for larger units and equipment were received. Many units have been installed within the last 5 years and have a projected life of 25 years. As with any large investment, many owners commented on the extensive research they provided before making the purchase. In addition to considering a unit's efficiency some owners commented on other factors for purchasing their outdoor wood boiler including the aspect of providing heat from a renewable resource and the reliability cost saving of the fuel source over alternatives such as propane. As part of their research, some owners indicated that they contacted the Air Quality Division about air quality requirements. These units are exempt from Linn County permitting requirements and, without any exchange of information on emissions from these units, some people were told that there were no applicable air quality requirements. Having put forth a good-faith effort, most (if not all) owners of installed units strongly believe that any revision to the ordinance should include grandfathering or amnesty provisions.

The underlying issue is that there was a lack of information on the boiler emissions, which remains unchanged. As previously mentioned, the Air Quality Division did not know and had not been informed about the emission rates of these relatively small boilers. Even after all of this public input, only one boiler manufacturer, Central Boiler, has provided emission data for us to consider. Fortunately, the emission data provided by Central Boiler was comprehensive representing many boiler manufacturers and was very helpful in supporting further analysis of emission impacts. Public Health had been using an EPA quoted emission rate of 2.0 lb/MMBtu in our analysis of boiler emissions while the manufacturer supplied boiler data showed an average of 1.44 lb/MMBtu. While these values are not significantly different, it will provide some relief when calculating off-property impacts of outdoor wood boiler emissions.

Public Health also found that not only did many manufacturers fail to provide the owners any particulate emission data for consideration during their purchase, they in some cases provided misleading information. There are certain Greenhouse Gas (GHG) emissions benefits from use of biomass as fuel. But this was at times provided in a misleading way. For example, one comment was received that the vendor told them that the boiler would emit no more pollution than if the wood was left to decay on the property. While this may

have some GHG validity, it certainly misleads as to the overall environmental impacts of the particulate emissions. As another example, a manufacturer brochure provided Public Health states, “No published independent data exists proving greater efficiency or lower emissions for any outdoor furnace.” While this manufacturer does sell one or two EPA Phase 1 qualified boilers, they sell many units that are not qualified under EPA’s Voluntary Program and do not sell the lower emitting Phase 2 qualified boiler. We have asked the manufacturer for emission data to support their quote. In general, this lack of data has led to uninformed decisions being made. Without disclosure of emission data from the boiler manufacturer, Public Health had no knowledge that these boilers could not meet the 1976 regulatory standard of 0.6 lb/MMBtu. Therefore, in the past we failed to inform the owners of the potential applicability of the requirement. Likewise, many owners who researched boiler information also thought their outdoor wood boilers were clean burning units. Many comments were received that they did not even know that there was an EPA Voluntary Program until it was identified in the proposed ordinance.

The Air Quality Division received very important and useful information from owners and manufacturers about the amount of wood fuel that is used during the year. Two manufacturers provided the Air Quality Division with annual heating demand data that they use to help consumers select an appropriate sized model. We were subsequently able to validate some of these values through information published by the US Energy Information Agency (EIA) and US Forest Service. Boiler manufacturers indicated that they size units in our area to provide approximately 100-200 MMBtu of heat per year. The US EIA data provides data does not provide data for Iowa but does include regional data (of which Iowa is in the northern portion of the region) that says a 2400 square foot home’s average heating and hot water demand is 76 MMBtu per year. Since many owners reported using their outdoor wood boiler to heat out-buildings as well (more indicative of rural properties) a range of an annual heating value range of 100 MMBtu/yr to 225 MMBtu/yr is representative of individual local demand. This correlates well to the amount of wood that owners reported using in a year: anywhere from 2 to 12 cords of wood per year based on US Forest Service data on the heat content of wood and the manufacturer stated efficiency of their outdoor wood boilers. (One cord is 4 x 4 x 8 feet [128 cu. ft.] of wood or 3,500 lbs). Survey data and public input indicate that the largest boiler in rural residential use was approximately 500,000 Btu/hr, which is half of the largest size considered in the original proposed ordinance. Anything larger appears to be a commercial application.

The Air Quality Division was able to further assess the heat demand over the calendar year on a month by month basis. Using published average heating degree days for Linn County, it was found that the peak heat demand months are December and January and each month accounts for slightly more than 20% of the annual heat demand. 86% of the heat demand occurs from November through March and only a few days of heating are required in May or September. No more than 20-25% of the owners’ annual wood usage would occur in any one month.

The Hearth, Patio, and Barbecue Association (HPBA) is the outdoor wood boiler manufacturers’ trade association. The trade association publishes outdoor wood furnace

best burn practices that include a recommendation that the unit be installed no less than 100 feet from any residence not served by the furnace and that for any unit within 300 feet to any residence not served by the furnace, the stack should be at least 2 feet higher than the peak of that residence. There were mixed responses to questions asked of the public regarding whether they could move their boilers or raise stack heights. The ability to move a boiler is limited as they may not be more than 150 feet from the home served without experiencing heating losses through the underground piping. Raising stacks was also mixed. While some existing OWB owners indicated that they would be willing to do this, other expressed concerns. Some boiler manufacturers sell extension kits and others do not. Some owners fear that raising their stack will jeopardize their warranty. Others worry that they will not be able to adequately clean a tall stack thereby creating a fire hazard. Of the boiler manufacturers that contacted the Air Quality Division, we were informed that while there were technical challenges with raising stacks, they could be overcome.

The March 19th draft ordinance specified minimum setback distances measured to the property lines. Many of the surveys and written comments indicated that even in rural areas that these setback distances could not be met even though the nearest neighboring residence may be a significant distance away. Although homes may be sited on large parcels, they are often located near the edge of the property and it is technically infeasible to site the outdoor wood boiler more than 150 feet from the building it serves without incurring significant efficiency losses. Additionally, the property line may not be adjacent to another property where there is a residential structure – the land is used for other purposes.

Several individuals reported health concerns from outdoor wood boilers. Detailed concerns on a variety of pollutants other than particulate matter were provided by one person whose written submittals are enclosed. The majority of health concerns expressed by the public are with neighboring units. Several individuals spoke for the first time as a result of the publicity that this topic has now received. These citizens are in more residential areas. The Board of Health has already been made aware of the moratorium that Central City has already placed on installation of outdoor wood boilers, which is indicative of the difficulty in operating an outdoor wood boiler in residential areas. Individuals reported that they could not enjoy their property including activities such as gardening or sitting on their deck or patio because of the smoke from their neighboring outdoor wood boiler. It is reported that these units are sited along the property line and in some cases closer to their home than the home served by the outdoor wood boiler.

Ambient air quality standards for fine particulate matter (PM_{2.5}) are established for 24-hour (short-term) exposure of 35 µg/m³ and annual (long-term) exposure of 15 µg/m³. At the time the original ambient air quality impact analysis was conducted by the Air Quality Division, the 24-hr value for Linn County was 29 µg/m³. Since then, 2008 ambient monitoring results have been compiled and validated showing our current value to be 26 µg/m³. This leaves a approximately 6 to 9 µg/m³ that can be consumed by new sources of emissions, wherever they may be sited. Several comments were received questioning whether ambient air monitors sited in Cedar Rapids were indicative of

ambient air quality in rural areas. The Air Quality Division researched ambient air monitoring results at Lake Seguma, Iowa, a state park in the southern part of the state approximately 120 miles away, and the monitoring results there are quite close to the Linn county results. This indicates that fine particulate matter emissions are quite pervasive in Eastern Iowa and, although we are not currently monitoring fine particulate matter outside of Cedar Rapids, we do believe that the results would not be significantly different to affect the ambient air quality results.

Concluding Remarks

The current Linn County Ordinance that stipulates all boilers under 10 MMBtu/hr may emit no more than 0.6 lb/mmmbtu must be addressed else most all existing outdoor wood boilers would be deemed out of compliance. During the last month of public dialogue it was also determined that this ordinance, which applies to all indirect fired units, include wood furnaces (air-to-air heat exchanger rather than air-to-water) as well. The issue of whether to provide amnesty or grandfather existing units must be addressed. Two arguments are put forth; the first by Public Health and the second (as we have admittedly summarized, herein) from the owners.

- This ordinance is an existing federally approved regulation. After any consideration or approval by the Board of Health and Board of Supervisor, any revised ordinance must be reviewed and approved by the EPA. To gain their approval, Public Health believes that we must demonstrate that any revisions are equally protective of ambient air quality. Tools such as ambient air quality modeling and monitoring help us do that. This is why so much effort is being put into this task and why setback distances, stack heights, and fuel consumption are being so closely evaluated. The existing rule of 0.6 lb/MMBtu was in effect in 1976 and therefore any boiler constructed after 1976 cannot technically be grandfathered. Some retrofit measures such as raising the stack height or agreeing to a fuel usage limit are technically feasible and should be required where appropriate.
- Individuals who installed these units in good faith should not be penalized. Anything less than amnesty or grandfathering creates a major economic burden that is unfair and unwarranted. Emissions from existing units are already reflected in past ambient air quality monitoring and so continued operation of these units does not affect the current attainment status of Linn County. Outdoor wood boilers are being unfairly targeted among the many different sources of wood heat and particulate matter emissions.

Boiler manufacturers, regardless of whether they are qualified under the EPA Voluntary Program, must be required to disclose emission data to the consumer and to the Air Quality Division if they are to install and operate those boilers in Linn County. Furthermore, it is unclear why outdoor wood boiler manufacturers did not do more to encourage consumers to install their units within the minimum location and stack height guidelines as specified by the Hearth, Patio, and Barbecue Association.

The Air Quality Division's analysis for ambient air impacts relied on EPA modeling methodology and Phase 1/Phase 2 testing procedures. This analysis allows the Air Quality Division to predict the ambient air impacts of the outdoor wood boilers. The Air Quality Division believes that the air dispersion modeling analysis will be necessary to demonstrate to the EPA that units emitting more than 0.6 lb/MMBtu will not degrade air quality. In our earlier analysis, we had relied on EPA modeling procedures and testing protocols to develop the input for the model. The public and the manufacturers expressed concerns that relying solely on EPA methods and published data (or other state equivalent methods and data) did not reflect actual operation of their units; that such an approach was overly conservative. Based on the good quality data on fuel usage provided by manufacturers and the public, the Air Quality Division believes that we can support a modeling analysis that uses about 1/3 to 1/2 of the emission rates previously modeled. We are currently performing this analysis and will have results shortly. The outcome should be significantly shorter setback distances than currently proposed. We cannot comment on the feasibility of implementing these calculated setback distances until that work is complete. It is the intention of the Air Quality Division to provide the analysis on distances where national ambient air quality standards are met, leaving it to the Board of Health and Board of Supervisor to determine policy regarding setback distances that balance ambient air quality with other factors.

In non-residential areas, we believe that there is merit in establishing setback distances as measured to the neighboring residence and not the property line. Land use does not change as rapidly in rural parts of Linn County as does residential and therefore the likelihood of new residential structures being impacted by existing outdoor wood boilers is much less likely. We will continue to assess whether raising stacks to a minimum height is needed in addition to setbacks as well and will be based on the outcome of the ambient air modeling. There was some discussion that signatures be obtained from consenting neighbors and based on feedback from a variety of stakeholders, Public Health does not believe that this a practice that would be practical to adopt.

Siting Outdoor Wood Boilers in residential areas of Linn County is a very challenging problem. We have identified several measures to be considered by the Board of Health for existing and new outdoor wood boilers on properties zoned residential or otherwise incorporated. Further analysis and public input on the appropriate residential zoning designations is needed.

- Outdoor wood boilers should be no closer to the neighbor's home than the home served by the boiler. Installed units should have to be relocated to meet this "good neighbor" policy.
- Stack heights for outdoor wood boilers should be 2 feet higher than the peak of the eave of the neighboring residence. Whether the 300 foot distance proposed by the HPBA or some other value as determined by the Air Quality Division's ambient air monitoring results needs to yet be determined.
- Revised outdoor wood boiler setbacks should be measured to the property line. Existing units not able to meet the 0.6 lb/MMBtu or setback requirements would not be allowed to operate during the non-heating season. Based on published data and other state examples, this would likely be during the months of May

through September with some stipulation allowing for unusually cold weather. (This measure does imply that installed units could be creating an offsite impact during the winter month that exceeds ambient air quality standards). Residential hot water demand would have to be source by an alternative method such as electricity, natural gas, or propane.

For all outdoor wood boiler installations:

- Drop or significantly revise the table structure in the draft ordinance as it created more confusion than help as intended. Definition of residential boilers (less than 500,000 Btu/hr) and commercial boilers (more than 500,000 Btu/hr) may be considered.
- Retain the proposed 20% opacity standard as an enforceable limit. This will help strengthen the nuisance provisions of the draft outdoor wood boiler ordinance and allow for Public Health to enforce illegal or improper operating practices.
- Establish a limit on the amount of wood that can be burned a year for units that do not meet the 0.6 lb/MMBtu standard or the recommended setback distances. This is necessary to support the use of the reduced emission rates by 1/2 to 2/3 in the ambient air monitoring analysis which will be used to gain EPA approval. Initial analysis indicates that this would be approximately 3-5 cords of wood per year for residential installations and 12-15 cords a year for non-residential installations.
- Any wood that can be legally burned according to current open burning regulations can be burned in an outdoor wood boiler and not count toward any fuel restrictions. Feedback on exempting any boiler that only burns wood generated on site and that the owner could legally burn in accordance with open burning regulations is requested of the Board of Health, Supervisors, and public.
- Retain the variance procedure to petition for a case-by-case analysis for any unit that cannot meet these standards and who can provide alternative data that would justify different fuel usage limits, stack heights, or setback distances.
- Retain the permitting process in the draft ordinance. All existing units would have a period of 90 to 180 days to register their unit.

It has admittedly been adversarial at times, but the information collected has been very useful and I believe that we will be able to successfully re-draft the ordinance. In the end there are many individuals who own and/or sell outdoor wood boilers that have given much of their time to help Public Health with this difficult issue. Their input has made a difference. Likewise, we must recognize the individuals who voiced their concerns about their health and the affect neighboring boilers are having on them. These individuals also want to be good neighbors and not create problems, but in the end believe something needs to be done to remedy the air quality problems they experience.