

Fairbanks North Star Borough

**Evaluation of Electrostatic Precipitators (ESP) as Retrofit Control
Devices**

2-YEAR FIELD OPERATION MONITORING OF ELECTROSTATIC PRECIPITATORS FOR RESIDENTIAL WOOD HEATING SYSTEMS

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ABSTRACT: To assess the applicability of ESPs for particulate matter emission reduction in old residential wood heating appliances comprehensive field tests with accompanying ESP operation monitoring and dedicated emission measurement campaigns have been performed in the region of Graz (AT). Three OekoTube ESPs were thereby tested during the heating seasons 2014/2015 and 2015/2016 at different sites with rather old respectively high-PM-emission wood burning devices. Before installing the ESPs at the field testing sites they were checked in the lab regarding functionality and precipitation efficiency. The evaluation of the plant monitoring data collected during the field tests revealed high seasonal ESP availabilities between 80.2% and 97.7%. Dedicated test runs with emission measurements at the different testing sites showed high precipitation efficiencies which were well comparable with those gained during preceding lab-tests. Based on these results it can be concluded, that ESP models like the OekoTube are suitable as retrofit units in old appliances and have due to their high availability and particle precipitation efficiency the potential to contribute to a significant reduction of particulate matter emissions from old residential wood burning systems.

Keywords: gas cleaning, particle emission, small scale application

1 INTRODUCTION AND OBJECTIVES

According to the European Biomass Association (AEBIOM) more than 50% of the bioheat produced in the EU28 is related to residential heating [1]. Logwood stoves, logwood boilers, pellet boilers and wood chip boilers are thereby the most common heating technologies. However, biomass burning in stoves and outdated boiler systems is increasingly criticized as a major source of particulate matter (PM) emissions. With the introduction of the EU directive 1999/30/EC, which limits among others PM₁₀ concentrations in the ambient air, it had to be recognised that in many European regions the related limit value is more frequently exceeded than allowed. As the main sources for PM emissions traffic, industry and domestic heating have been identified. It has furthermore been shown that the contribution of residential biomass combustion to the total PM emissions of the residential heating sector exceeds 80% in some European regions.

Previous research projects dealing with this problem have revealed that especially old wood burning appliances are responsible for the high PM emissions of the residential heating sector [2, 3, 4]. An appropriate solution to the problem would be to exchange old appliances by modern low-emission systems. However, since owners of outdated heating systems cannot be forced to shift to newer ones and since also incentives for replacing old boilers did up to now often not show the desired effect, the application of precipitators for PM emission reduction seems to be the economically most feasible short-term approach.

The city of Graz (AT) is located in a typical basin-shaped region with a low exchange of air especially during winter time. This leads to accumulation of PM in the ambient air and consequently to more frequent exceedances of the PM concentrations allowed. A broad application of particle precipitators in old wood burning appliances could therefore, among others, be one appropriate countermeasure against air pollution. Recent work has shown that especially electrostatic precipitators (ESPs) are suitable for PM emission reduction from residential biomass combustion appliances [5]. However, former research projects such as the ERA-NET

Bioenergy project FutureBioTec have also revealed that many ESPs presently available are not designed for a long-term operation at the harsh operation conditions prevailing in old logwood boilers and stoves which are characterized by a flue gas with insufficient burnout as well as high soot and organic aerosol emissions. The reason therefor is that presently ESPs are mainly developed with the aim to safeguard the keeping of the stringent dust emission limits for pellet and wood chip combustion defined in the 1. BImSchV in Germany. Consequently, they are designed for much better burnout conditions than prevailing in old appliances. Moreover, no reliable long-term performance data regarding ESP operation are available.

Thus, the overall objectives of the project presented has been to identify an ESP technology suitable for the application with old high-emission wood burning appliances and to test it over two heating seasons within field tests in the region of Graz. These field tests should be accompanied by a comprehensive monitoring and measurement program.

2 APPROACH

2.1 Selection and description of the ESP technology

At first, an appropriate ESP technology, which is capable to operate at the harsh conditions of old biomass burning appliances had to be identified. Test runs with four different ESPs performed within a former Austrian R&D project have shown that the availability and precipitation efficiency of ESPs may significantly suffer from high concentrations of organic aerosols and soot in the raw gas which lead to problems and failures with ESP operation. In this project, the ESP OekoTube of the company OekoSolve (CH) has been identified as reliable ESP, which can operate at poor burnout conditions of the biomass boiler resp. stove to which it is connected and achieves very good precipitation efficiencies. Therefore, the OekoTube technology was selected for the field tests.

The OekoTube is a typical tube-type electrostatic precipitator. The unit consist of a T-fitting (9 in Figure 1) and a metal tube which are mounted on top of the chimney (chimney-top application). It uses the inner

surface of the chimney or in case of a non-metallic chimney an extended metal tube (as shown in Figure 1) as precipitation electrode. A 1.6 m long electrode (10) thereby extends downwards in the chimney and is connected with an insulator (5) positioned outside the flue gas stream. The electronic circuit and the control unit (2) are mounted outside and protected with a cover (4) against weathering. The power consumption of the ESP amounts to 20-30 W during operation and the high-voltage power applied is usually in the range of 15-30 kV. The OekoTube is applicable for biomass combustion systems up to 40 kW.

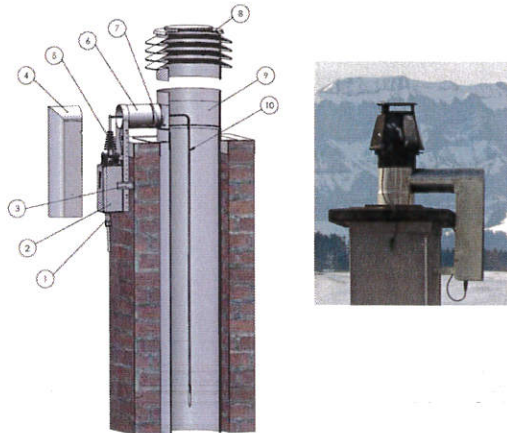


Figure 1: Scheme (left) and installation example (right) of the ESP OekoTube

Explanations: 1 ... power plug; 2 ... control unit; 3 ... mounting angle; 4 ... protective cover; 5 ... high voltage insulator; 6 ... connecting tube; 7 ... temperature sensor; 8... chimney crest (optional); 9 ... T-fitting; 10 ... electrode; source: www.oekosolve.ch

The OekoTube is equipped with a temperature sensor (7 in Figure 1) which measures the flue gas temperature. Based on the exceedance of a predefined temperature the control system identifies the start-up phase of the heating system and automatically activates the ESP. In turn, when the flue gas temperature drops below a certain predefined limit, the ESP is turned off again. These temperature set-values are configured in the control software before the first ESP start with respect to the expected flue gas temperatures and can be modified also during operation. Also the installation situation of the thermocouple is thereby considered since its readings may be influenced by cold radiation from the metal tube which is exposed to the ambient.

One advantage of the system, especially for integration in existing heating systems, is its positioning at the top of the chimney which demands for no additional space inside the building. As the precipitator has no automated cleaning system, ESP cleaning is carried out by the chimney sweep during his visits. The cleaning interval thereby depends on operating time and type of furnace. However, as a rule of thumb one additional chimney cleaning per year compared to operation without the OekoTube has to be considered.

Within the project presented also one so-called OekoTube inside has been tested. The ESP technology is

the same as for the chimney-top model but the OekoTube inside is designed for an installation in between the heating device and the chimney. The only restriction that has to be taken into account is a maximum flue gas temperature of 200°C during permanent operation.

2.1 Selection of appropriate field testing sites

Identically constructed ESPs have been delivered by OekoSolve and have at first been tested at the testing facilities of BIOS BIOENERGIESYSTEME GmbH to check their principal functionality and to gain benchmark values for the dust precipitation efficiency.

These ESPs should then be applied during a comprehensive field testing campaign in the heating season 2014/2015. For the second field testing campaign (heating season 2015/2016) one ESP has been replaced by an OekoTube inside.

Candidates for the field testing campaign have been screened and the most suitable testing sites have been selected. The aim was to select appliances which are suspected to show high particulate emissions and which are typical for the Graz region. Moreover, easy accessibility of the chimney for field measurements was a relevant requirement. Finally, private buildings with the following heating devices have been chosen:

Site 1: logwood boiler; year of manufacture: 2010; nominal boiler capacity: 25 kW. During the field test season 1 it was equipped with the OekoTube and during field test season 2 with the OekoTube inside technology. Figure 2 shows the OekoTube and the OekoTube inside installed at site 1.



Figure 2: OekoTube (left) and OekoTube inside (right) mounted at site 1



Figure 3: OekoTube mounted at site 2

Site 2: logwood boiler, year of manufacture: 1997; nominal boiler capacity: 18 kW (tested during field test year 1). The ESP tested at this plant was moved to site 3

during the second testing season.

Site 3: logwood stove, year of manufacture: 2009; nominal capacity 8.4 kW.

As an example for these installations the OekoTube mounted at the top of the chimney at site 2 is presented in Figure 3.

2.1 Performance of field testing and operation monitoring

At these testing sites the ESPs have been continuously operated over the whole heating seasons and relevant ESP operation data have been recorded and evaluated at least once a week. Moreover, two emission measurement (gaseous and particulate emissions) campaigns have been performed per testing site and per heating season.

At the end of the first heating season (2014/2015) the results have been evaluated and possible measures for adaptations respectively optimisations have been communicated to the manufacturer OekoSolve. The modifications have then been implemented for the field testing phase 2 during the heating season 2015/2016.

3 METHODOLOGY

3.2 Performance of pre-tests in the lab

In order to check the performance of the three ESPs delivered and to gain reference values regarding their precipitation efficiencies for TSP (total suspended particulate matter = total dust) and PM₁ (particulate matter with a diameter smaller than 1 µm = fine PM), at first the ESPs have been tested in the lab under controlled operation conditions of the boiler applied. Therefore, a state-of-the-art pellet boiler (Windhager BioWIN 210, nominal boiler capacity: 21 kW) has been connected to the ESPs.

In order to simulate the later field operation on top of the chimney, a tube with controlled electric trace heating was installed between the boiler and the ESP, so that a flue gas temperature of about 100°C has been achieved at ESP inlet. This tube also contained an isothermal sampling section right at ESP inlet, where TSP and PM₁ measurements upstream the ESP have been performed. At ESP outlet a second tube was installed for measurements downstream the ESP and for connection to the chimney. This tube has also been equipped with electric trace heating in order to keep the temperatures constant and to avoid possible influences by the condensation of organic vapours on the measurement results. In Figure 4 the experimental setup is schematically described.

The boiler was operated with A1-quality wood pellets (according to EN ISO 17225-2) at three different operation modes, which have been adjusted by appropriate manipulation of the process control settings.

- Normal operation
- Operation at conditions causing high emissions of organic aerosols to simulate the behaviour of an old logwood boiler
- Operation at sooty conditions to simulate the behaviour of a logwood stove.

The contents of O₂ (paramagnetic sensor), CO, CO₂ (ND-IR) and organic gaseous compounds (FID) in the flue gas were measured and on-line recorded. The particulate emissions have been measured in parallel upstream and downstream the ESP. A total dust measurement equipment according to VDI2066 and a

Berner-type low-pressure impactor to determine the PM₁ emissions where therefore applied. From these parallel measurements the total dust and the PM₁ precipitation efficiencies were calculated. Moreover, relevant ESP and boiler operation data have been recorded on-line and evaluated.

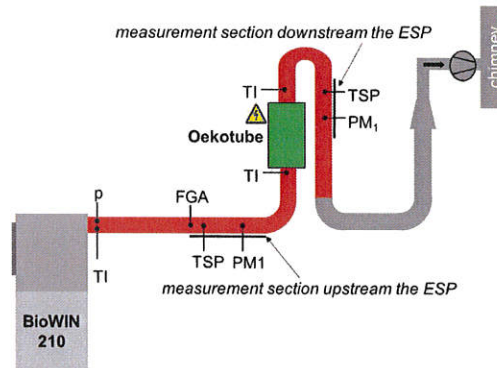


Figure 4: Scheme of the test stand setup

Explanations: Red colored tubes are equipped with electric trace heating; PM₁ ... Berner-type low-pressure impactor measurement; TSP ... total dust measurement; FGA ... flue gas analysers (O₂, CO, OGC); TI ... flue gas temperature measurements; P ... draft measurement

3.2 Field monitoring

To facilitate a continuous observation of the ESP performance during the field tests, relevant operation data were logged by data acquisition systems installed at each site in 5 second intervals. Each day the data were automatically submitted via GSM to the office of BIOS BIOENERGIESYSTEME GmbH. The data received were evaluated at least once a week in order to detect possible system failures and to decide if appropriate countermeasures have to be taken. The data recorded and evaluated were:

- Operating state of the ESP [ON/OFF]
- ESP voltage [kV]
- ESP current [µA]
- Flue gas temperature at ESP outlet [°C]
- Temperature in the ESP control box [°C]
- Error messages regarding the control hardware
- Error messages indicating operation failures

3.2 Dedicated measurement campaigns

At each ESP at least two dedicated testing campaigns have been performed – one at the beginning and one in the second half of the heating season. Thereby the gaseous and particulate emissions downstream the ESP were determined with the same equipment as applied during the lab tests. To enable a correct measurement downstream the ESP, a “measurement section”, which is a tube with appropriate sampling ports, was connected on top of the ESP. In Figure 5 the measurement setup is presented.

As there has been no possibility to measure the PM emissions upstream the ESP, the PM precipitation efficiency was determined with downstream measurements at two successive days; one day with and one day without ESP operation. It has been taken care that the framework conditions during these two days

regarding outside temperatures, operation cycles of the biomass combustion systems and duration of the test runs were comparable.

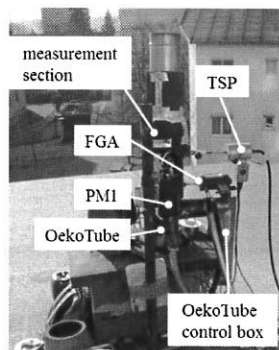


Figure 5: Measurement setup during the dedicated field measurement campaigns

At the logwood boilers (site 1 and 2) consecutive TSP measurements have been performed in order to cover the whole operation cycle of the boiler including the ignition phase, the main combustion phase and the charcoal burnout phase. At least three short-term impactor measurements (duration of some minutes) have been carried out during the distinct combustion phases to determine the PM_{10} emissions. At the stove (site 3) one TSP measurement per batch has been performed and at least 3 impactor measurements were made within one test run day during the main combustion phases of selected batches.

From these data the particle precipitation efficiencies were calculated. However, the main aim of these measurements was to check if relevant changes regarding the precipitation efficiencies in comparison with the lab tests and over the heating seasons occur rather than to get exact data on particle precipitation.

4 RESULTS

4.1 Results of the lab tests performed

The aim of the preliminary lab tests has been to check the ESPs before installing them in the field and to gain data regarding particle precipitation efficiencies under well-controlled lab conditions which can be compared with results from the field tests.

The ESPs generally could be taken into operation without problems. During the two test weeks performed with each ESP also no relevant failures occurred.

At boiler standard operation conditions, which were characterized by a good gas phase burnout with CO emissions below 60 mg/MJ (related to the NCV of the fuel) and low PM emissions at ESP inlet (total dust emissions below 10 mg/MJ_{NCV}) all ESPs showed precipitation efficiencies of 88 to 93% for total dust and of 88 to 97% for PM_{10} . The ESP voltage was slightly below 30 kV and the ESP power between 10 and 16 W. Based on experience from former projects and on literature data this has been an expected result.

The boiler operation which aimed at a high amount of organic aerosol emissions was characterized by very high CO emissions (around 4,000 mg/MJ_{NCV}) and high oxygen contents the flue gas (up to 18 vol% d.b.). Total dust

emissions at ESP inlet were in the range between 35 and 50 mg/MJ_{NCV}. At these conditions precipitation ratios of about 90% could be achieved for total dust and PM_{10} . The ESP voltage was at about 30 kV and the ESP power between 4 and 10 W. Compared with former experience these values regarding PM precipitation must be assessed as very good.

During the sooty operation the pellet boiler was operated at very low excess air ratios (about 4 vol% O_2 in the dry flue gas) resulting in increased CO emissions (up to in average 2,000 mg/MJ_{NCV}) and high total dust emissions of up to 50 mg/MJ_{NCV}. The ESP voltage was at about 30 kV and the ESP power between 3.4 and 8.0 W. For PM_{10} a very good precipitation efficiency of up to 96% could be determined. However, regarding total dust at some measurements the emissions downstream the ESP were even higher than upstream the ESP which can be explained by the high soot emissions. Soot particles form rather loose dendritic agglomerates on the electrodes and the filter walls which can easily be re-entrained with the flue gas and cause emissions of rather big (even some millimeter in diameter) soot flakes. After the flue gas exits the chimney these flakes are immediately precipitated by gravitational forces and do not remain in the ambient air.

Summing up, from the lab tests it could be concluded that the ESPs were functional and showed the expected particle precipitation efficiencies. Moreover, the data acquisition systems have been tested and finally the ESPs were released for the field testing.

4.2 Results of the ESP monitoring at the field testing sites

Field monitoring took place over two heating seasons (2014/2015 and 2015/2016). The data gained have been continuously evaluated in order to regularly check the ESP performance.

As an example in Figure 6 a typical ESP operation cycle from one day at site 1 is presented. Due to the increase of the flue gas temperature above 35°C the ESP control identifies the ignition phase of the logwood boiler and turns on the ESP. Immediately, the ESP voltage and power increase. In the following the ESP control tries to maximize the ESP power by increasing the voltage. In the case presented the targeted power of 15 W is reached after 15 seconds. If the voltage is increased too much, sparkovers can occur. In this case the power is reduced and then increased again and a failure message is sent. The occurrence of such sparkovers is accepted in order to achieve a high average ESP power and therefore a high precipitation efficiency.

The precipitation efficiency of the ESP depends, besides the voltage and power also on the flue gas temperature and the particle load at ESP inlet. From Figure 6 it can be derived that during the ignition and the main combustion phase (can be identified by the higher flue gas temperatures) voltage and power remain at about the same level of about 25 kV and up to 16 W respectively. The temperature decrease in the second half of the operation cycle indicates the charcoal burnout phase. As soon as the temperature drops below a certain level, the ESP power decreases. This is related to the decrease of the electric conductivity of the flue gas with decreasing temperatures. At a flue gas temperature of 30°C (set value for this ESP) the ESP control desires the end of the heating cycle and turns off the ESP.

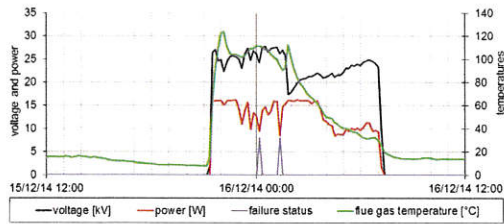


Figure 6: Typical daily operation cycle of the ESP at field test site 1

In Figure 7 the trends regarding the ESP operation parameters during January and February 2015 at site 1 are presented. The logwood boiler at site 1 was typically operated once a day for in average 7 hours, usually starting the operation cycle in the late evening to load the buffer storage of the heating system during nighttime. From Figure 7 it can be revealed that the voltage (black line) always reaches maximum values between 25 and 30 kV which indicates a good precipitation performance.

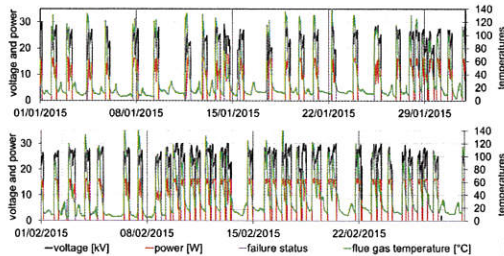


Figure 7: Operation data of the ESP at field testing site 1 during January and February 2015

At site 2 also a logwood boiler was operated and therefore, about the same operation cycles and operation behaviour as for site 1 were observed. However, at this installation very harsh operating conditions prevailed with flue gas temperatures at ESP inlet of more than 300°C and, as the dedicated test runs have shown, high CO, OGC and PM emissions. This was one reason why at this plant the highest number of sparkovers and the lowest average voltage were detected (see Table II). Moreover, the high flue gas temperatures after some weeks of operation led to the deformation of the electrode due to thermal tensions and the electrode had therefore to be replaced by a more robust one. This was the only failure occurring over the field testing periods with all ESPs which demanded for a revision by the manufacturer.

All data collected during the two heating seasons have finally been evaluated in order to determine the availability of the ESPs as well as the average ESP voltage and power. Therefore, the maximum possible operation hours have been calculated from the periods where the ESP signal indicated operation ("ESP ON"), i.e. the period at which the flue gas temperatures were above the operation threshold values. The availability is calculated by the operation hours of the ESP divided by the maximum possible operating hours. The mean values and standard deviations of the ESP voltage and the ESP power were calculated over all operation cycles (periods between turning on and off the ESP). Moreover, the number of ESP operation cycles and the average duration of an operation cycle has been evaluated. The respective data are presented

in Table I and Table II.

In Table I relevant data collected for the ESP operated at site 1 are summarised. During the first heating season the chimney-top version of the OekoTube has been tested. The detailed evaluation of the data has revealed that at each time when the boiler was taken into operation also the ESP was turned on. Due to a low number of operation failures (sparkovers), which led to short-term shut downs of the ESP, a high availability of 97.7% could be reached. The average voltage (24.3 V) is quite close to the maximum voltage of 30 kV and the average power (13.5 W) is within the range determined during the lab-tests (10-16 W). It has been noticed that dust deposits on the electrode and the walls caused a slight but gradual decline of the voltage and the current, however, after an intermediate cleaning by the chimney sweep at the end of February 2015 the initial values could be reached again.

Due to the stable performance, the acceptable precipitation efficiency achieved, and because of the moderate flue gas temperatures at site 1 it was decided to replace the chimney-top OekoTube by an OekoTube inside for the second monitoring season. The idea was to gain additional experience with this model, which is in terms of precipitation technology identical with the chimney-top version but can be installed inside the building. The advantage are the lower installation costs (no crane is needed and no cable has to be laid to the roof top) provided that there is enough space for mounting the ESP between the boiler and the chimney.

Table I: Results of the evaluation of the ESP operation data at site 1

Explanations: M ... mean value; s ... standard deviation

	2014/2015 OekoTube	2015/2016 OekoTube inside
Field test period	12/11/2014 - 29/03/2015 3,288 h	02/11/2015 - 31/03/2016 3,624 h
Maximum possible operating hours	915.2 h	777.7 h
Number of operation cycles	121	133
Average duration of an operation cycle	452 min	346 min
ESP availability:	97.7 %	81.2 %
Average voltage:	M: 24.3 kV s: 4.3 kV	M: 21.4 kV s: 5.2 kV
Average power:	M: 13.5 W s: 3.8 W	M: 8.2 W s: 6.5 W

The heating season 2015/2016 was characterized by a rather calm weather and therefore the maximum possible operating hours decreased from 915.2 in the preceding heating season to 777.7 hours although ESP operation started earlier. Also the average duration of one operation cycle was lower. Compared with the chimney-top version of the OekoTube the availability of the OekoTube inside was with 81.2% lower but still acceptable. The main reason for the lower availability was that the maximum flue gas temperature of 200°C was unexpectedly often exceeded which led to failures and short shutdowns. Also with the OekoTube inside one intermediate cleaning in the mid of February 2016 was sufficient to maintain a stable ESP operation throughout the whole heating season.

In Table II the results for the ESP installed at site 2 and site 3 are presented. During the first heating season it had

been installed at site 2 but problems with the owner regarding access for the dedicated measurement campaigns have led to the decision to change to site 3 during the second heating season.

At site 2 an outdated logwood boiler was operated. Typical features of this boiler were very high flue gas temperatures at boiler outlet leading to temperatures up to more than 300°C in the ESP and very sooty emissions. Analyses of dust samples taken after cleaning by the chimney sweep have revealed elemental carbon contents of 30 to 45 wt% (d.b.). Especially the high temperatures caused thermal deformations of the electrode and as a consequence of that massive sparkovers. Therefore, before the electrode was replaced by a more robust one, it sometimes took more than one attempt of the control system to reach stable operation. These effects are also the reasons for the lower availability (81.7%) and the comparably low average voltage that could be reached in comparison with site 1. However, as measured by these framework conditions, the availability achieved can still be assessed as acceptable. As already noticed at site 1 also at site 2 a gradual decrease of the ESP voltage and the ESP current over time occurred and one intermediate cleaning of the ESP by the chimney sweep was needed.

Table II: Results of the evaluation of the ESP operation data at site 2 and 3

Explanations: M ... mean value; s ... standard deviation

	2014/2015 OekoTube site 2	2015/2016 OekoTube site 3
Field test period:	01/12/2014 - 12/04/2015 3,168 h	21/10/2015 - 17/04/2016 4,320 h
Maximum possible operating hours	573 h	1,360 h
Number of operation cycles	137	368
Average duration of an operation cycle	249 min	222 min
ESP availability:	81.7 %	80.2 %
Average voltage:	M: 18.1 kV s: 5.9 kV	M: 26.1 kV s: 8.8 kV
Average power:	M: 10.0 W s: 6.6 W	M: 6.6 W s: 4.9 W

Before the heating season 2015/2016 the ESP has been moved from site 2 to site 3. There, a wood stove is operated as primary heating system, and as the data regarding the duration of an average operation cycle and the number of heating cycles confirm, the system was even more in operation than the logwood boiler in the year before. Logwood stoves typically show relatively high soot emissions and the average voltage (26.1 kV) and the average ESP power (6.6 W) reflect the results of the lab-tests at sooty conditions (30 kV and 3.4 to 8 W). High amounts of soot deposits on the ESP surfaces caused some problems during continuous operation and therefore the availability of the ESP at site 3 was with 80.2% in the same range as at site 2. Two intermediate cleanings by the chimney sweep were demanded at this site.

4.3 Results of the dedicated field measurement campaigns

At each testing site two dedicated measurement campaigns per heating season have been carried out to

check the precipitation efficiencies of the ESPs. Therefore, measurements have been performed at two successive days, one with and one for comparison without ESP operation. It has been taken care that the framework conditions regarding the operation of the wood heating devices have been comparable during both days. The flue gas temperatures, the duration of the operation cycle and the O₂, CO and OGC contents of the flue gas have therefore been evaluated.

As an example for such a measurement campaign a test run performed at site 1 is presented in the following. In Figure 8 the oxygen contents of the flue gas and the flue gas temperatures for two successive testing days are presented whereby the start of the test runs has been synchronised to gain a better comparability of the results. The average oxygen content of the flue gas over the whole test run amounted to 16.7 vol% (with ESP operation) respectively 17.3 vol% d.b. The average flue gas temperatures at ESP were with 98.6°C (with ESP operation) and 106.8°C (without ESP operation) also in about the same range. The CO emissions were with in average 4,750 mg/Nm³ during operation with ESP higher than during operation without ESP (3,930 mg/Nm³). The same is true for the OGC emissions (328 resp. 138 mg/Nm³ - all emissions related to dry flue gas and 13 vol% O₂). Consequently, during operation of the ESP slightly worse burnout conditions prevailed than during the measurements without ESP operation.

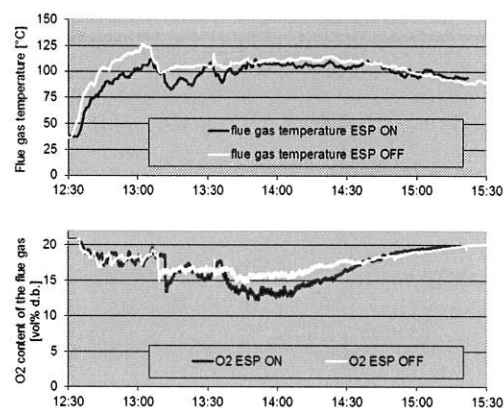


Figure 8: Comparison of the trends of the O₂ concentrations in the dry flue gas and the flue gas temperatures during test runs at site 1 on two successive days

Three consecutive total dust emission measurements have been performed. The total dust emissions varied during operation without ESP between 234.4 mg/Nm³ (during the ignition phase), 45.7 mg/Nm³ (main combustion phase) and 47.8 mg/Nm³ (during the charcoal burnout phase). During ESP operation total dust emissions of 48.0 (ignition phase), 7.2 mg/Nm³ (main combustion phase) and 15.9 mg/Nm³ (charcoal burnout phase) have been measured (all emissions related to dry flue gas and 13 vol% O₂). From these single measurements total dust precipitation efficiencies of 80%, 84% and 67% could be calculated for the different combustion phases. Four short term measurements with the Berner-type low-pressure impactor per day revealed PM₁ precipitation efficiencies of 86 to 87.5% whereby the PM₁ contents in the flue gas

amounted from 19.4 to 44.8 mg/Nm³ (without ESP operation) and 2.0 to 7.4 mg/Nm³ (with ESP operation). When evaluating these data it has to be considered that the total dust measurements covered the whole operation period while the PM₁ measurements are only related to rather short (some minutes) operation phases during which impactor measurements have been performed.

In Table III and Table IV the PM emission data and the precipitation efficiencies achieved at the different testing sites are summarised. The broad variation of the single TSP measurements at the logwood boilers (site 1 and 2) mainly results from the different combustion phases during which the single measurements were performed (ignition phase, main combustion phase, charcoal burnout). It has to be mentioned that during some measurements flaking (re-entrainment of agglomerates of already precipitated soot particles from the precipitator surfaces) occurred. In some cases this caused higher total dust emissions during ESP operation than during operation without ESP. These results have not been considered in Table III and IV.

Moreover, the comparability of the combustion conditions during the different combustion phases between the measurement days with and without ESP operation always is limited which also contributes to the scattering of the data regarding particle precipitation efficiency.

Table III: Results of the dedicated testing campaigns with emission measurements at site 1

Explanations: emissions in mg/Nm³ related to dry flue gas and 13 vol% O₂; TSP ... total suspended particulate matter = total dust; PM₁ ... particles <1 µm aerodynamic diameter

	2014/2015 OekoTube	2015/2016 OekoTube inside
TSP emissions without ESP operation	33 – 274	15 – 220
TSP emissions with ESP operation	4 – 174	2 – 100
TSP precipitation efficiency	30 – 93%	54 – 90%
PM ₁ precipitation efficiency	55 – 96%	46 – 98%

The data regarding site 1 show, that the TSP emissions without ESP operation were in the same range for both heating seasons. For both, the chimney-top and the inside version of the OekoTube acceptable precipitation efficiencies were determined (Table III). The lower values regarding the TSP precipitation efficiency at this boiler are most probably due to re-entrainment of already precipitated soot particles (flaking). The highest precipitation efficiencies (93% resp. 90% for the OekoTube and the OekoTube inside) are well comparable with results gained from the lab tests. The average TSP emissions during operation with filter amounted to 39 mg/Nm³ resp. 22 mg/Nm³ (related to dry flue gas and 13 vol% O₂)

The maximum precipitation efficiencies regarding PM₁ show values of up to 96% respectively 98%, which are well comparable with the results of the lab-test performed. However, since impactor measurements are short term measurements (some minutes). Slightly changing combustion conditions at the two testing days which are compared can have a certain impact on the resulting precipitation efficiencies and therefore, the range mentioned in Table III has to be evaluated with care.

At site 2 (Table IV) the highest PM emissions upstream the ESP of all testing sites have been

determined (up to 736 mg/Nm³). Moreover, as chemical analyses of selected TSP samples have shown, the contribution of soot to the TSP emissions was very high (elemental carbon content of the TSP of up to 85 wt%). The latter explains the low minimum value of the TSP precipitation efficiency, which is assumed to be due to re-entrainment of already precipitated soot particles. In fact soot flakes have been found in the vicinity of the chimney which confirms the occurrence of the flaking effect. The maximum precipitation efficiencies for TSP (83%) and PM₁ (93%) however confirm the expectations from the lab-test. The average TSP emission for ESP operation amounted to 84 mg/Nm³ (related to dry flue gas and 13 vol% O₂).

Table IV: Results of the dedicated testing campaigns with emission measurements at site 2 and 3

Explanations: emissions in mg/Nm³ related to dry flue gas and 13 vol% O₂; TSP ... total suspended particulate matter = total dust; PM₁ ... particles <1 µm aerodynamic diameter

	2014/2015 OekoTube site 2	2015/2016 OekoTube site 3
TSP emissions without ESP operation	74 – 736	98 – 321
TSP emissions with ESP operation	22 – 154	14 – 46
TSP precipitation efficiency	35 – 83%	57 – 93%
PM ₁ precipitation efficiency	44 – 93%	50 – 97%

Also at site 3 very good maximum precipitation efficiencies for TSP (93%) and PM₁ (97%) have been determined. The average TSP emissions for ESP operation amounted to 28 mg/Nm³ (related to dry flue gas and 13 vol% O₂).

Summing up, the dedicated field measurement campaigns have shown that the ESPs worked well and that also in field operation precipitation efficiencies comparable with those gained during lab-tests can be achieved. Moreover, no significant differences between the two measurement campaigns at the beginning of the heating season and in its second half could be found.

5 SUMMARY AND CONCLUSIONS

To assess the applicability of ESPs for particulate matter emission reduction in residential wood heating appliances field tests with accompanying ESP operation monitoring and dedicated emission measurement campaigns have been performed in the region of Graz (AT). Three OekoTube ESPs (two chimney-top and one inside version) were thereby tested over the heating seasons 2014/2015 and 2015/2016 at three different sites, two with logwood boilers and one with a logwood stove.

Before being released for the field tests the ESPs were checked within lab-tests regarding functionality and particle precipitation efficiency.

At the field testing sites the ESPs could be installed and taken into operation without major problems. Also during the operation over the heating seasons no severe problems occurred at site 1 and site 3. Site 2 however distinguished its self by very high flue gas temperatures of up to 300°C at the ESP which led to a deformation of

the electrode. After replacement with a more robust electrode, which was less sensitive regarding thermal tensions, no further problems occurred.

ESP operation periods in the range of 630 to 1088 hours per season were determined. One (site 1) and two (site 2 and 3) additional cleanings by the chimney sweep were needed to maintain the ESP performance over the whole heating season. The cleaning demand could thereby be identified from slightly decreasing ESP voltage and ESP power with increasing operation time.

The evaluation of the plant monitoring data revealed acceptable respectively high ESP availabilities for the chimney-top version of 81.7% and 80.2% (at site 2 and 3) and 97.7% at site 1. The availability of the OekoTube inside was evaluated with 81.2%. These availabilities are all above the target value of 80% which has been defined by the manufacturer OekoSolve for this product.

Dedicated test runs with emission measurements at the different testing sites showed scattering results regarding the precipitation efficiencies. This was due to the fact that they have been calculated from measurement data from two successive days, one with and one without ESP operation. Additionally, flaking (re-entrainment of already precipitated soot agglomerates from the filter surfaces) sometimes occurred. However, the highest precipitation efficiencies determined (>83% for TSP and >93% for PM₁), were well comparable with those gained during the lab-tests. Moreover, the measurements revealed no significant changes of the precipitation efficiencies over the heating season. The total dust emissions could be reduced to 39 mg/Nm³ (site 1 – OekoTube), 22 mg/Nm³ (site 1 – OekoTube inside), 84 mg/Nm³ (site 2) and 28 mg/Nm³ (site 3; all data related to the dry flue gas and 13 vol% O₂)

From the project also some proposals for further improvements resulted. At boilers and stoves with high flue gas temperatures, electrodes have to be applied which are not sensitive regarding thermal deformations as such deformations lead to increased sparkovers or even to electrode damages. Secondly, the re-entrainment of already precipitated soot particles with the flue gas (so called flaking) should be avoided by the implementation of automated cleaning systems which regularly remove soot agglomerates from the ESP surfaces. This cleaning should be done during shut down phases without reasonable flue gas flow so that the soot flakes can drop to the bottom of the chimney.

Summing up, the results of the project have revealed, that ESP models like the OekoTube have the potential to contribute to a significant reduction of particulate matter emissions from outdated and high-emission residential wood burning systems. More of relevance than the acceptable precipitation efficiencies is thereby the fact, that even at problematic framework conditions such as flue gases with high temperatures, high tar contents and high soot contents during both field test seasons high availabilities were achieved.

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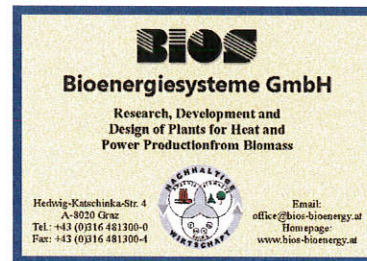
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7 ACKNOWLEDGEMENTS

The authors gratefully acknowledge the financial support of the Styrian Government and of the City of Graz - Environmental Department who made this project possible.

8 LOGO SPACE



FORMATION MECHANISMS AND PHYSICAL PROPERTIES OF PARTICLES FROM WOOD COMBUSTION FOR DESIGN AND OPERATION OF ELECTROSTATIC PRECIPITATORS

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ABSTRACT: The particles from biomass combustion are collected in a laboratory electrostatic precipitator (ESP). Three different combustion regimes are maintained by a modified pellet boiler, i.e., high temperature and sufficient oxygen, high temperature and local lack of oxygen, and low temperature. The resulting particles are classified as salts, soot, and condensable organic compounds (COC) based on the particle type expected from the theory of particle formation. The chemical and electrical properties are analysed and confirm the classification: While salts exhibit a low carbon content, soot and COC are high in carbon. Soot and COC can be distinguished by significantly different molar C/H-ratio being 6.44 for soot and 1.24 for COC. The electrical conductivity, which is a key parameter for the precipitation and dust layer built-up in the ESP, is measured at different temperatures and humidities. Significant differences in conductivity are found for salts, soot, and COC, and in addition, a strong influence of the humidity of the flue gas is observed. Salt is confirmed to be ideal for ESP, while soot reveals high conductivity leading to re-entrainment of agglomerated particles, and COC exhibit low conductivity leading to back-corona which can be limiting at low humidity. The presented particle properties can be applied as guideline for ESP design and operation. **Keywords:** Aerosol, particle emission, chemical composition, combustion, gas cleaning.

1 INTRODUCTION

1.1 Background

Particulate Matter smaller 10 micron (PM_{10}) is related to adverse health effects. Due to more stringent emission limit values for small and medium scale applications, there is an increasing demand for particle precipitation for biomass combustion plants. Beside applications for industrial plants > 1 MW, where particle precipitation is widely applied nowadays, there is an additional need for small and medium scale applications, i.e.,

- a) in residential heating from 5 kW – 70 kW and
- b) in automatic boilers from 200 kW – 1 MW.

For both categories, electrostatic precipitators (ESP) have been introduced to the market in the past few years in countries which implemented stringent emission limit values for these categories such as e.g. Switzerland.

The principles for ESP – as shown in Figure 1 – are well known and design parameters are available in the literature for different flue gas composition and particle characteristics [1–3]. However, experiences for ESP so far result mainly from large scale applications as e.g. thermal power stations with constant operation at high flue gas temperatures. In addition, particle characteristics are mainly based on coal, while data from wood particles are scarce [4]. Consequently, the following specific needs have to be considered for applications of ESP in wood combustion devices:

1. Particles from small scale wood combustion consist of different components, which can be basically divided into three fractions, i.e.,
 - a) inorganic particulates (salts),
 - b) soot (available as solid particles in the flue gas),
 - c) condensable organic compounds (COC).
2. The concentration of H_2O as well as of CO , CO_2 and O_2 can vary in a wide range and consequently the

precipitation conditions in the ESP (which are strongly influenced e.g. by the content of H_2O).

3. Wood combustion is often applied for heating purposes where on-/off-operation and short periods of uninterrupted operation are common [5]. This results in low flue gas temperatures thus potentially enabling condensation of water vapour and – if present in the flue gas – organic condensates in the ESP. To avoid condensation, ESP are usually shut-off at low flue gas temperatures, which can result in a poor availability and consequently increased emissions in real-life operation. In addition, transient conditions during start-up and shut-down, which are not considered in type tests or during on-site acceptance inspection, can play an important role to the operation of the ESP and the clean gas emissions.

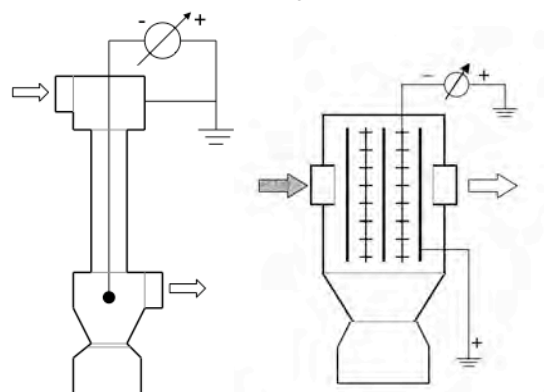


Figure 1: Principles of electrostatic precipitator (ESP).

1.2 Aim

The aim of the present investigation is to collect precipitation properties of particles and flue gases from wood combustion under different operation conditions. These data shall be used as a basis for future design and operation parameters for ESP for wood combustion applications. Furthermore, based on these results, ope-

rating problems such as back-ionisation and re-entrainment shall be related to dedicated combustion conditions thus enabling improved operation of the combustion system and the ESP. Back-ionisation is usually referred to as back corona and describes the localized discharge which occurs at the collecting electrode surface, when that surface becomes coated with an electrically insulating layer of poorly conducting particles such as e.g. COC and thus reduce the precipitation performance. Re-entrainment may occur for agglomerates with low electrical resistivity such as soot.

2 THEORY

Biomass combustion is related to three basic types of particles, which are summarized as 'salts', 'soot', and Condensable Organic Compounds 'COC', and exhibit completely different chemical and physical properties:

- Inorganic particles, basically salts, are formed from minerals (i.e., ash constituents) in the fuel. These particles are dominant at near-complete combustion
- COC are formed in different processes:
 - At low temperature volatile or condensed organic compounds are formed from wood pyrolysis with characteristic compounds depending on residence time, heating rate, temperature and other operation

parameters.

– At moderate temperatures and local lack of oxygen, organic compounds can be converted to secondary tars, which appear as condensables.

- Soot is formed from organic precursors in zones of high temperatures and lack of oxygen, where volatiles and primary tars react to secondary tars and form polyaromatic hydrocarbons, which consequently can form soot particles by further agglomeration and release of hydrogen.

The formation mechanisms are described in Figure 2.

In automatic wood combustion, nearly complete combustion can be achieved and hence salts are dominant as particles. However, during start-up, and in phases of inappropriate operation, condensables or soot can also be emitted from automatic plants.

Incomplete combustion is often found in manual wood combustion, whereby soot or condensables can be the dominant part of the total particulate matter released to the atmosphere. Due to the different temperature regimes and the different influence of the residence time for soot and COC formation, usually either one of the two particle type dominates the particle ensemble.

Table 1 summarizes the main properties of salt, soot, and COC found in biomass flue gases.

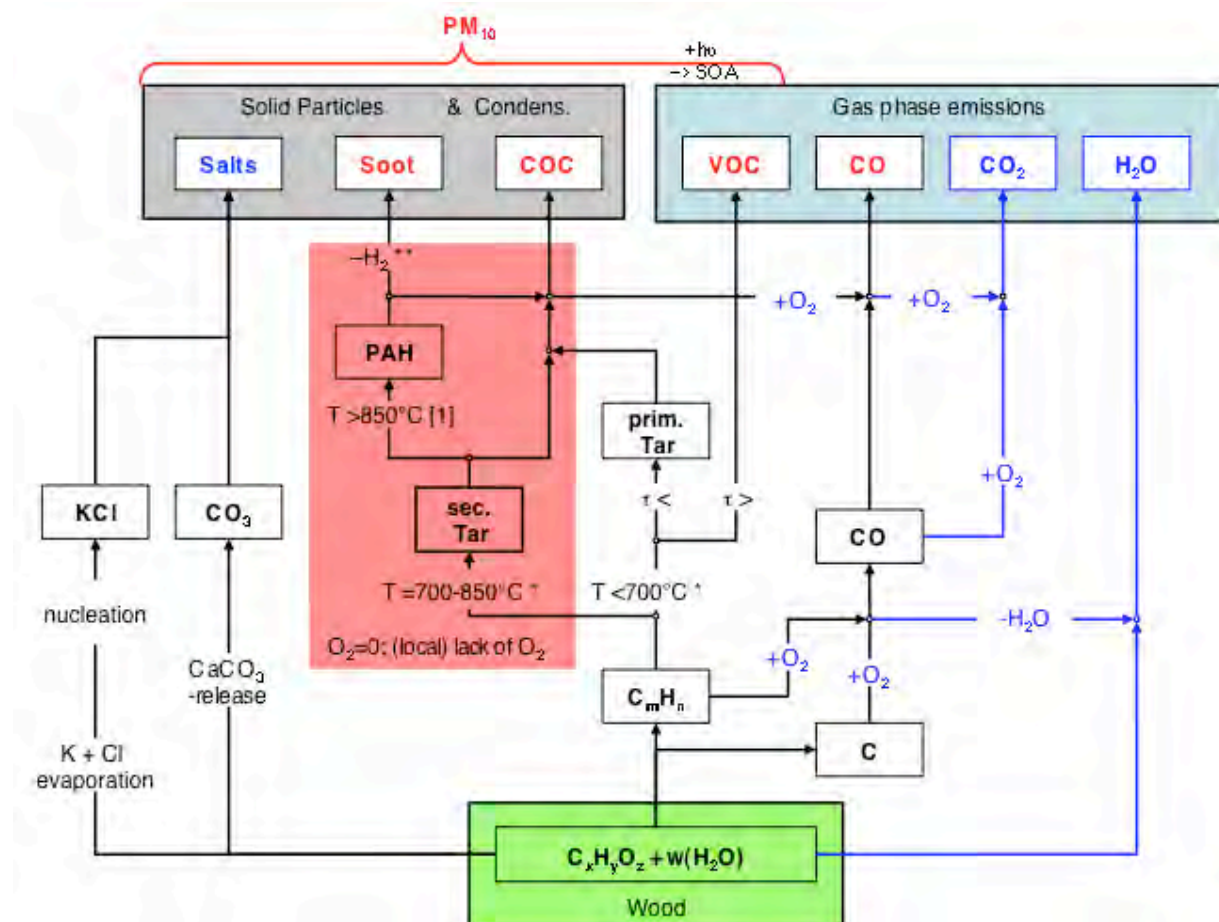


Figure 2: Mechanisms of aerosol formation in biomass combustion. *[6], **[7].

3 METHOD

For the experiments, an electrostatic lab-scale precipitator was designed as tube type ESP with a maximum voltage of $U_{\max} = -65$ kV and connected to a pellet boiler (Figure 3). The pellet boiler was modified to enable stationary operation at specific combustion conditions, which normally exist only during transient phases such as during start-up. The ESP was designed to enable precipitation efficiencies as typically found in commercial small and medium scale ESP, i.e., safely $> 90\%$ for all particle sizes and $> 95\%$ as average precipitation efficiency for typical particle collectives found in biomass combustion (Figure 4). Electrical conductivity was analysed acc. to IEEE Std 548-1984 (due to missing valid standards, the old standard is used). The relevance of the conductivity measurements for ESP is described in [10].

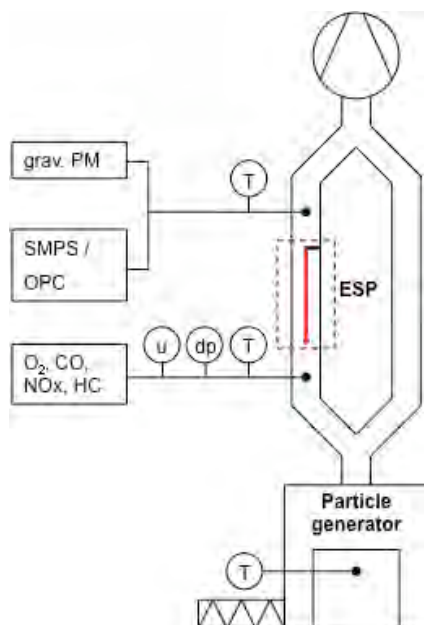


Figure 3: Experimental setup.

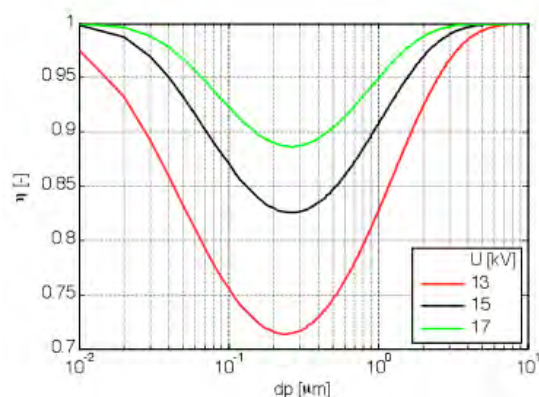


Figure 4: Calculated precipitation efficiency of the laboratory ESP as function of the particle size and the voltage. Design parameters of the ESP: L 1000 mm, D 100 mm, u 1 m/s, SCA 45 s/m, $U_{\max} = -65$ kV.

4 RESULTS

4.1 Particle types

In biomass combustion, three combustion regimes can be distinguished which – among other parameters – are related to the level of excess air available in the combustion chamber [11]. Figure 5 shows the particles found in the present laboratory device for different excess air ratios:

At low excess air ratio (regime C), soot is formed in hot zones in the flame as a synthesis product through the release of hydrocarbons containing primary tars from wood pyrolysis, formation of secondary tars in an atmosphere with lack of oxygen, PAH formation, and finally release of hydrogen during particle growth thus resulting in a high C/H ratio as indicated in Table 1.

At optimum excess air (regime B), near complete combustion is achieved, if good mixing of combustible gases with air is guaranteed and quenching of the flame is avoided. Consequently, carbonaceous matter in solid and liquid phase is emitted in very small concentrations, while inorganic particles formed from ash constituents are available as particulate matter (PM) in the flue gas and predominantly found as salts.

At high overall excess air (regime A), the combustion temperature decreases, resulting in incomplete combustion. Due to low temperature, the formation of soot and the release of hydrogen is suppressed, resulting in high concentrations of primary and secondary tars formed during pyrolysis consequently leading to condensable organic compounds (COC) in the flue gas with low C/H ratio.

Since ESP operation is ideal at operation at optimum excess air, nowadays applications are often limited to such combustion conditions, while the ESP is often shut-off during unideal combustion conditions.

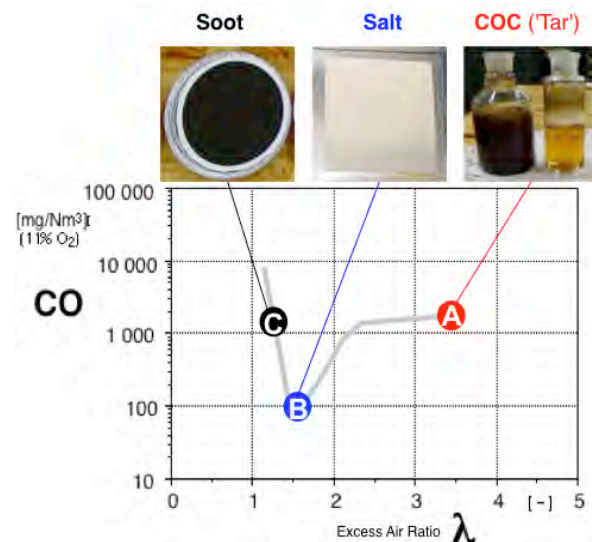


Figure 5: Three regimes of biomass combustion shown in the diagram CO as function of excess air λ acc. to [11]. The three combustion regimes are related to three different types of combustion particles, i.e., soot, salts, and COC, depending on the level of excess air and other parameters.

4.2 Particle properties

According to the chemical composition and the physical properties, salts are expected to be suitable for ESP operation, while soot may result in re-entrainment and COC may be related to back-corona (Table 1). Due to the release of hydrogen during soot formation, a significantly different molar ratio of soot and COC is expected, thus enabling to identify and distinguish the two types of aerosols from incomplete combustion (Table 1).

Figure 6 shows the combustion conditions and indicated by emissions, temperature, and excess air as well as the resulting particle composition, table 2 shows the results from the chemical analysis, while Figure 7 shows the electrical particle properties. The results confirm, that the particle properties are influenced by the excess air ratio (λ), which enables to distinguish three different combustion regimes.

- At $\lambda = 1.2$, a lack of oxygen results in high soot formation (but low content of CO and HC), which leads to re-entrainment of agglomerated particles.
- For $\lambda = 1.55$, almost complete combustion is achieved in the pellet boiler thus resulting in mainly inorganic particles.
- By increasing the excess air ratio to 3.5, stable operation at high concentrations of CO and HC is achieved, resulting in COC an leading to back-ionisation, which leads to a slightly reduced precipitation efficiency.

Figure 7 shows the results of analyses of the electrical conductivity as function of the temperature measured from four different types of combustion particles, i.e., soot, salt, and COC from the laboratory equipment, and dust collected in the ESP from a 1 MW industrial wood combustion plant and referred to as "Reference".

As expected, salt particles and reference dust exhibit a favourable conductivity in a relatively broad range of application and hence are potentially well suited for precipitation in ESP. However, the moisture content in the flue gas strongly influences the conductivity of the particle layer and needs to be considered for the design and operation of the ESP. Although measurements are recommended for specific applications, the results in Figure 6 enable a qualitative indication for optimised operation of ESP for different particle types:

Dry flue gas is favourable for salts in the most relevant temperature range up to 200°C, while for COC, reasonable conditions in dry flue gas are only expected at temperatures above 170°C. In wet flue gas, the precipitation of salts becomes critical for temperatures below 120°C. Consequently, a relatively narrow range of optimum operation may result for practical conditions of biomass combustion with varying excess air and varying fuel moisture content.

4.3 Precipitation mechanisms

Since the electrical conductivity influences the formation of dust layers in the electric field, different dust layers may be formed depending on the particle proper-

ties. Soot leads to dendritic build-up with a weak adhesion of the agglomerates as shown in Figure 8, which can cause re-entrainment of agglomerated soot particles. Salt forms a homogeneous layer, which can be safely removed by state-of-the-art dedusters. COC may form a homogeneous, but sticky layer, which is difficult to be removed and may cause operational problems.

4.4 Precipitation efficiency

Table 3 and Figure 9 show the precipitation efficiencies achieved for the three different particle types. While the expected precipitation of 90% can be easily achieved for salt particles, the precipitation of COC is slightly reduced due to back-corona resulting in a limitation of the electric field or the maximum allowable voltage respectively. For soot, slightly reduced precipitation efficiency is achieved indicated by particle number concentration. However, the precipitation efficiency for soot indicated by mass concentration is far lower (i.e., 22%) than the precipitation efficiency indicated by number concentration, which is due to re-entrainment of agglomerated particles.

The particle size distribution in Figure 10 shows that the distribution mode is reduced by about an order of magnitude with the ESP, while the ESP leads to an increase by almost one order of magnitude of the particles larger than 0.5 micron. This confirms the effect of re-entrainment of agglomerated soot particles. Hence the ESP acts partly as an agglomerator and partly as a precipitator. This effect can be relevant for small-scale ESP for wood stoves and boilers, where precipitation efficiencies by mass of less than 80% are common and where measurements of particle mass concentrations can result in unreliable precipitation efficiencies. With respect to health effects, the re-entrainment of coarse particles can be seen as an improvement in comparison to the emission of primary combustion particles in the size range smaller than 10 micron. Nevertheless, the emission of agglomerated soot particles may have negative local impacts and hence needs to be restricted as well. This effect can potentially limit the applicability of ESP for small scale wood combustion related to high soot concentration in the flue gas.

4.5 Electrical behaviour of ESP

In ESP operation at wood combustion plants, the operator usually has no information about the electric dust conductivity. By looking at the current density as a function of the voltage, conclusions can be drawn about the electric conductivity in case of high resistivity. As shown in Figure 11, back corona can occur for COC, characterized by simultaneous increase of the current at constant or even decreasing voltage. Low resistivity from soot cannot be detected by this method.

Table 1: Chemical and electrical properties and suitability for precipitation in ESP of the three particle types as expected from theory and experiences [1,8,9]. *primary tar: isolating, secondary tar and PAH: semiconductiv.

Property	Particle type	Salts	Soot	COC
Molar ratio C/H		–	> 6 – 8	≈1 (< 2)
Electrical conductivity		medium	high	low (electrically insulating)*
Suitability for ESP		ideal	re-entrainment	back-corona

Table 2: Carbon content (1) and elemental composition (2) of the particles
(1) thermal carbon analyses and (2) elemental analyses.

			Soot	Salt	COC
1	C (Total C)	wt.-%	51.4	15.211	45.214
2	C	wt.-%	41.0	14.5	36.0
	H	wt.-%	0.53	0.45	2.41
	N	wt.-%	0.28	0.53	0.73
	S	wt.-%	3.12	5.12	1.53
	C/H	[Mol/Mol]	6.44		1.24

Table 3: Precipitation efficiencies measured by mass and number concentration of 'soot', 'salt', and 'COC' as resulting combustion particles for the three different combustion regimes, i.e., low excess air, ideal excess air, and high excess air.

	[Dim.]	low excess air & high temperature	ideal excess air & high temperature	high excess air & low temperature
Particle type		Soot	Salt	COC
Excess air lambda	[-]	1.2	1.55	3.5
CO	[mg/m _n ³] at 13 vol.-% O ₂	1000	70	4000
THC	[mg/m _n ³] at 13 vol.-% O ₂	20	2	400
PM mass conc. before ESP	[mg/m _n ³] at 13 vol.-% O ₂	50	30	50
PM mass conc. after ESP	[mg/m _n ³] at 13 vol.-% O ₂	42	3	7
Precipitation efficiency by mass	[%]	16	90	86
PM number conc. before ESP	[cm _n ⁻³]	6.0 10 ⁷	6.0 10 ⁷	9.6 10 ⁷
PM number conc. after ESP	[cm _n ⁻³]	7.5 10 ⁶	4.8 10 ⁶	9.0 10 ⁶
Precipitation efficiency by number	[%]	88	92	90

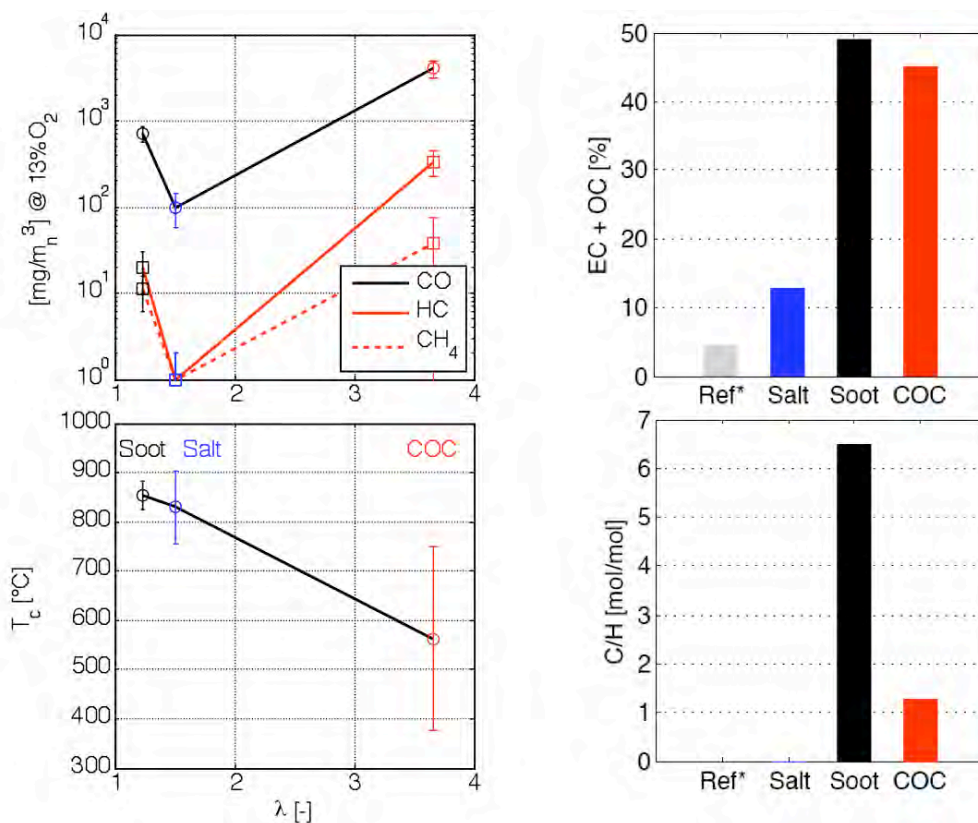


Figure 6: Left: Characteristic of the three operating points maintained with the modified pellet boiler. Right: Results of the chemical analysis of the three particle types. In addition, results from dust sampled in a commercial ESP found after combustion of natural wood chips in an automatic combustion plant are shown and indicated as "Ref" for "Reference".

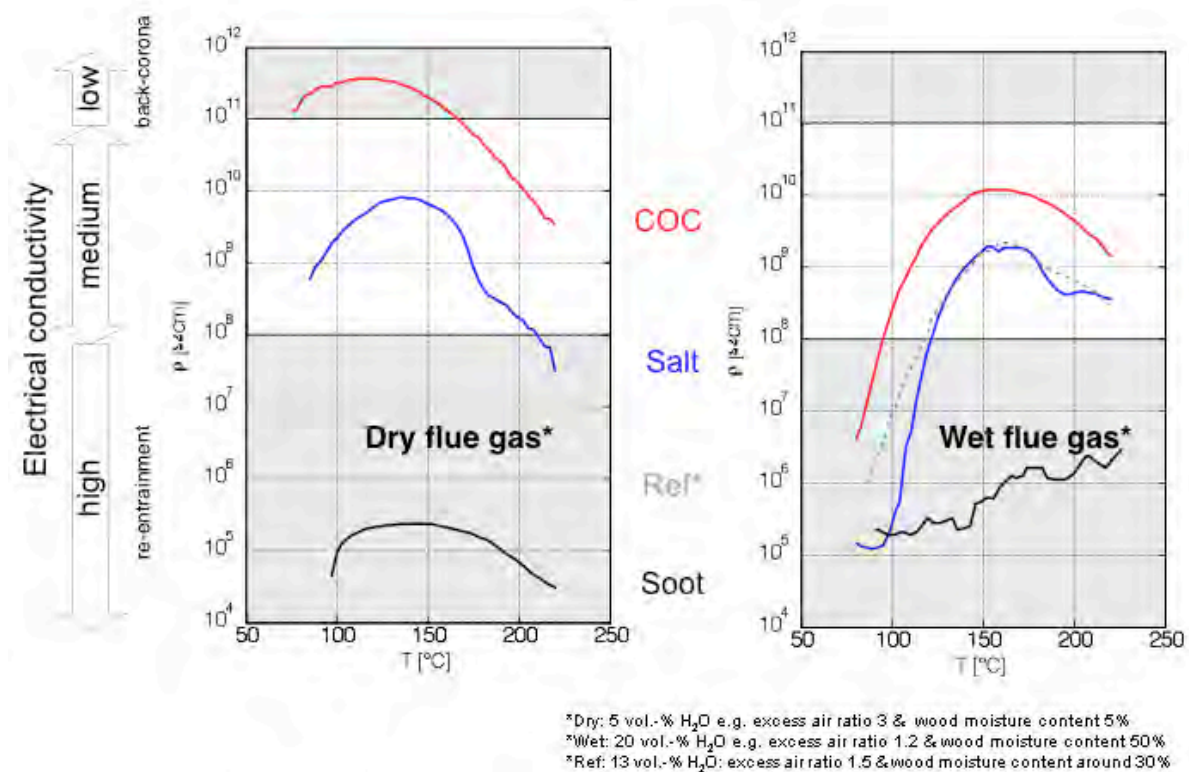


Figure 7: Electrical conductivity measured for soot, salts, and COC sampled in the laboratory equipment during combustion conditions as described. In addition, results from dust sampled in a commercial ESP found after combustion of natural wood chips in an automatic combustion plant are shown and indicated as "Ref" for "Reference". The optimum range for precipitation in ESP is indicated according to Parker [2].

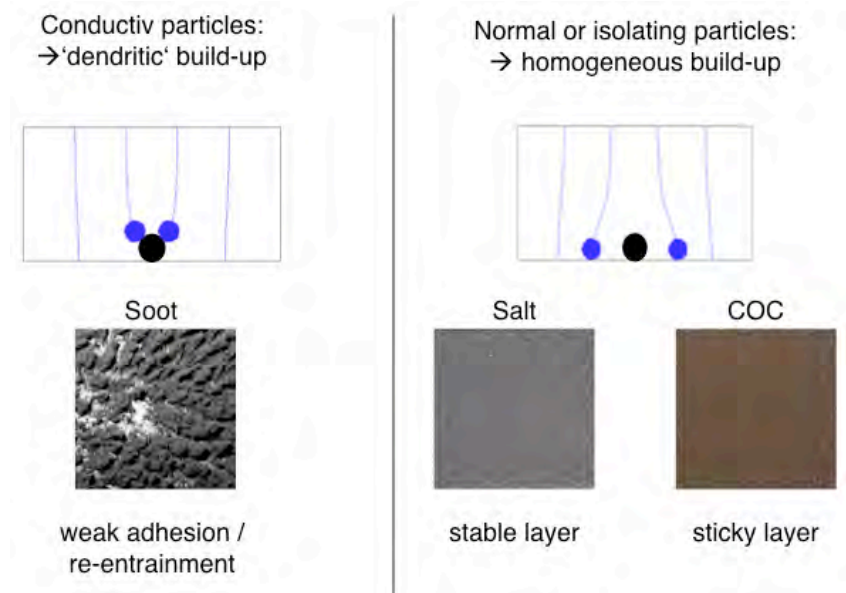


Figure 8: Mechanisms of dust layer built-up due to electric field (acc. to [12]) for conductiv particles (left) and isolating particles (right). The pictures below show the resulting dust layers found in the ESP.

From left to right:

1. Dendritic coarse soot agglomerates from combustion with insufficient air (black carbon, mainly elemental carbon),
2. Homogeneous grey dust layer from combustion with ideal air supply, and
3. Sticky brown dust layer from combustion with high air excess (brown carbon, mainly organic carbon).

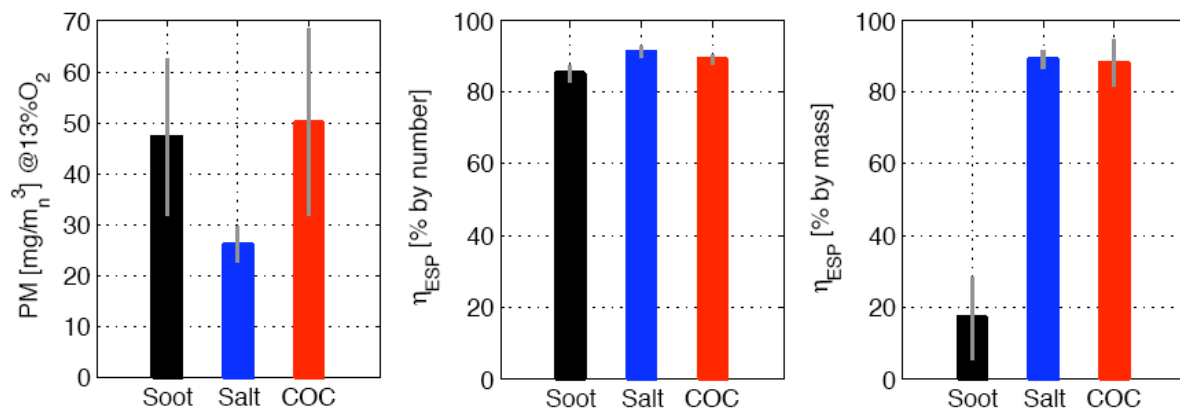


Figure 9: Particle mass concentration in the raw gas from the different combustion regimes measured by gravimetric method, precipitation efficiency measured by particle number concentration, and precipitation efficiency measured by particle mass concentration of 'soot', 'salt' and 'COC'.

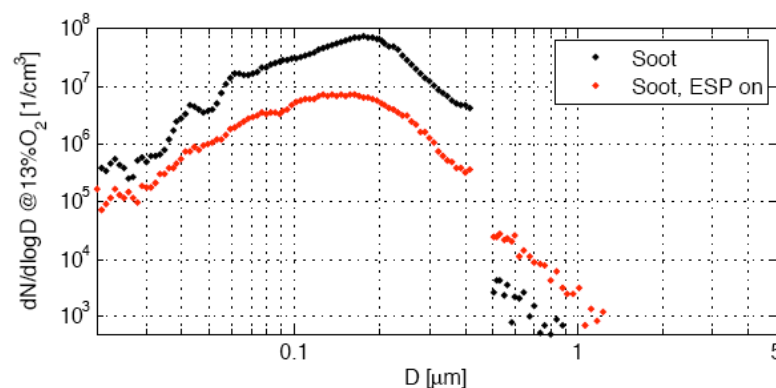


Figure 10: Particle size distribution for soot measured with SMPS and OPC after the laboratory ESP.

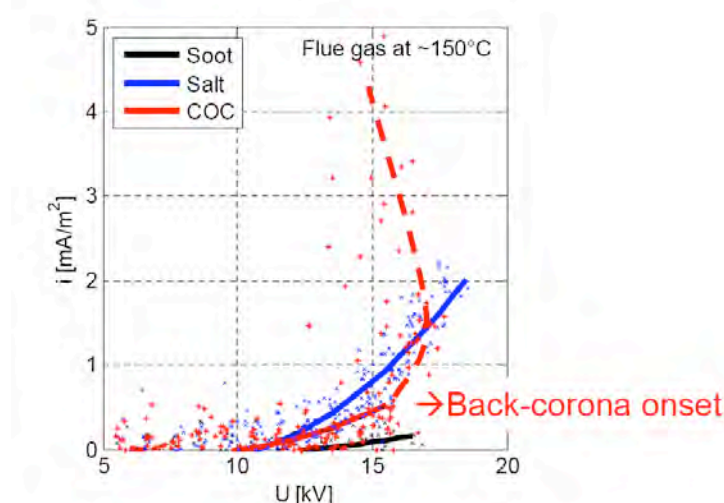


Figure 11: Current density as function of the voltage depending on the particle typ

5 CONCLUSIONS

Particles from different combustion conditions have been collected in a laboratory ESP and were analysed with respect to chemical and electrical properties to deduce recommendations on the ESP design and operation leading to the following conclusions:

- Three different particle types from wood combustion have been identified which correspond to different combustion regimes, i.e.,
 - soot resulting from combustion at high temperature but with low excess air and consequently local lack of oxygen,
 - particles which consist dominantly of mineral matter such as salts found at high combustion temperature and with sufficient local excess air
 - condensable organic compounds (COC) resulting from low temperature combustion conditions at high excess air.
- The three particle types exhibit completely different physical and chemical properties, among which the electrical conductivity is most relevant for ESP operation. The identified properties confirm the particle type and the particle properties as expected from the proposed theory of the particle formation mechanisms.
- Particles from good combustion (mainly inorganic compounds such as salts) exhibit ideal conductivity for ESP.
- Soot reveals high conductivity thus enabling high precipitation efficiency but severe re-entrainment of agglomerated particles
- Condensable organic compounds (COC) exhibit low conductivity thus leading to back-corona which limits ESP operation
- ESP operation for good and stationary conditions during wood combustion with mainly inorganic particles enables uncritical operation, while ESP operation can be critical e.g.
 - during start-up due to COC from low temperatures
 - during throttled air, either due to COC released at

low temperatures or due to soot formed at high temperatures in zones with lack of oxygen. Both undesired conditions are often found in small scale biomass combustion applications for heating.

These results show, that ESP alone will usually only guarantee low particle emissions when the combustion device is properly operated, while during transient conditions, the clean gas emissions can be increased not only due to increased raw gas concentrations, but additionally due to reduced precipitation efficiency. Detailed information on the influence of combustion conditions on particle characteristics enable improved ESP design and operation for the specific needs for small and medium scale wood combustion devices.

6 RECOMMENDATIONS AND OUTLOOK

ESP availability is crucial and needs to be improved by optimum plant design, system integration, and plant operation based on the following three measures:

1. Optimum design and system integration of combustion and ESP enabling stationary operation, e.g. by plant design with two boilers and two ESP for variable load.
2. Process integrated control of ESP with specific information as indicators for the particle properties
 - flue gas temperature (as today) plus:
 - excess air ratio
 - combustion temperature
 - water content of the fuel
 This increases the operation regime of the ESP.
3. Measures to avoid re-entrainment:
 - Limitation of gas velocity to < 1.5 m/s
 - optimised shape of collecting plates
 - shorter dedusting intervall during re-entrainment regimes.

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- [11] T. Nussbaumer, *Energy & Fuels*, Vol. 17, No 6, 2003, 1510–1521
- [12] Blanchard, D. et al.: Correlation Between Current Density and Layer Structure for Fine Particle Deposition in a Laboratory Electrostatic Precipitator. *IEEE Transactions on Industry Applications*, Vol. 38, No 3, 2002, 832–839

Acknowledgments

Swiss Federal Office for Energy (SFOE)
Commission for Technology and Innovation (CTI)

**Inspection office for stoves • Dürener Strasse 92 • 50226 Frechen**

Approved inspection office in accordance with the Construction Products Act, notified body number: 1427

Approved inspection office in accordance with the State construction regulations, key number: NRW 16

Approved inspection office in the approval procedure of authorities in charge of construction supervision

Approved DIN CERTCO inspection office

Report on testing of an installation of type "OekoTube OT-2" for removing dust from the flue gases of domestic stoves

File no.	FSPS-Wa 2011-08
Client	OekoSolve AG, Essanestr. 127, LI-9492 Eschen
Test object	Appliance for removing dust from the flue gases of domestic stoves Type: OekoTube OT-2
Scope of testing	Testing of an electrical appliance for removing dust from the flue gases of domestic stoves fired with lignite briquettes in extension of national technical approval Z-7.4-3451 dated 03.08.2011
Test period	November and December 2011
Test basis	DIBt Preliminary Test Programme for "Dust Separators for Hand-Stoked Small Combustion Facilities" - draft 2008 September -

Abstract prepared by the inspection office for stoves:

The electrostatic dust separator type OekoTube OT-2 manufactured by OekoSolve has been granted technical approval for use for separating dusts from the flue gases of wood-fired stoves. The present study was performed to check whether this secondary appliance is also suitable for use with lignite briquettes as fuel.

The dust separating appliance was tested on three stoves (two intermittent burning appliances and one continuous burning stove) at different load levels. Dust separation efficiencies in the region of 42 to 97% were obtained when burning lignite briquettes. Smooth operation and the high dust separation performance obtained in the test phase attest that the OekoTube OT-2 is also suitable for separating dust from the flue gases of lignite-briquette-fired domestic stoves.

This test report is prepared notwithstanding any rights of third parties, especially private property rights relative to the client or manufacturer.

The test report with pages 1 to 13 and the annexed test documents a to g contain the results of the test in compliance with this standard.

Frechen, 13.12.2011

Dipl.-Ing. Joachim Wawrzinek

Name of head of inspection office



RWE Power AG
Feuerstättenprüfstelle
Dürener Straße 92
50226 Frechen
T 0221/480-20745
F 0221/480-20444

**1 Purpose of testing**

The purpose of the test was to assess the operating performance of the electrical dust separator when burning lignite briquettes in domestic stoves.

The safety, the sootfire resistance, the dependability, ease of cleaning, the aerodynamic flow resistance, the mechanical strength and the malfunction response of the appliance have already been tested by TÜV SÜD in Report No. S 1136-00/11 dated 14.02.2011.

The electrical safety in accordance with the requirements of DIN EN 60730-1 was assessed and the expert appraisal of the test specimen submitted was performed in Report No. S-E 1136-00/11.

2 Test basis

DIBt Preliminary Test Programme for "Dust Separators for Hand-Stoked Small Combustion Facilities"

3 Attachments

Annex a	Sketch of the test set-up
Annex b	Photos of the test set-up
Annex c	Technical documentation
Annex c	Criteria for approval
Annex e	Prerequisites for installation in stainless steel flue gas system
Annex f	Installation instructions
Annex g	Operating instructions

4 Description of the test object

The dust separator OecoTube OT-2, comprising the following parts:

- an external control unit (black box) for generating the voltage of -15 to -30 kV
- the flexible electrode made of spring steel
- the insulator
- the spring-mounted electrode holder
- the mains plug
- the T-fitting for installation
- a temperature sensor
- the fixtures and fasteners

is intended for installation in a sootfire-proof brick or metal flue gas system and operation at sub-atmospheric pressure with non-condensing flue gases.

The high-voltage electrode is inserted centrally in the flue gas system through a circular opening in the T-fitting with a diameter of 130 mm. The ionization electrode is 1,550 mm long and consists of bossed spring steel (16 mm wide). The electrode is axially aligned in the flue gas system by means of an adjustable guide and a weight.

A temperature sensor on the separator detects the temperature rise in the flue gas system, switches the separator from standby mode to on-line and activates generation of the high voltage.

According to the manufacturer's data, the separator can be installed in systems up to 40 kW with a flue gas pipe diameter of 150 mm to 400 mm.

The separator is intended for outdoor installation only, at the outlet from the flue gas system.



Test report

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According to the manufacturer, the separator is suitable for use up to a flue gas temperature of 400°C and is fitted for connection to a 230 V power supply. The power consumption is, according to the manufacturer's data, 20 to 30 W in on-line operation and 0.7 W in standby mode. The housing material according to the manufacturer's information is steel 1.4404 or 1.4301.

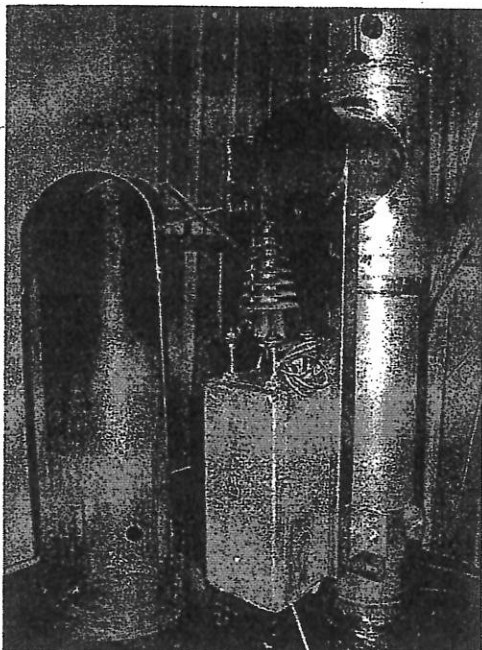


Fig. 1: Control unit (black box) with enclosure and electrode penetration

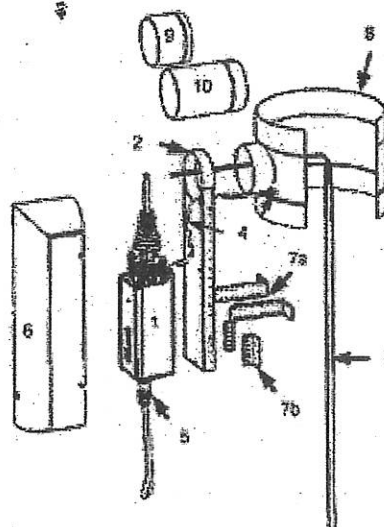


Fig. 2: Parts of the dust separator

- 1 Control unit with springs, nuts and an insulator
- 2 Mounting bracket
- 3 Flexible electrode with hexagonal holder
- 4 Temperature sensor (cable and holder)
- 5 Mains plug (230 v AC)
- 6 Cover
- 7a Anchor elements for brick stack
- 7b Anchor elements for steel stack

**5 Test method and discussion of the results****5.1 Test set-up for checking the efficacy of the separator**

An intermittent burning appliance (A) with a rated output of 9 kW, tested in accordance with DIN EN 13240 for firing with wood billets or lignite briquettes, was used to determine the separating efficiency. By way of comparison, a corresponding intermittent burning appliance (B) with a rated output of 8 kW and a continuous burning appliance (C) tested to DIN 18890 in 1991 with an automatic controller and a rated output of 4.5 kW were also used.

The dust measurements were performed in parallel using two Afriso STMG 40 dust monitors according to DIN SPEC 1101: 2010-02.

The flue gas system having an inside diameter of 150 mm was installed upright (see attachments a and b). The distance between the stove outlet and the separator was 1.7 m. The dust was measured in the vertical flue gas line about 0.3 m upstream of and about 0.5 m downstream of the separating module.

In all tests (except the zero test), the electronic controller of the OecoTube OT-2 was in normal operation with a maximum voltage setting of 27 kV and a maximum power setting of 16 W.

The dust measurements were started in parallel three minutes after each new fuel input and continued for 30 minutes at a time. The flue gas composition and the temperatures were recorded over the entire test period.

The results of calibration of the test set-up ("zero test") are shown in Tables 1 and 2.

Tables 3 to 6 show the equipment settings and operating modes in the tests to determine the separating efficiency.

The separating efficiencies achieved are shown in Tables 7 to 10 and the associated charts. Section 5.5 includes photos of the dust deposits in the flue gas system.



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5.2 Calibration of the test set-up ("zero test") with the dust separator installed but not operating

Table 1: Settings and operating modes of the intermittent burning appliance A during zero test

Test date		24.10. 2011	24.10. 2011	24.10. 2011
Test		1	2	3
Test fuel		BB 7"	BB 7"	BB 7"
Primary air	cm ²	8	8	8
Secondary air	cm ²	3.5	3.5	3.5
Lower heating value	MJ/kg	19,365	19,365	19,365
Feed mass	each	5	5	5
Test duration	min	75	75	78
Hourly burning rate	kg/h	2.14	2.16	2.16
Furnace capacity	kW	11.6	11.2	11.6
Space heating output	kW	8.9	9.2	9.2
Mean flue draught	Pa	11.2	11.2	11.4
Mean flue gas temperature	K	288	281	279
Mean CO ₂ content	%	10.40	10.67	10.54
Mean CO content based on 13 % O ₂	%	0.085	0.046	0.088
Flue gas mass flow	g/s	7.6	7.5	7.6

Table 2: Dust levels in the zero test

Test	Upstream of the separator mg/m ³	Downstream of the separator mg/m ³	Difference mg/m ³
1	47.3	52.2	4.9
2	36.0	40.6	4.6
3	52.7	58.5	5.8



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5.3 Settings and operating modes of the stoves

Table 3: Settings and operating modes of the intermittent burning appliance A during rated and heavy-duty operation

Test date		18.11. 2011	18.11. 2011	18.11. 2011	18.11. 2011	21.11. 2011	21.11. 2011	22.11. 2011	22.11. 2011
Test		1	2	3	4	5	6	7	8
Test fuel		BB 7"							
Primary air	cm ²	16	16	8	8	16	16	12	12
Secondary air	cm ²	3.5	3.5	3.5	3.5	2.5	2.5	2	2
Lower heating value	MJ/kg	19.365							
Feed mass	each	4	4	5	5	5	5	4	4
Test duration	min	53	59	76	75	52	60	52	54
Hourly burning rate	kg/h	2.93	2.45	2.20	2.13	3.48	2.71	2.71	2.48
Furnace capacity	kW	15.8	13.2	11.8	11.4	18.7	14.6	14.7	13.4
Space heating output	kW	11.2	9.4	9.0	8.8	13.9	10.6	10.7	10.0
Mean flue draught	Pa	13.6	12.5	10.7	10.2	16.2	14.4	15.4	14.0
Mean flue gas temperature	K	349	321	286	274	381	338	386	351
Mean CO ₂ content	%	9.43	8.65	9.41	9.52	12.01	9.76	11.91	11.38
Mean CO content based on 13 % O ₂	%	0.095	0.128	0.100	0.098	0.118	0.040	0.226	0.149
Flue gas mass flow	g/s	11.4	10.3	8.5	8.2	10.7	10.3	8.3	8.0

Table 4: Settings and operating modes of the intermittent burning appliance A under part load

Test date		05.12. 2011	05.12. 2011	05.12. 2011
Test		1	2	3
Test fuel		BB 7"	BB 7"	BB 7"
Primary air	cm ²	4	4	4
Secondary air	cm ²	2	1	closed
Lower heating value	MJ/kg	19.365	19.365	19.365
Feed mass	each	2	2	2
Test duration	min	60	63	64
Hourly burning rate	kg/h	1.06	1.06	1.06
Furnace capacity	kW	5.7	5.7	5.7
Space heating output	kW	4.4	4.5	4.7
Mean flue draught	Pa	10.6	8.5	7.2
Mean flue gas temperature	K	244	189	173
Mean CO ₂ content	%	8.00	7.38	8.38
Mean CO content based on 13 % O ₂	%	0.083	0.170	0.200
Flue gas mass flow	g/s	4.8	5.1	4.5



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Table 5: Settings and operating modes of the intermittent burning appliance B during rated and heavy-duty operation

Test date		23.11. 2011	23.11. 2011
Test		1	2
Test fuel		BB 7"	BB 7"
Primary air	cm ²	9	9
Secondary air	cm ²	4	4
Lower heating value	MJ/kg	19.365	19.365
Feed mass	each	5	5
Test duration	min	69	72
Hourly burning rate	kg/h	2.32	2.11
Furnace capacity	kW	12.5	11.3
Space heating output	kW	10.4	9.8
Mean flue draught	Pa	14.8	13.9
Mean flue gas temperature	K	350	321
Mean CO ₂ content	%	10.18	9.24
Mean CO content based on 13 % O ₂	%	0.250	0.214
Flue gas mass flow	g/s	8.2	8.2

Table 6: Settings and operating modes of the continuous burning appliance C during rated duty

Test date		29.11. 2011	29.11. 2011
Test		1	2
Test fuel		BB 7"	BB 7"
Primary air automatic	pos.	max.	max.
Secondary air	pos.	closed	closed
Lower heating value	MJ/kg	19.365	19.365
Feed mass	each	8	4
Test duration	min	192	90
Hourly burning rate	kg/h	1.36	1.37
Furnace capacity	kW	7.3	7.4
Space heating output	kW	5.3	4.7
Mean flue draught	Pa	11.2	13.9
Mean flue gas temperature	K	321	346
Mean CO ₂ content	%	9.87	7.35
Mean CO content based on 13 % O ₂	%	0.306	0.176
Flue gas mass flow	g/s	4.9	6.7



Test report

2011-08

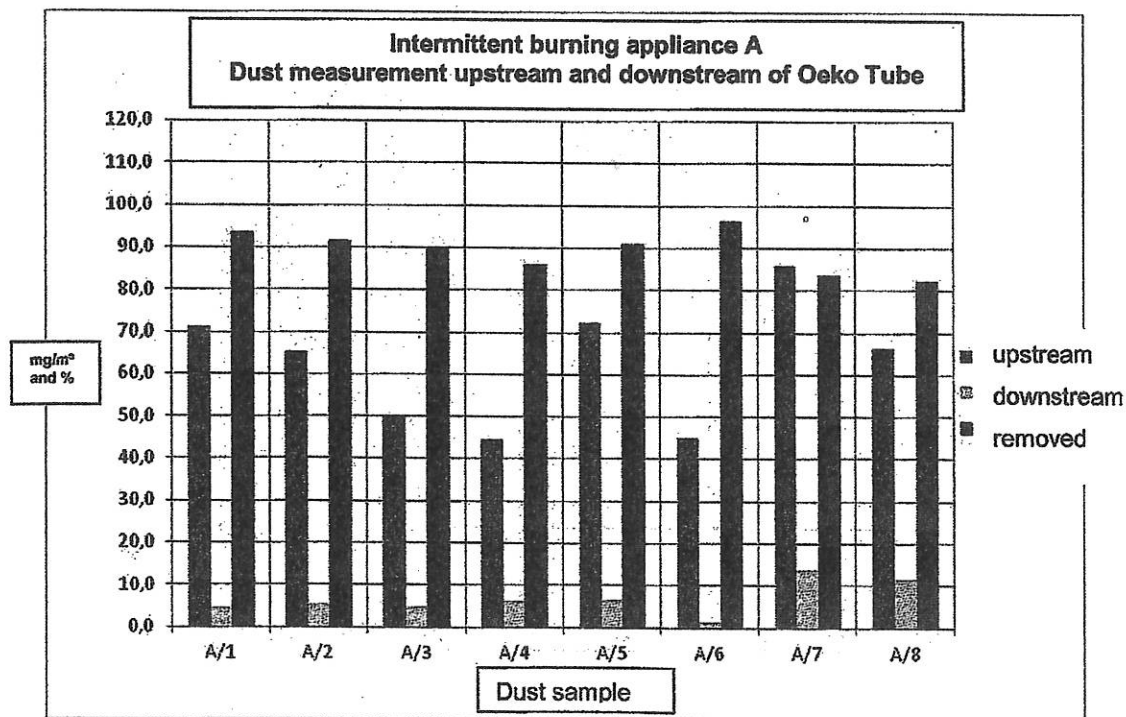
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5.4 Findings of the dust measurements

Table 7: Dust levels in intermittent burning appliance A during rated duty

Test	Upstream of separator		Downstream of separator		Difference mg/m ³	Separating efficiency %
	CO ₂ %	Dust mg/m ³	CO ₂ %	Dust mg/m ³		
1	12.25	71.1	12.27	4.6	66.5	93.5
2	12.32	65.2	12.33	5.5	59.7	91.6
3	14.45	50.2	14.25	4.9	45.3	90.2
4	13.95	44.5	13.75	6.2	38.3	86.1
5	15.29	45.1	14.88	6.5	38.6	91.0
6	13.21	49.0	12.90	1.6	47.4	96.5
7	15.70	85.8	15.39	14.0	71.8	83.7
8	17.10	66.2	16.46	11.7	54.5	82.3
Mean						89.4

Chart to Table 7





Test report

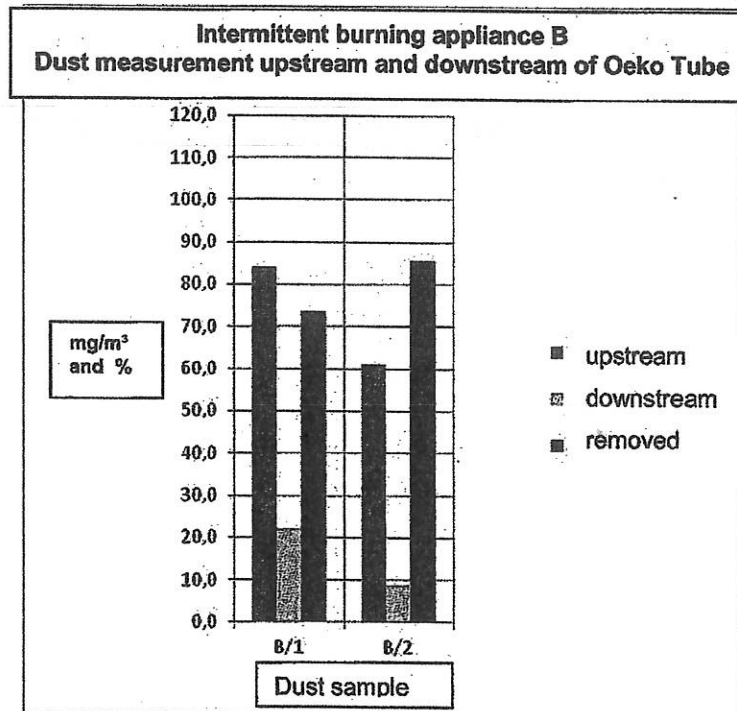
2011-08

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Table 8: Dust levels in intermittent burning appliance B during rated duty

Test	Upstream of separator		Downstream of separator		Difference mg/m ³	Separating efficiency %
	CO ₂ %	Dust mg/m ³	CO ₂ %	Dust mg/m ³		
1	15.27	84.1	14.74	22.2	61.9	73.6
2	16.26	61.1	15.53	8.8	52.3	85.6
Mean						79.6

Chart to Table 8





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Table 9: Dust levels in continuous burning appliance C during rated duty

Test	Upstream of separator		Downstream of separator		Difference mg/m ³	Separating efficiency %
	CO ₂ %	Dust mg/m ³	CO ₂ %	Dust mg/m ³		
1	12.79	116.0	12.45	23.6	92.4	79.7
2	9.11	82.8	9.02	47.8	35.0	42.3

Chart to Table 9

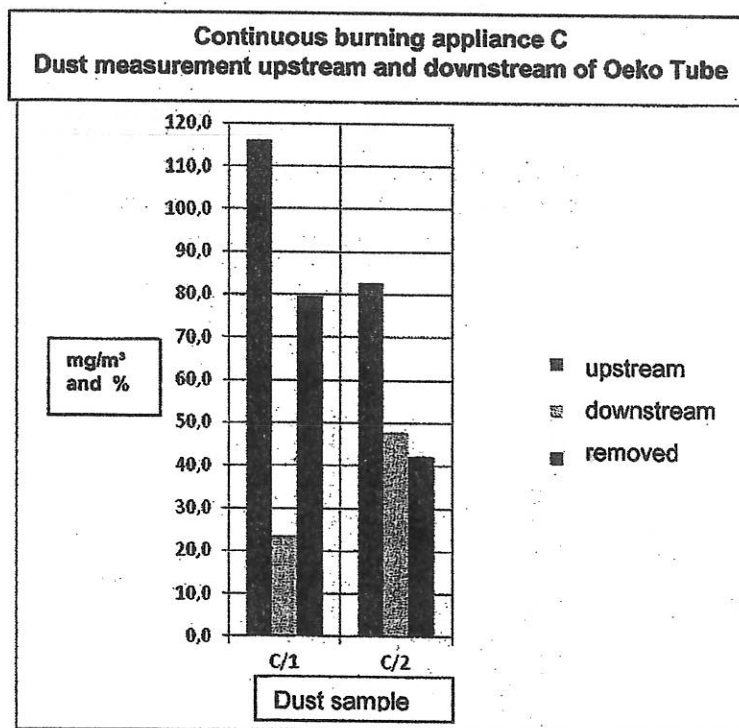
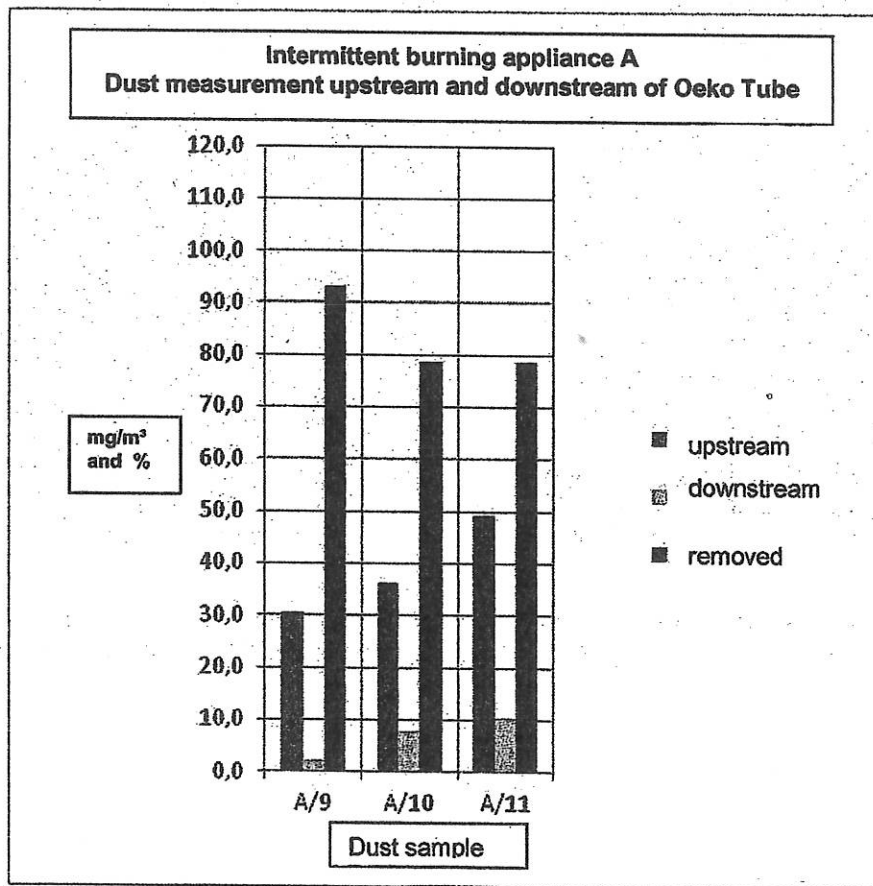




Table 10: Dust levels in intermittent burning appliance A under part load

Test	Upstream of separator		Downstream of separator		Difference mg/m ³	Separating efficiency %
	CO ₂ %	Dust mg/m ³	CO ₂ %	Dust mg/m ³		
1	9.88	30.5	9.90	2.1	28.4	93.1
2	8.93	36.1	8.98	7.7	28.4	78.7
3	10.27	49.1	10.29	10.5	38.6	78.6
Mean						83.5

Chart to Table 10

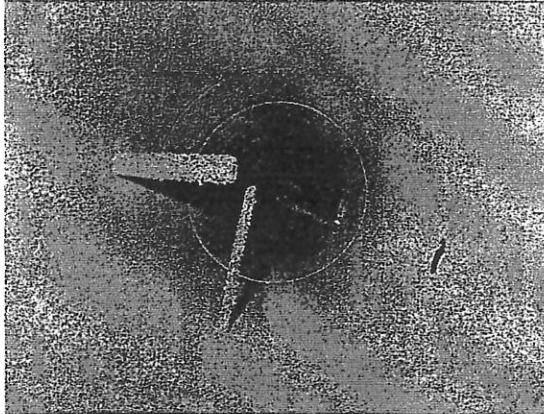


All dust levels stated in the report relate to 13 % O₂ at 1013 mbar and 0°C.



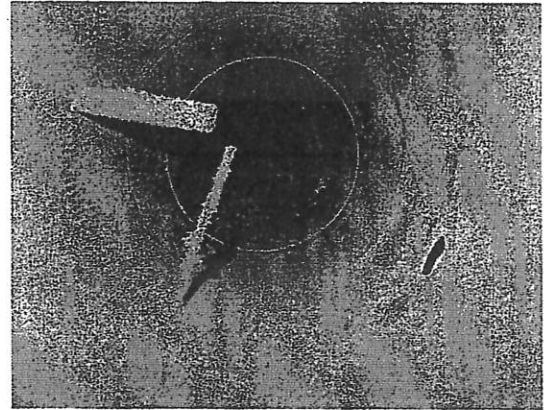
5.5 Photos of adhering dust in the flue gas pipe

After about 9 hours in operation and 20 kg fuel combustion



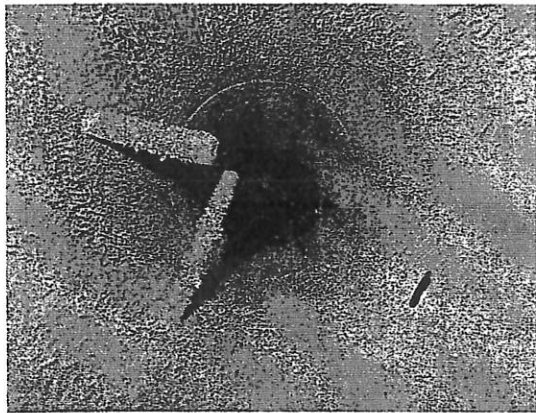
about 500 mm above the electrode

After about 27 hours in operation and 65 kg fuel combustion

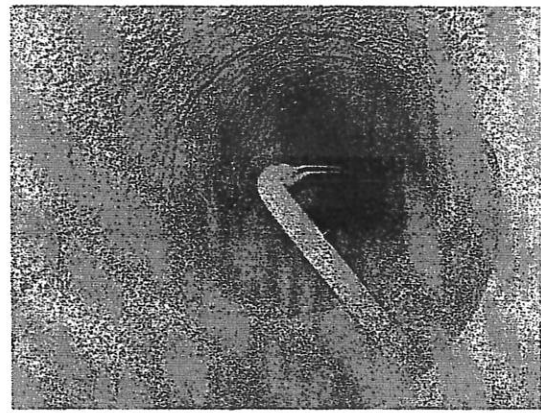


about 500 mm above the electrode

After about 55 hours in operation and 160 kg fuel combustion



about 500 mm above the electrode



In the vicinity of the electrode

In the course of operation, significant adhesion of dust agglomerates was observed on the inside of the pipe in and above the effective range of the electrode. The deposits were less pronounced on the electrode itself.



5.6 Discussion of the results

The particle separation test on the OecoTube OT-2 yielded the following findings:

- A separating efficiency of 82.3 % to 96.5 % (on average 89.4 %) was achieved with intermittent burning appliance A in the nominal duty range and in the heavy-duty range and a separation of 78.6 % to 93.1 % (on average 83.5 %) in the part-load range.
- The separating efficiency in the nominal duty range with the intermittent burning appliance B was between 73.6 % and 85.6 % (on average 79.6 %), about 10 % lower.
- The separating efficiency downstream of the continuous burning appliance C was between 79.7 % and 42.3 % (on average 61 %).

Verification of the separating efficiency values when installed in a flue gas system made of mineral substances was not the subject of the test.

5.7 References to other tests

The following checks and assessments were already done by TÜV SÜD in Report No. S 1136-00/11 and were not the subject of the present test:

- safety check
- check for sootfire resistance
- check for dependability
- assessment of ease of cleaning
- assessment of mechanical strength
- aerodynamic flow assessment
- assessment of the malfunction response

The electrical safety in accordance with the requirements of DIN EN 60730-1 was assessed and the expert appraisal of the test specimen submitted was performed by TÜV SÜD in Test Report No. S-E 1136-00/11.



OekoTube Test Report

Tests run August thru September 2013.

Summary

A small scale electrostatic precipitator (ESP) was mounted on the top exterior of a 20 foot tall lined chimney. This chimney was cleaned before use. The charge generator was within a weatherproof box (supplied) that was mounted with adjustable metal bands. A metal "tee" (supplied) of 10" diameter was secured on top of the chimney lining. The collection electrode coming out of the charge generator was centered within the chimney. The collection electrode is approximately 60" long with a weighted end.

A wood boiler connected to the bottom of the chimney was fueled with cord wood at fairly consistent moisture, tree type and quantity. The wood boiler combustion was run at a range of air inlet levels (20%, 40%, 60%, 80%, 100% stoichiometric rates)

A baseline test was run at each range of air inlet level with the electrostatic precipitator "off".

After each test run (both with the ESP off as well as on) the collection electrode was removed with condition and particulate coverage amounts noted. The chimney was also inspected after each run, and condition noted.

Results

More extensive testing is needed; however initial testing demonstrates that with equivalent quantities of wood-the ESP is effective for the capture of particulates for exhausts that are at "starved" stoichiometric levels.

The exhaust flow rate may be too "fast" for more effective particulate capture at the higher "burn" rates.

It is assumed that the increase of resistivity of the ESP collection electrode (or size) would also increase the particulate capture.

**Wood Boiler Type**

HS Tarm Model 404
Inlet air controlled via valve
Digital temperature probes within firebox and at exhaust
Boiler Pressure Relief Valve (PRV) at 15 PSI- with automatic water recharge

Fuel

2 kg. Hardwood- maple and oak- kindling split to approx. 1/2" either direction.

23 kg. Hardwood- maple and oak
Split wood- no rounds
Typical size- 16" long by 8" square
20% -30% moisture content
No bark

Test Runs

Each start consisted of "warm up" of the wood boiler at room temperature with full air inlet opening- using 2 kg of hardwood kindling- after 30 minutes 23 additional kg of hardwood added to the fuel box and air inlet opening valve adjusted.

Time for each test was noted to nearest 15 minutes- determined when firebox temperature was reduced to 150 degrees F.

The ESP was removed and all particulates lightly brushed with soft cloth to be weighed- and compared against tare weight of cloth.

The ESP and chimney cleaned before each test run.

Outside ambient temperature ranged from 60 to 85 degrees F.



Results

Test	Time	Particulates	Other Notes
20% ESP off	10 hours 30 min.	1.4 grams	Creosote liquid on chimney lining Exhaust Temp at chimney top 120-130 degrees F
20% ESP on	11 hours 5 min.	8.5 grams	Creosote liquid on chimney lining Exhaust Temp at chimney top 120-130 degrees F
40% ESP off	8 hours 15 min.	1.2 grams	Creosote liquid on chimney lining Exhaust Temp at chimney top 125-150 degrees F
40% ESP on	8 hours 15 min.	6.2 grams	Creosote liquid on chimney lining Exhaust Temp at chimney top 125-150 degrees F
60% ESP off	6 hours 45 min.	1.4 grams	No creosote Exhaust Temp at chimney top 140-150 degrees F
60% ESP on	6 hours 30 min.	4.0 grams	No creosote Exhaust Temp at chimney top 140-150 degrees F
80% ESP off	5 hours 15 min.	1.2 grams	No creosote PRV release @ 3 hr. mark Exhaust Temp at chimney top 140-170 degrees F
80% ESP on	5 hours 15 min.	4.8 grams	No creosote PRV release at 3 hr. mark Exhaust Temp at chimney top 140-180 degrees F
100% ESP off	4 hours 15 min.	None observed	No creosote PRV release @ 2 hr. 15 min mark Exhaust Temp at chimney top 150-180 degrees F
100% ESP on	4 hours 30 min.	2 gráms (very light)	No creosote PRV release @ 2 hr. mark Exhaust Temp at chimney top 150-180 degrees F

1 By: Karl Kassel, Mayor
2 Lance Roberts
3 Matt Cooper
4 Van Lawrence
5 Introduced: 09/06/2018
6 Advanced: 09/06/2018
7 Adopted: 09/13/2018
8 Immediate
9 Reconsideration Failed: 09/13/2018
10 Adopted: 09/13/2018

11
12 FAIRBANKS NORTH STAR BOROUGH13
14 ORDINANCE NO. 2018-20-1G15
16 AN ORDINANCE AMENDING THE FY 2018-19 BUDGET BY APPROPRIATING
17 \$458,000 FROM THE GENERAL FUND FUND BALANCE TO THE TRANSIT
18 ENTERPRISE PROJECTS FUND FOR WOOD STOVE/PELLET
19 STOVE RETROFIT EMISSIONS CONTROL DEVICE TESTING
20

21 WHEREAS, Due to the high and varying cost of fuel oil, there is considerable
22 interest in identifying technologies capable of reducing PM_{2.5} emissions from wood and
23 pellet stoves in order to allow them to operate during air quality stage alerts; and
24

25 WHEREAS, Retrofit emissions control devices such as electrostatic
26 precipitators that are used in conjunction with a solid fuel burning appliance (SFBA) may be
27 one way of reducing emissions to levels equal to or less than levels emitted by residential
28 fuel oil boilers and furnaces; and
29

30 WHEREAS, The administration is actively working with the Environmental
31 Protection Agency to establish protocols for quantifying emission reductions of after-market
32 emission control devices for residential wood burning stoves; and
33

34 WHEREAS, Additional data is required to quantify emission reductions from
35 retrofit emissions control devices and this appropriation will fund the testing and allow it to
36 happen in an expedient manner.
37

38 NOW, THEREFORE, BE IT ORDAINED by the Assembly of the Fairbanks North
39 Star Borough:
40

41 Section 1. Classification. This ordinance is not of a general and permanent
42 nature and shall not be codified.
43

44 Section 2. General Fund Appropriation. The FY 2018-19 budget is hereby
45 amended by appropriating \$458,000 to the General Fund budgetary guideline entitled

"Contribution to Transit Enterprise Projects Fund" and by increasing Contribution from Fund Balance by a like amount.

Section 3. Transit Enterprise Projects Fund Appropriation. The FY 2018-19 budget is hereby amended by appropriating \$458,000 to the Transit Enterprise Projects Fund budgetary guideline entitled "Retrofit Emissions Control Device Testing" and by increasing Contribution from General Fund by a like amount.

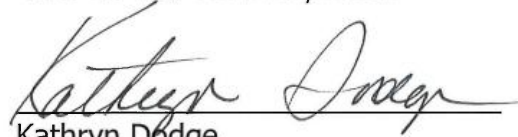
Section 4. Contingency. This appropriation is contingent upon completion of a competitive process for selecting a retrofit emissions control device, designed for residential wood and/or pellet stoves, to undergo a testing program approved by the Environmental Protection Agency so that such devices can be considered as a successful part of the Borough's Air Quality Program. The process will be open to any manufacturer of a retrofit emissions control device that is currently in production; this process is not intended to be used for research and development of devices. The scoring matrix of the proposal process will include consumer price, existing test data demonstrating particulate matter reductions, number of existing installations, and financial contributions of the manufacturer.

Section 5. Lapse of Funds. Upon completion or abandonment of the project, any unencumbered, unexpended funds will lapse back to the General Fund fund balance.

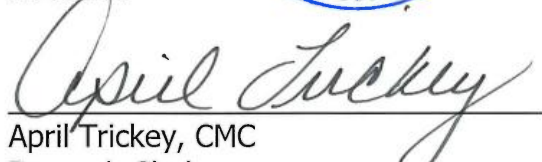
Section 6. Effective date. This ordinance shall be effective at 5:00 p.m. on the first Borough business day following its adoption.

PASSED AND APPROVED THIS 13TH DAY OF SEPTEMBER, 2018.




Kathryn Dodge
Presiding Officer

ATTEST:


April Trickey, CMC
Borough Clerk

Yeses: Roberts, Tacke, Gray, Major, Quist, Cooper, Lawrence, Dodge

Noes: None

Other: Lojewski (Excused)

By: John Davies
Kathryn Dodge
Janice Golub
Introduced: 01/15/2015
Advanced: 01/15/2015
Substituted: 02/12/2015
Amended: 02/12/2015
Amended: 02/26/2015
Amended: 02/27/2015
Adopted: 02/27/2015
Immediate
Reconsideration Failed: 02/27/2015
Adopted: 02/27/2015

FAIRBANKS NORTH STAR BOROUGH

ORDINANCE NO 2015 - 01

AN ORDINANCE AMENDING CHAPTER 8.21 OF THE FNSB CODE OF
ORDINANCES REGARDING THE PM_{2.5} AIR QUALITY CONTROL PROGRAM,
AMENDING 2.48.120 REGARDING THE AIR POLLUTION CONTROL COMMISSION'S
DUTIES, AND AMENDING 1.04.050 REGARDING THE FINE SCHEDULE TO ADD
VIOLATIONS OF THE PM_{2.5} AIR QUALITY CONTROL PROGRAM

WHEREAS, EPA, on December 22, 2008, declared part of the Fairbanks
North Star Borough a non-attainment area for fine particulate pollution (PM_{2.5}); and

WHEREAS, in the winter, PM_{2.5} concentrations in the non-attainment area
routinely exceed the allowable limit, thereby violating the federal health-based
standards; and

WHEREAS, an excessive level of PM_{2.5} impacts the health and well-being
of borough residents; and

WHEREAS, air quality issues could impact large scale economic
development, including military expansion; and

WHEREAS, studies have identified wood burning as a significant
contributor of PM_{2.5}, particularly wood with high moisture content; and

WHEREAS, the combined effort of an educational program concerning the
importance of burning only dry wood and an increase in the availability of dry wood
could significantly reduce Borough PM_{2.5} levels; and

AMENDMENTS ARE SHOWN IN LEGISLATIVE FORMAT

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44
45 WHEREAS, PM_{2.5} emissions from solid fuel burning appliances can be
46 significantly reduced through the selection and proper use of modern, EPA rated
47 models designed to meet more stringent emissions standards and by operating in
48 accordance with “best practices”, including selection of appropriate fuel sources; and
49

50 WHEREAS, voluntary, incentive-based programs coupled with
51 comprehensive education programs have been employed in other communities to help
52 reduce PM_{2.5} emissions; and
53

54 WHEREAS, voluntary measures may enable the Borough to model
55 attainment, however, it is likely that they would take more than five years to reach this
56 goal and they would not address local neighborhood problems arising from one or two
57 significant polluters, neither of which is acceptable; and
58

59 WHEREAS, the State of Alaska, through a Memorandum of Agreement
60 with the Borough, has authorized the Fairbanks North Star Borough to establish and
61 administer an area-wide local PM_{2.5} air quality control program that will operate in lieu of
62 and consistent with the State’s air quality program; and
63

64 WHEREAS the State of Alaska Department of Environmental
65 Conservation has issued draft regulations intended to be part of the State
66 Implementation Plan (SIP) as required by the EPA; those regulations provide some new
67 restrictions on the sale of solid fuel burning appliances and firewood, and authorize the
68 borough to take on additional regulatory responsibility related to the SIP; and
69

70 WHEREAS, at the recent “Town Hall” on the PM_{2.5} problem, more than 50
71 citizens provided testimony indicating that our air quality was not acceptable and that
72 they expected the Assembly to act to put into place programs that will improve the air
73 quality in the borough.
74

75 WHEREAS, it is the intent of the Fairbanks North Star Borough Assembly
76 to respond to calls for regulations that will help improve the air quality within the
77 borough by adopting a program that balances the need for clean air with the needs for
78 economically heating our buildings; and
79

80 WHEREAS, in adopting this clean air program, it is the intent of the
81 Assembly that it be enforced by concentrating on the most significant sources of PM_{2.5}
82 pollution first, both for attainment within the Non-Attainment area and for significant local
83 sources of pollution that affect adjacent and nearby properties; and
84

AMENDMENTS ARE SHOWN IN LEGISLATIVE FORMAT

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WHEREAS, in enforcing this clean air program, it is the intent of the Assembly that the focus be on assisting violators to come into compliance through the use of warning, education, and assistance provided through programs such as the enhanced solid fuel burning device change-out program.

NOW, THEREFORE, BE IT ORDAINED by the Assembly of the Fairbanks North Star Borough:

Section 1. This ordinance is of a general and permanent nature and shall be codified.

Section 2. The following definitions in FNSBC 8.21.010 Definitions are amended or added as follows:

"Advisory" means a notice issued by the FNSB Air Quality division when the division determines, using available data, that a PM_{2.5} concentration of 25 ug/m³ has, or will likely occur.

"Air Quality Control Zone" means the area of the Borough currently contained in the EPA designated non-attainment area, which uses the non-attainment area southern, western and eastern boundaries as modified by their respective intersection with the following northern boundary described as; beginning at the intersection of Isberg Road with Chena Ridge Road on the western boundary of the EPA designated non-attainment area, then following Chena Ridge Road back to Chena Pump Road and continuing north on the Parks Highway to Sheep Creek Road, then Sheep Creek Road to Miller Hill Road, then north on Miller Hill Road, then east on Yankovich, then north from Yankovich Road along the east boundary of the Large Animal Research Station to a point just north of its intersection with Nottingham drive and follows the ridge crest across Nottingham Estates to approximately the point where Swallow Drive intersects Dalton Trail to north on Dalton Trail to the crest of the Farmer's Loop Ridge, then follow the geographic crest of Farmer's Loop Ridge to its intersection with the New Steese Highway, then south east on Bennet Road, and along Steel Creek Road to the intersection of Chena Hot Springs Road, and Chena Hot Springs Road to the eastern boundary of the EPA designated non-attainment area.

"Alert" means a notice issued by the FNSB air quality division when the division determines, using available data, that a PM_{2.5} violation of the 35 [MICROGRAMS PER CUBIC METER] ug/m³ has, or will likely occur.

"Clean wood" means natural wood that has not been painted, varnished, or coated with a similar material, has not been treated with preservatives, and does not contain resins or glues as in plywood or other composite wood products.

"Construction and demolition debris" means a conglomeration of materials from construction, repair, remodeling or demolition of buildings and structures containing any prohibited fuels.

"Episode" means when conditions reach or are predicted to reach advisory or alert status.

AMENDMENTS ARE SHOWN IN LEGISLATIVE FORMAT

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128 “Forecast” means a description of the current dispersion conditions described as
129 good, fair, or poor and including the expected PM_{2.5} concentrations expressed in
130 micrograms per cubic meter.

131 “Opacity” means the reduction in transmitted light through a column of smoke as
132 measured by an observer certified in using EPA Reference Method 9 as defined by
133 federal law.

134
135 Section 3. Section 8.21.020 **Borough listed appliances** shall be
136 amended as follows:

137 A[N] solid fuel burning appliance shall be listed by the borough if:

138 A. The *solid fuel burning appliance* is certified by the U.S. Environmental Protection
139 Agency as meeting the federal emissions [LIMIT STANDARD APPROPRIATE FOR
140 THAT APPLIANCE OR IN THE CASE OF *HYDRONIC HEATERS* IS AT LEAST
141 PHASE II QUALIFIED] rate of 2.5 grams of PM_{2.5} per hour or less or for hydronic
142 heaters, meets Phase II qualifications and has an annual average emission level rating
143 equal to or less than 2.5 grams of PM_{2.5} per hour. For purposes of this section,
144 “certified” means that the *solid fuel burning appliance* meets emission performance
145 standards when tested by an accredited independent laboratory and labeled according
146 to procedures specified by the EPA in 40 CFR 60 Subpart AAA; or

147 B. The *solid fuel burning appliance* is tested, including by use of a handheld or other
148 portable device, by an accredited independent laboratory, or other qualified person or
149 entity approved by the borough, establishing that it meets an [THE EPA] emissions
150 [LIMIT STANDARD APPROPRIATE FOR THAT APPLIANCE OR AN EMISSIONS
151 LIMIT STANDARD EQUIVALENT TO THAT OF A LISTED APPLIANCE IN A SIMILAR
152 CATEGORY] rate of 2.5 grams of PM_{2.5} per hour or less or for hydronic heaters the
153 appliance has an annual average emission level rating equal to or less than 2.5 grams
154 of PM_{2.5} per hour.

155
156 Section 4. Section 8.21.025 **Prohibited acts** shall be amended as
157 follows:

158 [THE BOROUGH SHALL NOT, IN ANY WAY, REGULATE, PROHIBIT,
159 CURTAIL, NOR ISSUE FINES OR FEES ASSOCIATED WITH THE SALE,
160 DISTRIBUTION, OR OPERATION OF *HEATING APPLIANCES* OR ANY TYPE OF
161 COMBUSTIBLE FUEL.]

162 A. Installation of certain solid fuel burning appliances in the non-attainment area.
163 Within the non-attainment area no person shall install or allow the installation of a solid
164 fuel burning appliance unless it is listed by the Borough as qualifying under this chapter
165 and the installation complies with all other requirements imposed in this chapter. It is a
166 separate violation to fail to remove a solid fuel burning appliance installed in violation of
167 this chapter.

168 B. All persons owning and selling their property within the Air Quality Control Zone
169 with an unlisted installed solid fuel burning appliance that will not be removed before
170 sale must, if the solid fuel burning appliance was not listed by the Borough as qualifying

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at the time of installation, provide a written disclosure to the buyer and to the Division prior to closing.

C. Visible Emissions Standard in the Air Quality Control Zone.

1. Standard. No person shall cause, permit, or allow the emission from a solid fuel burning appliance in the Air Quality Control Zone to create opacity greater than 20 percent for a period or periods aggregating more than 10 minutes in any hour except during the first 30 minutes after the initial firing of a cold unit when the opacity limit shall be less than 50 percent.

2. Procedures and Enforcement. When ambient weather and light conditions permit, methods and procedures specified by the EPA in 40 CFR 60 Appendix A reference method 9 (Visual determination of the Opacity of Emissions From Stationary Sources), or an alternative technology that replaces method 9, when the technology is available and the choice is feasible, upon request of the person being investigated, shall be used to determine compliance with this section. Smoke visible from a chimney, flue or exhaust duct in excess of the opacity standard for a period in excess of 30 minutes shall constitute prima facie evidence of unlawful operation of an applicable solid fuel burning appliance.

D. PM_{2.5} Emissions Crossing Property Lines. No person shall cause or permit emissions from a solid fuel burning appliance to impact the resident(s) of a neighboring property through the creation of an emissions plume that:

1. crosses a property line
2. is observable using EPA method 22 (40 CFR 60 Appendix A), and
3. is 25ug/m³ greater than the surrounding immediate vicinity background PM_{2.5} level using methods defined by the Borough Division of Air Quality. For purposes of this subsection, the surrounding "immediate vicinity" means land within an area measured 1,200 feet in all directions from the boundaries of the emitting property.

E. Borough-Wide Installation Requirements for Hydronic Heaters.

1. Setback. Unless permitted by a variance, installing an approved pellet fuel burning appliance, or replacing an existing hydronic heater with a listed appliance, no person shall install or allow the installation of a hydronic heater located less than:

a. 330 feet from the closest property line, or
b. 660 feet from a school, clinic, hospital, or senior housing unit.
2. Any hydronic heater installed in violation of this section shall be immediately remedied or made inoperable and removed as soon as practicable; however, in no case shall the time of removal be longer than 180 days after notice from the Division of a violation.

F. Prohibited Fuels.

No person shall burn in the Borough any fuel, except coal in an appliance designed to use coal, which is not listed in the manufacturer's owner's manual as an acceptable fuel for that device or any of the following items in a solid fuel burning appliance:

1. Any wood that does not meet the definition of clean wood or has more than 20% moisture content,

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2. Garbage,
3. Tires,
4. Materials containing plastic or rubber,
5. Waste petroleum products,
6. Paints and paint thinners,
7. Chemicals,
8. Glossy or colored papers,
9. Construction and demolition debris,
10. Plywood,
11. Particleboard,
12. Saltwater driftwood,
13. Manure,
14. Animal carcasses,
15. Asphalt products,
16. Flooring products.

G. Sales or Leasing of Solid Fuel Burning Appliances.

1. No person shall sell or lease a solid fuel burning appliance or barrel stove kit in the borough that does not meet the emissions limits established in 8.21.020 A. unless the buyer signs an affidavit, on a form prescribed by the Borough, that the appliance will not be installed or used in the Air Quality Control Zone. This section does not apply to appliances or stoves that transfer pursuant to a sale of property.

2. No person shall commercially sell or offer for sale or lease a solid fuel burning appliance in the borough unless the commercial seller or dealer provides the prospective buyer or lessee, prior to any sales or lease agreement, with a written notice, prepared or approved by the Division, that includes, but is not limited to, the following:

- a. The fuel restrictions imposed in this chapter;
- b. Proper installation, property location, operation, and maintenance of the appliance;
- c. An advisory statement noting that operation of solid fuel burning appliances may not be appropriate in some areas due to terrain, meteorological conditions, or other relevant conditions that render the operation of the appliance a public nuisance or health hazard even though it is otherwise legally installed and operated, and

3. The written notice required in this section shall be signed and dated by the prospective buyer or lessee prior to purchase or lease to indicate receipt of the notification requirements of this section.

4. The commercial dealer or seller shall mail or otherwise provide a copy of the notice, any required affidavit, to the Division within thirty days of the sale. All commercial dealers or sellers shall also include with the notice documentation showing whether the appliance sold or leased meets the Borough's emissions standard.

H. Nuisance. No person within the Fairbanks North Star Borough shall cause or allow emissions of a solid fuel or waste oil burning appliance that are injurious to human life or to property or that unreasonably interfere with the comfortable enjoyment of life or

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property. No person within the Fairbanks North Star Borough shall operate a solid fuel or waste oil burning appliance in a manner so as to create a public or private nuisance. A violation of a provision of this chapter is hereby declared to be a nuisance.

I. Other laws. Nothing in this section precludes other local jurisdictions from having more restrictive codes.

J. Penalties. Upon first conviction of an offense in this chapter, the penalty(ies)/fines(s) set forth in FNSBC Title 1 regarding violations of the PM_{2.5} air quality control program may be satisfied by completion within 60 days of a borough approved class covering PM_{2.5} health concerns, non-attainment, importance of dry wood and proper operation of solid fuel burning appliances. The borough may on its own initiative file notice of satisfaction of attendance requirements with the court, or the defendant may file a certificate of completion with the court within the applicable time frame.

Section 5. Section 8.21.040, **Forecasting exceedances and voluntary restrictions in the non-attainment area during an alert**, shall be amended as follows:

8.21.040 Forecasting exceedances and [VOLUNTARY] restrictions in the Air Quality Control Zone [NON-ATTAINMENT AREA] during an alert

A. During the winter months of October through March, the Borough shall issue a daily PM_{2.5} forecast [at] by 4:30 p.m. [MONDAY THROUGH FRIDAY]. When the PM_{2.5} concentration reaches the onset level for an episode and is expected to remain at that level for 12 hours or more, an alert or advisory will be declared. An alert or advisory may apply to the Air Quality Control Zone as a whole, or to one or more sub-areas designated by the division. Once an alert or advisory is declared, PM_{2.5} control measures set forth in this section shall be implemented and continued until the alert or advisory is cancelled. There are three levels of episodes: Stage 1, 2 and 3. The obligations imposed in this sub-section do not require, absent specific funding for that purpose, any actions to be taken outside of the borough's normal business days and hours of operation.

B. The Division will notify local media to ensure the declared alert or advisory is broadcast. The Division shall also use social media and methods of direct communication such as text messages as feasible. Information within the notification will contain the PM_{2.5} forecast, Stage level for areas, and actions required to reduce sources of PM_{2.5}. The obligations imposed in this sub-section do not require, absent specific funding for that purpose, any actions to be taken outside of the borough's normal business days and hours of operation.

[B]C. Stage 1: Voluntary Restrictions in the Air Quality Control Zone [NON-ATTAINMENT AREA] During an [ALERT] Advisory.

1. A Stage 1 air advisory is implemented when concentrations exceed or are forecasted to exceed 25ug/m³.

[1]2. Residents shall be requested to voluntarily stop operation of solid fuel [BURNING APPLIANCES], pellet [STOVES], and waste oil burning appliances, [AND] as well as masonry heaters and all outdoor burning that includes recreational fires such

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as bonfires, campfires and the use of fire pits, non-permitted incinerators and burn barrels in the Air Quality Control Zone [NON-ATTAINMENT AREA].

[2. THE DIVISION WILL NOTIFY LOCAL MEDIA TO ENSURE THE DECLARED ALERT IS BROADCAST. INFORMATION WITHIN THE NOTIFICATION WILL CONTAIN THE PM FORECAST AND PROCEDURES TO REDUCE SOURCES OF PM.]

D. Stage 2: Required Restrictions in the Air Quality Control Zone During an Alert

1. A Stage 2 air alert is implemented when concentrations exceed or are forecasted to exceed 35ug/m³.

2. Burning is permitted in all borough listed appliances. No fuel source may be added to the combustions chamber or firebox of any non-listed solid fuel burning appliance or waste oil burning appliance. Residents should rely instead on their home's alternate, cleaner source of heat (such as a gas or fuel oil fired furnace or boiler or electric baseboard heaters) until the Stage 2 air alert is cancelled.

3. If a building owner or other person with a property or managerial interest in the building has an approved "No Other Adequate Source of Heat" designation, the building owner is exempted from complying with the Stage 2 air alert restrictions for that building.

4. Outdoor burning is prohibited including non-permitted incinerators and burn barrels. This does not include recreational fires such as bonfires, campfires or ceremonial fires and the use of fire pits.

5. These restrictions shall not apply during a power failure.

E. Stage 3: Required Restrictions in the Air Quality Control Zone During an Alert.

1. A Stage 3 air alert is implemented when concentrations exceed or are forecasted to exceed 55ug/m³.

2. No fuel source may be added to the combustions chamber or firebox of any solid fuel burning appliances, masonry heaters, pellet fuel burning appliances, cook stoves, fireplaces, or waste oil burning appliances. No waste oil may be added to a waste oil burning appliance. Residents should rely instead on their home's alternate, cleaner source of heat (such as a furnace, boiler or electric baseboard heaters) the Stage 3 air alert is cancelled.

3. If a building owner or other person with a property or managerial interest in the building has an approved "No Other Adequate Source of Heat" designation the building owner is exempted from complying with the Stage 3 air alert restrictions for that building.

4. Outdoor burning is prohibited including non-permitted incinerators and burn barrels. This does not include recreational fires such as bonfires, campfires or ceremonial fires and the use of fire pits.

5. These restrictions shall not apply during a power failure or to listed appliances, masonry heaters or pellet fuel burning appliances when the temperature is below -15 as recorded at the Fairbanks International Airport.

Section 6. FNSB 2.48.120 **Powers and duties** of the Air Pollution Control Commission are amended as follows:

AMENDMENTS ARE SHOWN IN LEGISLATIVE FORMAT

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F. The commission may [SHALL] develop or review comprehensive plans for the prevention, abatement, and control of air pollution in the borough. Such plans may include recommendations on subjects including, but not limited to, transportation control measures, zoning, taxation, research, and public relations.

H. After a public hearing, the commission shall determine whether a person may receive a variance from the installation requirements of FNSB 8.21.020 E allowing them to install a hydronic heater. In determining whether to grant the variance, the commission shall consider the proposed location of the appliance, impact on surrounding neighborhood, emission levels of the appliance, terrain, meteorological conditions, and other relevant conditions that may render the operation of the appliance at that location a nuisance or a health hazard.

Section 7. A new section, Section 8.21.043, **No other adequate source of heat determination**, shall be added as follows:

A. A building-owner or other person with a property or managerial interest in the building may obtain a "No Other Adequate Source of Heat" determination from the Division if:

1. The building-owner(s) or other person with a property or managerial interest in the building applies with the Division on a form developed by the Division.

2. The building-owner(s) or other person with a property or managerial interest in the building files an affidavit with the application that the subject structure must be heated and the structure has no adequate heating source without using a solid fuel or waste oil burning appliance or that economic hardships require the applicant's use of a solid fuel or waste oil burning appliance or complying with a restriction would result in damage to property including damage to the appliance itself and its heating system components.

B. There shall be no fee for applying for or obtaining a determination.

C. It shall be a violation to submit a false affidavit for a "no other adequate source of heat" determination.

D. If the "no other adequate source of heat" appliance does not meet the standards set in this chapter, the Division shall provide the applicant with information concerning the borough's voluntary removal, replacement and repair program.

E. Applications denied by the division may be appealed to the Air Pollution Control Commission.

Section 8. FNSB 1.04.050 **Fine schedule** is amended to add the following:

<u>Code Section</u>	<u>Offense</u>	<u>Penalty/Fine</u>	<u>Mandatory Warning Required</u>
<u>8.21.025(A)</u>	<u>Installation of an unlisted appliance</u>	<u>\$500.00</u>	<u>No</u>

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<u>8.21.025(A)</u>	<u>Failure to remove an unlisted appliance</u>	<u>\$500.00</u>	<u>Yes</u>
<u>8.21.025(B)</u>	<u>Failure to disclose an unlisted appliance before sale</u>	<u>\$500.00</u>	<u>No</u>
<u>8.21.025(C)</u>	<u>Violation of visible emissions standard 1st offense</u>	<u>\$100.00</u>	<u>Yes</u>
<u>8.21.025(C)</u>	<u>Violation of visible emissions standard 2nd offense</u>	<u>\$500.00</u>	<u>No</u>
<u>8.21.025(D)</u>	<u>Emissions crossing property lines 1st offense</u>	<u>\$500.00</u>	<u>Yes</u>
<u>8.21.025(D)</u>	<u>Emissions crossing property lines 2nd offense</u>	<u>\$1000.00</u>	<u>No</u>
<u>8.21.025(E)</u>	<u>Illegal installation of hydronic heaters</u>	<u>\$500.00</u>	<u>No</u>
<u>8.21.025(E)</u>	<u>Failure to remove hydronic heaters</u>	<u>\$500.00</u>	<u>No</u>
<u>8.21.025(F)</u>	<u>Use of prohibited fuels--1st offense</u>	<u>\$100.00</u>	<u>Yes</u>
<u>8.21.025(F)</u>	<u>Use of prohibited fuels--2nd offense</u>	<u>\$500.00</u>	<u>No</u>
<u>8.21.025(G)</u>	<u>Violation of commercial sale requirements</u>	<u>\$500.00</u>	<u>No</u>
<u>8.21.040(D)</u>	<u>Violation of a stage 2 air alert restriction</u>	<u>\$500.00</u>	<u>Yes</u>
<u>8.21.040(D)</u>	<u>Violation of a stage 3 air alert restriction</u>	<u>\$1000.00</u>	<u>Yes</u>
<u>8.21.043</u>	<u>Filing a false affidavit</u>	<u>\$500.00</u>	<u>No</u>

Section 9. Effective Date. Except for FNSBC 8.21.025 G (Commercial Sales) which shall be effective 30 days after adoption, and FNSBC 8.21.025 B (sale of property) which shall be effective on May 1st, 2015, and FNSBC 8.21.025(F)(1) (requirement wood be 20% moisture content) which shall be effective on October 1, 2015. This ordinance shall be effective at 5:00 pm on the first Borough business day

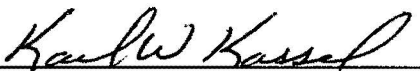
AMENDMENTS ARE SHOWN IN LEGISLATIVE FORMAT

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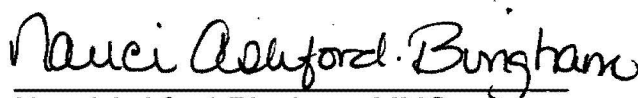
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following its adoption and shall have only prospective application, meaning no provision shall apply to any act, including installation or purchase of a solid fuel appliance completed prior to the effective date.

PASSED AND APPROVED THIS 27TH DAY OF FEBRUARY, 2015.

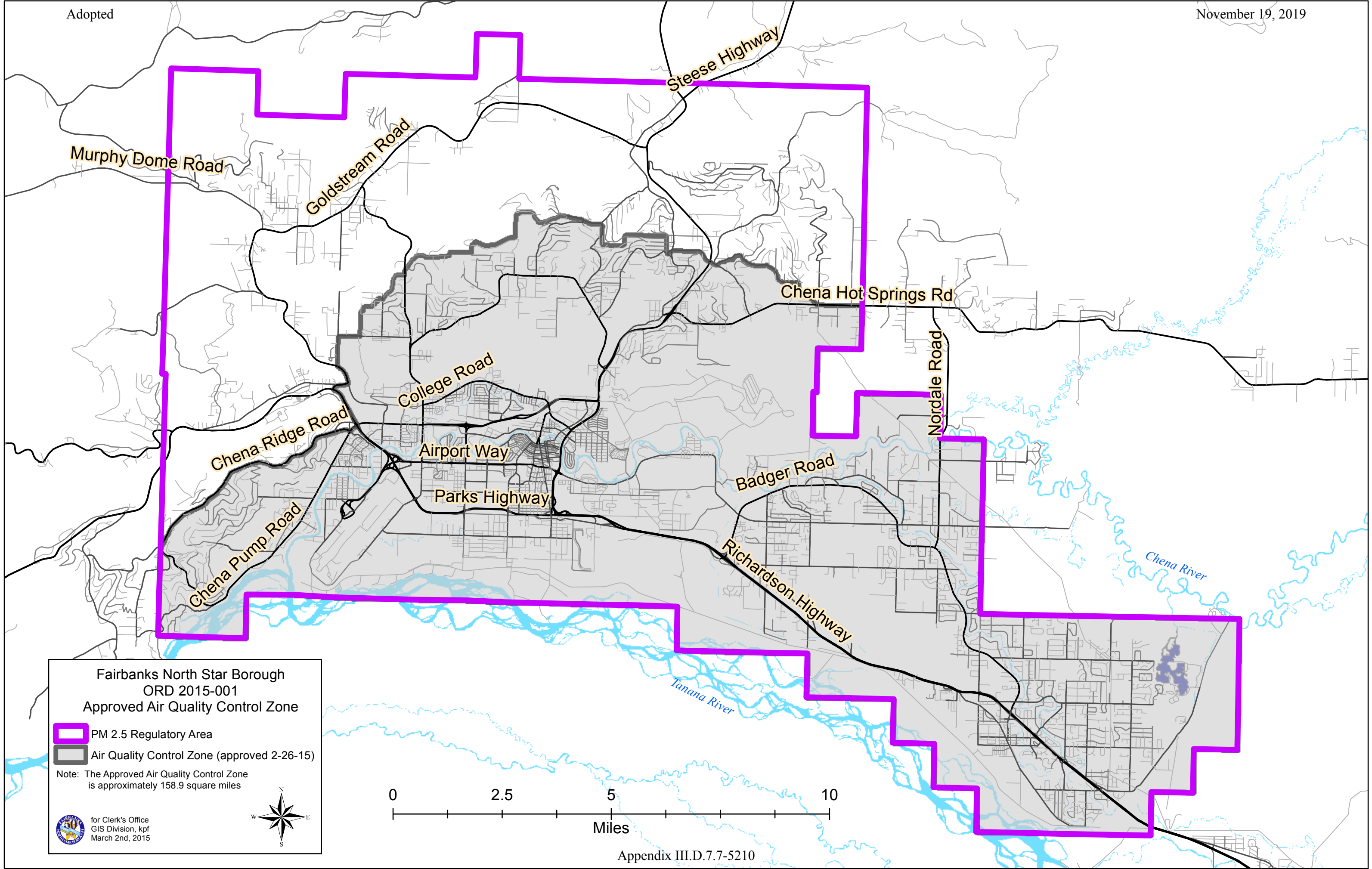

Karl Kassel
Presiding Officer

ATTEST:


Nanci Ashford-Bingham, MMC
Borough Clerk

Ayes: Golub, Hutchison, Lawrence, Dodge, Quist, Davies, Kassel
Noes: Sattley, Roberts

AMENDMENTS ARE SHOWN IN LEGISLATIVE FORMAT
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By: Van Lawrence
Matthew Cooper
Introduced: 03/24/2016
Advanced: 03/24/2016
Substituted: 05/04/2016
Amended: 05/04/2016
Adopted: 05/04/2016
Amended by Ordinance
No. 2016-33: 06/23/2016

FAIRBANKS NORTH STAR BOROUGH

ORDINANCE NO. 2016-21

AN ORDINANCE AMENDING FNSB 8.21.025 TO REQUIRE THE REMOVAL OF CERTAIN UNLISTED HYDRONIC HEATERS IN THE AIR QUALITY CONTROL ZONE, AMENDING THE FY 2015-16 BUDGET BY APPROPRIATING \$500,000 FROM THE GENERAL FUND FUND BALANCE TO THE TRANSIT ENTERPRISE PROJECTS FUND TO PAY FOR THE REMOVAL OF THE UNLISTED HYDRONIC HEATERS AND SUSPEND ALL OTHER PAYMENTS FROM THE VOLUNTARY REMOVAL AND REPLACEMENT PROGRAM UNTIL MAY 1, 2017

WHEREAS, Hydronic heaters that do not have an emissions rating of 0.10 pounds per million BTU or less cannot, under existing code, be legally installed in the borough's nonattainment area; and

WHEREAS, Certain hydronic heaters significantly contribute to the borough's air quality problem; and

WHEREAS, The Borough has offered in past years and continues to offer a removal program that pays homeowners to remove or replace these hydronic heaters; and

WHEREAS, The Borough needs to increase funding of the removal program and temporarily preclude other program spending in order to ensure funds are available to pay owners who are required to remove these unlisted hydronic heaters; and

WHEREAS, The imminent reclassification by the EPA of the Fairbanks North Star Borough from a Moderate to a Serious non-attainment area will result in the imposition of control measures, including expensive technology upgrades for power plants and other stationary sources, which will lead to insignificant improvement to air quality but will significantly increase utility rates; and

CODE AMENDMENTS ARE SHOWN IN LEGISLATIVE FORMAT

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Text to be *deleted* is [BRACKETED AND CAPITALIZED]

WHEREAS, The Borough's continued failure to significantly reduce PM2.5 pollution will further result in offset sanctions which will strangle economic development in the non-attainment area and highway sanctions eliminating federal funding of road projects within the non-attainment area; and

WHEREAS, These sanctions will be lifted if and when air quality violations cease.

NOW, THEREFORE, BE IT ORDAINED by the Assembly of the Fairbanks North Star Borough:

Section 1. Sections 2, 3 and 4 are of a general and permanent nature and shall be codified. Sections 5, 6 and 7 shall not be codified.

Section 2. FNSBC 8.21.025 B. is hereby amended as follows:

B. No person who has been convicted of or pled no contest to two or more violations of this chapter involving visible emissions or emissions crossing property lines shall, in the air quality control zone, operate, use or keep installed a hydronic heater unless the hydronic heater is:

1. Borough listed or was listed at the time of installation,
2. A closed combustion system with automatic components that feed solid fuel, including wood pellets, into a firebox where the combustion is enhanced by an active airflow system, or
3. Connected to a thermal mass system that is certified by the contractor or installer as sufficient to allow the hydronic heater to burn at maximum capacity minimizing on/off cycling. The division may require an owner to provide documentation supporting the certification.

This prohibition shall be effective 90 days after the 2nd conviction or entry or a no contest plea.

All persons owning and selling their property within the *air quality control zone* with an installed non-EPA-certified *solid fuel burning appliance*[, OR FOR HYDRONIC HEATERS NON-EPA PHASE II QUALIFICATIONS,]that will not be removed before sale must provide a written disclosure to the buyer prior to closing, and a copy to the *division* no later than 10 days after the recording of the sale.

CODE AMENDMENTS ARE SHOWN IN LEGISLATIVE FORMAT

Text to be *added* is underlined

Text to be *deleted* is [BRACKETED AND CAPITALIZED]

Section 3. FNSBC 1.04.050, fine schedule, is amended to add the following:

Code Section	<u>Offense</u>	Penalty/Fine	Mandatory Warning Required
8.21.025(B)	<u>Failure to remove, using or operating a prohibited hydronic heater.</u> <u>1st offense.</u>	<u>\$500</u>	<u>Yes, with removal as soon as practicable.</u>
8.21.025(B)	<u>Failure to remove, using or operating a prohibited hydronic heater.</u> <u>2nd offense.</u>	<u>\$1,000</u>	<u>No.</u>

Section 4. General Fund Appropriation. The FY 2015-16 budget is hereby amended by appropriating \$500,000 to the General Fund budgetary guideline entitled "Contribution to Transit Enterprise Projects Fund" and by increasing Contribution from Fund Balance by a like amount.

Section 5. Transit Enterprise Projects Fund Appropriation. The FY 2015-16 budget is hereby amended by appropriating \$500,000 to the Transit Enterprise Projects Fund budgetary guideline entitled "Enhanced Voluntary Removal, Replacement, and Repair Program" and by increasing Contribution from General Fund by a like amount.

Section 6. Limited Use of Funds. All unencumbered funds remaining in the removal, replacement and repair program on the effective date of this ordinance may be spent only on payments to applicants within the air quality control zone who are (1) removing or replacing an unlisted hydronic heater or (2) removing or replacing a woodstove [THAT HAS BEEN THE SUBJECT OF MORE THAN ONE SUBSTANTIATED NEIGHBORHOOD COMPLAINT AND] meeting [ADDITIONAL] criteria established by the Mayor. This restriction shall continue until May 1, 2017 or until the assembly appropriates additional funds to pay for the other removal, replacement or repairs authorized under the program, whichever occurs first.

Section 7. Lapse of Funds for the "Enhance Voluntary Removal, Replacement, and Repair Program". Upon completion or abandonment of the program, any unexpended and unencumbered funds will lapse to the General Fund fund balance.

Section 8. Effective Date. Sections 2, 3 and 4 of this ordinance shall be effective on October 1, 2016. The remaining sections shall be effective at 5:00 pm. on the first Borough business day following its adoption.

CODE AMENDMENTS ARE SHOWN IN LEGISLATIVE FORMAT

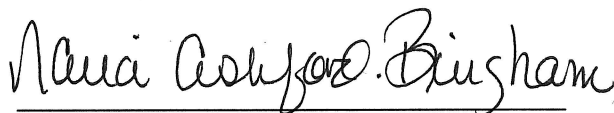
Text to be *added* is underlined

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PASSED AND APPROVED THIS 4TH DAY OF MAY, 2016 AND AMENDED
BY ORDINANCE NO. 2016-33 ADOPTED JUNE 23, 2016.


John Davies
Presiding Officer

ATTEST:



Nanci Ashford-Bingham, MMC
Borough Clerk

Adopted on May 4, 2016:

Yeses: Sattley, Hutchison, Cooper, Westlind, Lawrence, Dodge, Quist, Davies

Noes: Roberts

Amended on June 23, 2016:

Yeses: Sattley, Hutchison, Cooper, Roberts, Westlind, Lawrence, Dodge, Quist, Davies

Noes: Roberts

CODE AMENDMENTS ARE SHOWN IN LEGISLATIVE FORMAT

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Text to be *deleted* is [BRACKETED AND CAPITALIZED]

By: Karl Kassel, Mayor
Introduced: 06/23/2016
Advanced: 06/23/2016
Amended: 07/28/2016
Adopted: 07/28/2016

FAIRBANKS NORTH STAR BOROUGH

ORDINANCE NO. 2016-37

AN ORDINANCE AMENDING TITLE 21 REGARDING NO OTHER ADEQUATE
SOURCE OF HEAT DETERMINATIONS

WHEREAS, Borough code exempts qualifying buildings with no other adequate source of heat from compliance with certain air quality regulations; and

WHEREAS, Granting these exemptions only to buildings constructed prior to December 31, 2016 will encourage property owners to include an alternative source of heat in new construction for use during times of exceedances.

WHEREAS, Because borough codes imposing restrictions on the use of solid fuel and other appliances during air alerts apply only to the air quality zone, only owners within the air quality zone need to apply for a "no other adequate source of heat" determination;

NOW, THEREFORE, BE IT ORDAINED by the Assembly of the Fairbanks North Star Borough:

Section 1. This ordinance is of a general and permanent nature and shall be codified.

Section 2. FNSBC 21.28.060 **No other adequate source of heat determination** is amended to read as follows:

A. A building owner or other person with a property or managerial interest in [THE] a building located within the air quality control zone may obtain a "no other adequate source of heat" determination from the division if:

1. The building owner(s) or other person with a property or managerial interest in the building applies with the division on a form developed by the division[.];

2. The building owner(s) or other person with a property or managerial interest in the building files an affidavit with the application that the subject structure must be heated and the structure has no adequate heating source without using a solid fuel or waste oil burning appliance or that economic hardships require the applicant's use of a solid fuel or waste oil burning appliance or complying with a restriction would

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45 result in damage to property including damage to the appliance itself and its heating
46 system components[.]; and

47 3. The building was constructed on or before December 31, 2016.

48 B. There shall be no fee for applying for or obtaining a determination.

49 C. It shall be a violation to submit a false affidavit for a "no other adequate source of
50 heat" determination.

51 D. If the "no other adequate source of heat" appliance does not meet the standards
52 set in this chapter, the division shall provide the applicant with information concerning
53 the borough's voluntary removal, replacement and repair program.

54 E. Applications denied by the division may be appealed to the air pollution control
55 commission.

56
57 Section 3. Effective Date. This ordinance shall be effective at 5:00 p.m.
58 of the first Borough business day following its adoption.

59
60 PASSED AND APPROVED THIS 28TH DAY OF JULY, 2016.

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John Davies
Presiding Officer

ATTEST:

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Nanci Ashford-Bingham, MMC
Borough Clerk

Yeses: Cooper, Sattley, Hutchison, Westlind, Lawrence, Dodge, Davies

Noes: Roberts

Other: Quist (Excused)

CODE AMENDMENTS ARE SHOWN IN LEGISLATIVE FORMAT

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By: Karl Kassel, Mayor
Introduced: 02/23/2017
Advanced: 02/23/2017
Amended: 03/09/2017
Adopted: 03/09/2017
Immediate
Reconsideration Failed: 03/09/2017
Adopted: 03/09/2017

FAIRBANKS NORTH STAR BOROUGH

ORDINANCE NO. 2017-18

AN ORDINANCE AMENDING CHAPTER 21.28 FNSBC
REGARDING THE PM_{2.5} AIR QUALITY CONTROL PROGRAM AND AMENDING
FNSBC 1.20.080, FINE SCHEDULE

WHEREAS, The United States Environmental Protection Agency (EPA), on December 22, 2008, declared part of the Fairbanks North Star Borough a non-attainment area for fine particulate pollution (PM_{2.5}); and

WHEREAS, On December 16, 2016 the EPA published public notice in the Federal Register of its intent to reclassify the Fairbanks North Star Borough's non-attainment area from Moderate to Serious status; and

WHEREAS, Reclassification to Serious non-attainment status triggers the mandate that Best Available Control Measures be implemented as mitigation measures within the non-attainment area; and

WHEREAS, The State of Alaska, through a Memorandum of Agreement with the Borough, has authorized the Fairbanks North Star Borough to establish and administer an area-wide local PM_{2.5} air quality control program that will operate in lieu of and consistent with the State's air quality program; and

WHEREAS, In the winter, PM_{2.5} concentrations in the non-attainment area routinely exceed the allowable limit, thereby violating the federal health-based standards; and

WHEREAS, An excessive level of PM_{2.5} impacts the health and well being of borough residents; and

WHEREAS, Air quality issues could negatively impact large scale economic development, including military expansion, in the Fairbanks North Star Borough.

AMENDMENTS ARE SHOWN IN LEGISLATIVE FORMAT

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45
46 NOW, THEREFORE, BE IT ORDAINED by the Assembly of the Fairbanks
47 North Star Borough:

48
49 Section 1. This ordinance is of a general and permanent nature and shall
50 be codified.

51
52 Section 2. FNSBC 21.28.010, **Definitions**, shall be amended as follows:

53
54 ["ADVISORY" MEANS A NOTICE ISSUED BY THE FNSB AIR QUALITY
55 DIVISION WHEN THE DIVISION DETERMINES, USING AVAILABLE DATA, THAT A
56 $PM_{2.5}$ CONCENTRATION OF 25 $\mu\text{G}/\text{M}^3$ HAS OCCURRED, OR WILL LIKELY OCCUR.]

57
58 ["AIR QUALITY ALERT" MEANS AN ADVISORY, ALERT OR EPISODE
59 CONCERNING AIR QUALITY WHETHER ISSUED BY THE FAIRBANKS NORTH
60 STAR BOROUGH OR THE STATE OF ALASKA.]

61
62 "Air quality control zone" means the area of the borough currently contained in
63 the EPA designated nonattainment area, which uses the nonattainment area southern,
64 western and eastern boundaries as modified by their respective intersection with the
65 following northern boundary described as: beginning at the intersection of Isberg Road
66 with Chena Ridge Road on the western boundary of the EPA designated nonattainment
67 area, then following Chena Ridge Road back to Chena Pump Road and continuing
68 north on the Parks Highway to Sheep Creek Road, then Sheep Creek Road to Miller Hill
69 Road, then north on Miller Hill Road, then east on Yankovich, then north from
70 Yankovich Road along the east boundary of the Large Animal Research Station to a
71 point just north of its intersection with Nottingham Drive and follows the ridge crest
72 across Nottingham Estates to approximately the point where Swallow Drive intersects
73 Dalton Trail to north on Dalton Trail to the crest of the Farmer's Loop Ridge, then follow
74 the geographic crest of Farmer's Loop Ridge to its intersection with the New Steese
75 Highway, then southeast on Bennet Road, and along Steel Creek Road to the
76 intersection of Chena Hot Springs Road, and Chena Hot Springs Road to the eastern
77 boundary of the EPA designated nonattainment area.

78
79 "Air Quality Index" (AQI) is an index for reporting daily air quality, which indicates
80 how polluted the air currently is or how polluted it is forecast to become. The higher the
81 AQI value, the greater the level of air pollution and the greater the health concern. AQI
82 is divided into six categories with correspondingly higher levels of health concern as
83 outlined in the table below:

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AQI (Air Quality Index)	AQI Category	Cautionary Statement	Health Statement
0-50	Good	None	None
51-100	Moderate	Unusually sensitive people should consider reducing prolonged or heavy exertion.	None
101-150	Unhealthy for Sensitive Groups	People with respiratory or heart disease, the elderly, and children should limit prolonged exertion.	Increasing likelihood of respiratory symptoms in sensitive individuals, aggravation of heart or lung disease and premature mortality in persons with cardiopulmonary disease and the elderly.
151-200	Unhealthy	People with respiratory or heart disease, the elderly, and children should avoid prolonged exertion; everyone else should limit prolonged exertion.	Increased aggravation of heart or lung disease and premature mortality in persons with cardiopulmonary disease and the elderly; increased respiratory effects in general population.
201-300	Very Unhealthy	People with respiratory or heart disease, the elderly, and children should avoid outdoor activity; everyone else should avoid prolonged exertion.	Significant aggravation of the heart or lung disease and premature mortality in persons with cardiopulmonary disease and the elderly; significant increase in respiratory effects in the general population.
301-500	Hazardous	Everyone should avoid any outdoor exertion; people with respiratory or heart disease; the elderly and children should remain indoors.	Significant aggravation of heart or lung disease and premature mortality in persons with cardiopulmonary disease and the elderly; significant increase in respiratory effects in the general population.

“Alert” means a notice issued by the [FNSB AIR QUALITY] division when the division determines, using available data or modeling, that [A] PM_{2.5} [VIOLATION OF THE 35 µg/m³ HAS OCCURED OR WILL LIKELY OCCUR] concentration levels have reached or are forecasted to reach 25µg/m³ or higher for at least 12 consecutive hours.

“Appliance” means a device or apparatus that is manufactured and designed to utilize energy and which does not require a stationary source air quality permit from the state of Alaska under 18 AAC 50.

“Clean wood” means natural wood that has not been painted, varnished, or coated with a similar material, has not been treated with preservatives, and does not contain resins or glues as in plywood or other composite wood products.

“Construction and demolition debris” means a conglomeration of materials from construction, repair, remodeling or demolition of buildings and structures containing any prohibited fuels.

“Cook stove” means a wood burning appliance that is designed primarily for cooking food and that has the following characteristics:

1. An oven, with a volume of 0.028 cubic meters (one cubic foot) or greater, and an oven rack;
2. A device for measuring oven temperatures;
3. A flame path that is routed around the oven;
4. A shaker grate;
5. An ash pan;

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- 111 6. An ash clean-out door below the oven; and
112 7. The absence of a fan or heat channels to dissipate heat from the device.
113

114 “Division” means the Fairbanks North Star Borough air quality division.
115

116 “Emergency Power System” is an independent source of electrical power that
117 supports important electrical systems on loss of normal power supply. An emergency
118 power system may include a standby generator, batteries, and other apparatus.
119 Emergency power systems are installed to protect life and property from the
120 consequences of loss of normal electric power supply.
121

122 “EPA” means the United States Environmental Protection Agency.
123

124 “EPA certified” means that the solid fuel burning appliance meets emission
125 performance standards when tested by an accredited independent laboratory and is
126 labeled according to procedures specified by the EPA in 40 CFR Part 60 Subpart AAA
127 or QQQQ.
128

129 [“EPISODE” MEANS WHEN CONDITIONS REACH OR ARE PREDICTED TO
130 REACH ADVISORY OR ALERT STATUS.]
131

132 “Fireplace” means an assembly consisting of a hearth and open fire chamber of
133 noncombustible factory-built or masonry materials and provided with a chimney, for use
134 with solid fuels, which cannot be operated with an air to fuel ratio of less than 35 to one.
135

136 “Fireplace insert” means a solid fuel burning appliance similar in function and
137 performance to a freestanding wood burning stove, which is made from cast iron or
138 steel designed to be installed in an existing masonry or prefabricated fireplace.
139

140 “Forecast” means a description of the current dispersion conditions described as
141 good, fair, or poor and including the expected PM_{2.5} [CONCENTRATIONS
142 EXPRESSING IN MICROGRAMS PER CUBIC METER] NowCast AQI categorized as
143 good, moderate, unhealthy for sensitive groups, unhealthy, very unhealthy, or
144 hazardous.
145

146 “Heating appliances” means, but is not limited to: [OIL FURNACES, GAS
147 FURNACES, WOOD STOVES, COAL STOVES, WOOD-FIRED HYDRONIC
148 HEATERS, WOOD-FIRED FURNACES, COAL-FIRED HYDRONIC HEATERS, COAL-
149 FIRED FURNACES] wood, coal, or pellet fired hydronic heaters, stoves, and furnaces;
150 oil or gas fired boilers and furnaces; and masonry heaters, pellet stoves, cook stoves,
151 and fireplaces.
152

153 “Hydronic” means having to do with a system moving heat from one location to
154 another by means of the circulation of a heat transfer liquid through piping or tubing.

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“Hydronic heater” means a fuel burning appliance designed to (1) burn wood or other solid fuels and (2) heat building space and/or domestic hot water via the distribution, typically through pipes, of a fluid heated in the appliance.

“Masonry heater” means a wood burning appliance that complies with the guidelines of ASTM E1602-08, Standard Guide for Construction of Masonry Heaters, and:

1. Is designed and intended for operation only in a closed combustion chamber configuration; and
2. Has enough thermal storage capacity to maintain no less than 50.0 percent of the maximum masonry-mass temperature for at least four hours after the maximum masonry-mass temperature has been reached; and
3. The masonry heater design and installation has been confirmed and documented by a qualified person or entity approved by the borough.

“Nonattainment area” is the area depicted on the map attached to the ordinance codified in this chapter and is further defined as follows:

Township Range Delineated Boundary for the Fairbanks
Nonattainment Area

MTRS F001N001 – All Sections, MTRS F001N001E – Sections 2-11, 14-23, 26-34, MTRS F001N002 – Sections 1-5, 8-17, 20-29, 32-36, MTRS F001S001E – Sections 1, 3-30, 32-36, MTRS F001S001W – Sections 1-30, MTRS F001S002E – Sections 6-8, 17-20, 29-36, MTRS F001S002W – Sections 1-5, 8-17, 20-29, 32-33, MTRS F001S003E – Sections 31-32, MTRS F002N001E – Sections 31-35, MTRS F002N001 – Sections 28, 31-36, MTRS F002N002 – Sections 32-33, 36, MTRS F002S001E – Sections 1-2, MTRS F002S002E – Sections 1-17, 21-24, MTRS F002S003E – Sections 5-8, 18.

“NowCast” means a weighted average of hourly air monitoring data used by the EPA for real-time reporting of the AQI for PM.

“Opacity” means the reduction in transmitted light through a column of smoke as measured by an observer certified in using EPA Reference Method 9 as defined by federal law or EPA approved Alternative Method 82 which is defined as American Society for Testing and Materials (ASTM) D 7520-09.

“Particulate matter” or “PM” means total particulate matter including PM₁₀ and PM_{2.5} (condensable and noncondensable fraction) and is a complex airborne mixture of extremely small particles and liquid droplets that are made up of a number of components, including acids, organic chemicals, metals, soil, or dust.

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“Pellet fuel burning appliance” or “pellet stove” means a closed combustion, vented pellet burning appliance with automatic components creating an active air flow system, sold with the hopper and auger combination as integral parts, and designed, warranted, safety listed, and advertised by the manufacturer specifically to be fueled by pellets of sawdust, wood products and other biomass materials while prohibiting the use of cordwood.

“PM_{2.5}” means particulate matter comprised of particles that have diameters of two and one-half microns or less.

“Sale” means the transfer of ownership or control.

“Solid fuel burning appliance” (SFBA) means any appliance[, UNLESS SPECIFICALLY EXCLUDED FROM THIS DEFINITION,] designed to produce heat by burning nongaseous and nonliquid fuels. This definition includes, but is not limited to:

1. Wood stoves;
2. Coal stoves;
3. Wood-fired *hydronic heaters*;
4. Wood-fired furnaces;
5. Coal-fired *hydronic heaters*;
6. Coal-fired furnaces; [AND]
7. *Fireplace inserts*[.];
8. Pellet fuel burning appliances;
9. Masonry Heaters;
10. Cook Stoves; and
11. Fireplaces.

[THE FOLLOWING APPLIANCES ARE SPECIFICALLY EXCLUDED FROM THIS DEFINITION:

1. MASONRY HEATERS;
2. PELLET FUEL BURNING APPLIANCES;
3. COOK STOVES; AND
4. FIREPLACES.]

“Waste oil burning appliance” means an appliance that burns used or waste oil.

Section 3. FNSBC 21.28.020, **Borough listed appliances**, shall be amended as follows:

A solid fuel burning appliance shall be listed by the borough if:

A. The solid fuel burning appliance is EPA certified [CERTIFIED BY THE U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)] as meeting the federal emissions rate of 2.5 grams of PM_{2.5} per hour or less, or for hydronic heaters, [MEETS PHASE II

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QUALIFICATIONS] is EPA certified and has an emission rating of 0.10 pounds per million BTU or less[. FOR PURPOSES OF THIS SECTION, "CERTIFIED" MEANS THAT THE SOLID FUEL BURNING APPLIANCE MEETS EMISSION PERFORMANCE STANDARDS WHEN TESTED BY AN ACCREDITED INDEPENDENT LABORATORY AND LABELED ACCORDING TO PROCEDURES SPECIFIED BY THE EPA IN 40 CFR 60 SUBPART AAA]; or

B. The solid fuel burning appliance is a masonry heater, cook stove, or fireplace; or

C. The solid fuel burning appliance is tested, including by use of a handheld or other portable device, by an accredited independent laboratory, or other qualified person or entity approved by the borough, establishing that it meets the emissions rate of 2.5 grams per hour or less. [OR FOR HYDRONIC HEATERS THE APPLIANCE HAS AN EMISSION RATING OF 0.1 POUNDS PER MILLION BTU OR LESS.]

Section 4. FNSBC 21.28.030, **Prohibited acts**, shall be amended as follows:

A. Installation of Certain Solid Fuel Burning Appliances in the Nonattainment Area. Within the nonattainment area no person shall install or allow the installation of a solid fuel burning appliance unless it is listed by the borough as qualifying under this chapter and the installation complies with all other requirements imposed in this chapter. It is a separate violation to fail to remove a solid fuel burning appliance installed in violation of this chapter.

B. No person who has been convicted of or pled no contest to two or more violations of this chapter involving visible emissions or emissions crossing property lines shall, in the air quality control zone, operate, use or keep installed a hydronic heater unless the hydronic heater is:

1. Borough listed or was listed at the time of installation,
2. A closed combustion system with automatic components that feed solid fuel, including wood pellets, into a firebox where the combustion is enhanced by an active airflow system, or

3. Connected to a thermal mass system that is certified by the contractor or installer as sufficient to allow the hydronic heater to burn at maximum capacity minimizing on/off cycling. The division may require an owner to provide documentation supporting the certification.

This prohibition shall be effective 90 days after the second conviction or entry [OR] of a no contest plea.

[ALL PERSONS OWNING AND SELLING THEIR PROPERTY WITHIN THE AIR QUALITY CONTROL ZONE WITH AN INSTALLED NON-EPA-CERTIFIED SOLID FUEL BURNING APPLIANCE THAT WILL NOT BE REMOVED BEFORE SALE MUST PROVIDE A WRITTEN DISCLOSURE TO THE BUYER PRIOR TO CLOSING, AND A

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COPY TO THE DIVISION NO LATER THAN 10 DAYS AFTER THE RECORDING OF THE SALE.]

C. Visible Emissions Standard in the Air Quality Control Zone.

1. Standard. No person shall cause, permit, or allow particulate emissions from a nonmobile source in the air quality control zone to create opacity greater than 20 percent for a period or periods aggregating more than 10 minutes in any hour except during the first 40[30] minutes after the initial firing when the opacity limit shall be less than 50 percent.

2. Procedures and Enforcement. When ambient weather and light conditions permit, methods and procedures specified by the EPA in 40 CFR 60 Appendix A Reference Method 9 (Visual determination of the Opacity of Emissions From Stationary Sources), or an alternative technology that replaces Method 9, when the technology is available and the choice is feasible, upon request of the person being investigated, shall be used to determine compliance with this section. Smoke visible from a chimney, flue or exhaust duct in excess of the opacity standard for a period in excess of 30 minutes shall constitute prima facie evidence of unlawful operation of an applicable solid fuel burning appliance.

D. PM_{2.5} Emissions Crossing Property Lines. No person shall cause or permit particulate emissions from a nonmobile source to impact the resident(s) of a neighboring property through the creation of an emissions plume that:

1. Crosses a property line;
2. Is observable using EPA Method 22 (40 CFR 60 Appendix A); and
3. Is 25 g/m³ greater than the surrounding immediate vicinity background PM_{2.5} level using methods defined by the borough division of air quality. For purposes of this subsection, the surrounding "immediate vicinity" means land within an area measured 1,200 feet in all directions from the boundaries of the emitting property.

E. Borough-Wide Installation Requirements for Hydronic Heaters.

1. Setback. Unless permitted by a variance, [INSTALLING AN APPROVED PELLET FUEL BURNING APPLIANCE]or if replacing an existing hydronic heater with a listed appliance, no person shall install or allow the installation of a hydronic heater located less than:

- a. Three hundred thirty feet from the closest property line; or
- b. Six hundred sixty feet from a school, clinic, hospital, or senior housing unit.

2. Any hydronic heater installed in violation of this section shall be immediately remedied or made inoperable and removed as soon as practicable; however, in no case shall the time of removal be longer than 180 days after notice from the *division* of a violation.

F. Prohibited Fuels. No person shall burn in the borough any fuel, except coal in an appliance designed to use coal, which is not listed in the manufacturer's owner's

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329 manual as an acceptable fuel for that device or any of the following items in a solid fuel
330 burning appliance:

- 331 1. Any wood that does not meet the definition of clean wood or has more
332 than 20 percent moisture content;
- 333 2. Garbage;
- 334 3. Tires;
- 335 4. Materials containing plastic or rubber;
- 336 5. Waste petroleum products;
- 337 6. Paints and paint thinners;
- 338 7. Chemicals;
- 339 8. Glossy or colored papers;
- 340 9. Construction and demolition debris;
- 341 10. Plywood;
- 342 11. Particleboard;
- 343 12. Saltwater driftwood;
- 344 13. Manure;
- 345 14. Animal carcasses;
- 346 15. Asphalt products;
- 347 16. Flooring products.

348
349 G. Sales or Leasing of Solid Fuel Burning Appliances.

350 1. No person shall sell or lease an unlisted solid fuel burning appliance or
351 barrel stove kit in the borough [THAT DOES NOT MEET THE EMISSIONS LIMITS
352 ESTABLISHED IN FNSBC 21.28.020(A)] unless the buyer signs an affidavit, on a form
353 prescribed by the borough, attesting that the appliance will not be installed or used in
354 the air quality control zone. This section does not apply to appliances or stoves that
355 transfer pursuant to a sale of property;

356 2. No person shall commercially sell or offer for sale or lease a solid fuel
357 burning appliance in the borough unless the commercial seller or dealer provides the
358 prospective buyer or lessee, prior to any sales or lease agreement, with a written notice,
359 prepared or approved by the division, that includes, but is not limited to, the following:

360 a. The fuel restrictions imposed in this chapter;
361 b. Proper installation, property location, operation, and maintenance
362 of the appliance;

363 c. An advisory statement noting that operation of solid fuel burning
364 appliances may not be appropriate in some areas due to terrain, meteorological
365 conditions, or other relevant conditions that render the operation of the appliance a
366 public nuisance or health hazard even though it is otherwise legally installed and
367 operated;

368 3. The written notice required in this section shall be signed and dated by the
369 prospective buyer or lessee prior to purchase or lease to indicate receipt of the
370 notification requirements of this section;

371 4. The commercial dealer or seller shall mail or otherwise provide a copy of
372 the notice[, and any required affidavit[,]] to the division within 30 days of the sale. All

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commercial dealers or sellers shall also include with the notice documentation showing whether the appliance sold or leased meets the borough's emissions standard.

H. Nuisance. No person within the Fairbanks North Star Borough shall cause or allow particulate emissions from a nonmobile source that are injurious to human life or to property or that unreasonably interfere with the comfortable enjoyment of life or property. No person within the Fairbanks North Star Borough shall operate a solid fuel or waste oil burning appliance in a manner so as to create a public or private nuisance. A violation of a provision of this chapter is hereby declared to be a nuisance.

I. Other Laws. Nothing in this section precludes other local jurisdictions from having more restrictive codes.

J. Penalties. Upon first conviction of an offense in this chapter, the penalty(ies)/fine(s) set forth in FNSBC Title 1 regarding violations of the PM2.5 air quality control program may be satisfied by completion within 60 days of a borough-approved class covering PM2.5 health concerns, nonattainment, importance of dry wood and proper operation of solid fuel burning appliances. The borough may on its own initiative file notice of satisfaction of attendance requirements with the court, or the defendant may file a certificate of completion with the court within the applicable time frame.

Section 5. FNSBC 21.28.040, **Enhanced voluntary removal, replacement and repair program**, shall be amended as follows:

The Fairbanks North Star Borough shall, to the extent funds are available and appropriated by the assembly, offer an enhanced removal, replacement and repair program to help offset the costs of removing, replacing or repairing a solid fuel burning appliance (SFBA) or fireplace. This program shall be subject to the following eligibility requirements, conditions, and criteria:

A. General Requirements.

1. Application. An application approved by the division and signed by all property owner(s) must be submitted along with any documentation required by the division. Applications for either the removal of a solid fuel burning appliance (SFBA), or replacement of a SFBA with an emergency power system, or an appliance designed to use natural gas, propane, or home heating oil shall include a signed recordable document restricting future installations of SFBAs[SOLID FUEL BURNING APPLIANCES] and requiring appropriate notice to purchasers in the seller's disclosure statement. Applicants must fully comply with the division's inspection process which shall verify the existence of a qualifying SFBA [OR FIREPLACE].

2. Priority Ranking. Applications may be prioritized and may be limited by the division in its discretion based on geographical location, the overall air quality benefit and the type of SFBA or fireplace being removed, replaced or repaired.

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3. Eligibility. The program is limited to properties within the air quality control zone boundary in which a qualifying SFBA or fireplace is installed. If an application is approved for the program, the applicant will be given up to 90 days to meet all of the requirements. Applicants must have no delinquent property tax or penalty or interest owing at the time of application and at completion of the program requirements.

4. Additional Requirements. In addition to the general requirements set forth in this section, applicants must also meet the following requirements:

a. Fully comply with the inspection process required by the division that shall ensure that the existence of the qualifying appliance to be removed, replaced or repaired is properly documented.

b. Removal of appliance.

c. Delivery of appliance to an authorized decommission station.

d. Certificate of destruction delivered to the division, if applicable.

e. Final installation of a qualified appliance visually verified.

f. All aspects of this section may be performed by borough-approved personnel or a borough-approved vendor.

5. Payments. Applicants will be eligible for reimbursements or, at the option of the applicant, payment may be made directly to a borough-approved vendor. Reimbursements and payments shall be available as follows:

a. Replacement of a hydronic heater:

i. With either an EPA-certified wood or pellet stove with an emission rate less than or equal to two grams of PM_{2.5} per hour, or an EPA phase II certified pellet burning hydronic heater with an emission rate equal to or less than 0.1 pounds per million BTU, or an emergency power system, up to \$10,000 for purchase and installation [OF THE APPLIANCE].

ii. With an appliance designed to use home heating oil (excluding waste or used oil) or a masonry heater (including parts, labor and any costs associated with upgrading the chimney to the extent required by the manufacturer of the appliance for proper installation), up to \$12,000 for purchase and installation of the appliance.

iii. With an appliance designed to use natural gas, propane, hot water district heat, or electricity, up to \$14,000 for purchase and installation of the appliance.

b. Replacement of a non-borough-listed SFBA [OR FIREPLACE]:

i. With either an EPA-certified wood stove, or fireplace insert that has an emission rate less than or equal to two grams of PM_{2.5} per hour, or in the case of an EPA-certified wood stove, PM_{2.5} emissions must be reduced by 50 percent and emit two grams of PM_{2.5} per hour or less, up to \$4,000 for purchase and installation of the *appliance*.

ii. With an EPA certified pellet stove that has an emission rate less than or equal to two grams of PM_{2.5} per hour [APPLIANCE DESIGNED TO USE PELLETS], up to \$5,000 for purchase and installation of the *appliance*.

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iii. With an appliance designed to use home heating oil (excluding waste oil), hot water district heat, electricity, or a masonry heater (including parts, labor and any costs associated with upgrading the chimney to the extent required by the manufacturer of the appliance for proper installation), or an emergency power system, up to \$6,000 for the purchase and installation [OF THE APPLIANCE].

iv. With an appliance designed to use natural gas or propane, up to \$10,000 per purchase and installation of the appliance. Multiple non-borough-listed solid fuel burning appliances or fireplaces, or combinations thereof, may be replaced with a single heating device that meets the requirements above, except for those that are fired by solid fuels. Payment will be based on the number of devices removed, up to a maximum of three, and may not exceed the replacement cost.

c. Removal of a SFBA (limited to a one-time participation in this program per property).

i. Removal of a hydronic heater through a one-time payment of \$5,000.

ii. Removal of other SFBAs through a one-time payment of \$2,000.

[CASH PAYMENT
\$5,000 – IF REMOVING HYDRONIC HEATER
\$2,000 – IF REMOVING OTHER SFBAS]

d. Repair Program.

i. The repair program will pay for the:

(A) Replacement of a wood stove's catalytic converter that has exceeded its life span through the one-time payment of up to \$750.00.

(B) Replacement of any emissions-reducing component of an EPA-certified wood stove up to the maximum amount of \$750.00.

ii. In addition to the general requirements set forth in this section, applicants must fully comply with any inspection process required by the division, which may be performed by a borough-approved vendor.

Section 6. FNSBC 21.28.050, **Forecasting exceedances and restrictions in the air quality control zone during an alert**, shall be amended as follows:

A. During the winter months of October through March, the borough shall issue a daily PM_{2.5} forecast by 4:30 p.m. When the PM_{2.5} concentration reaches the onset level for an alert [EPISODE] and is expected to remain at that level for 12 hours or more, an alert [OR ADVISORY] will be declared. An alert [OR ADVISORY] may apply to the air quality control zone as a whole, or to one or more sub-areas designated by the division. Once an alert [OR ADVISORY] is declared, PM_{2.5} control measures set forth in this section shall be implemented and continued until the alert [OR ADVISORY] is cancelled. There are [THREE] two levels of [EPISODES] alerts: Stage 1[,] and Stage 2 [AND 3]. The obligations imposed in this subsection do not require, absent specific funding for that purpose, any actions to be taken outside of the borough's normal

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business days and hours of operation. These restrictions shall not apply during a power failure. When an alert is in effect, outdoor burning is prohibited, including nonpermitted incinerators and burn barrels. This outdoor burning prohibition does not include recreational fires such as bonfires, campfires, or ceremonial fires and the use of fire pits.

B. The division will notify local media to ensure the declared alert [OR ADVISORY] is broadcast. The division shall also use social media and methods of direct communication such as text messages as feasible. Information within the notification will contain the PM_{2.5} forecast, stage level for areas, and actions required to reduce sources of PM_{2.5}. The obligations imposed in this subsection do not require, absent specific funding for that purpose, any actions to be taken outside of the borough's normal business days and hours of operation.

C. Stage 1: [VOLUNTARY] Restrictions in the Air Quality Control Zone during an [ADVISORY] Alert.

[1. A STAGE 1 AIR ADVISORY IS IMPLEMENTED WHEN CONCENTRATIONS EXCEED OR ARE FORECASTED TO EXCEED 25 µG/M³.

2. RESIDENTS SHALL BE REQUESTED TO VOLUNTARILY STOP OPERATION OF SOLID FUEL, PELLET, AND WASTE OIL BURNING APPLIANCES, AS WELL AS MASONRY HEATERS AND ALL OUTDOOR BURNING THAT INCLUDES RECREATIONAL FIRES SUCH AS BONFIRES, CAMPFIRES AND THE USE OF FIRE PITS, NONPERMITTED INCINERATORS AND BURN BARRELS IN THE AIR QUALITY CONTROL ZONE.

D. STAGE 2: REQUIRED RESTRICTIONS IN THE AIR QUALITY CONTROL ZONE DURING AN ALERT.]

1. A Stage 1 [2] air alert is implemented when concentrations exceed or are forecasted to exceed 25 [35] µg/m³.

2. Burning is permitted in all EPA-certified solid fuel burning appliances, and EPA [PHASE II QUALIFIED] certified hydronic heaters, [WITH AN ANNUAL AVERAGE EMISSION RATING OF 2.5 GRAMS OR LESS] masonry heaters,[PELLET FUEL BURNING APPLIANCES,] and cook stoves[, AND FIREPLACES]. No fuel source may be added to the combustion[S] chamber or firebox of any solid fuel burning appliance or waste oil burning appliance not listed above. Residents should rely instead on their home's alternate, cleaner source of heat (such as a gas or fuel oil fired furnace or boiler or electric baseboard heaters) until the Stage 1 [2] air alert is cancelled.

3. If a building owner or other person with a property or managerial interest in the building has an approved "no other adequate source of heat" designation, the building owner is exempted from complying with the Stage 1 [2] air alert restrictions for that building.

[4. OUTDOOR BURNING IS PROHIBITED INCLUDING NONPERMITTED INCINERATORS AND BURN BARRELS. THIS DOES NOT INCLUDE

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RECREATIONAL FIRES SUCH AS BONFIRES, CAMPFIRE OR CEREMONIAL FIRES AND THE USE OF FIRE PITS.

5. THESE RESTRICTIONS SHALL NOT APPLY DURING A POWER FAILURE.]

D[E]. Stage 2 [3]: Required Restrictions in the Air Quality Control Zone during an Alert.

1. A Stage 2 [3] air alert is implemented when concentrations exceed or are forecasted to exceed 35[55] $\mu\text{G}/\text{M}^3$.

2. No fuel source may be added to the combustion[S] chamber or firebox of any solid fuel burning appliance[S, MASONRY HEATERS, PELLET FUEL BURNING APPLIANCES, COOK STOVES, FIREPLACES,] or waste oil burning appliance[S. NO WASTE OIL MAY BE ADDED TO A WASTE OIL BURNING APPLIANCE]. Residents should rely instead on their home's alternate, cleaner source of heat (such as a furnace, boiler or electric baseboard heaters) until the Stage 2 [3] air alert is cancelled.

3. If a building owner or other person with a property or managerial interest in the building has an approved "no other adequate source of heat" designation the building owner is exempted from complying with the Stage 2 [3] air alert restrictions for that building.

[4. OUTDOOR BURNING IS PROHIBITED INCLUDING NONPERMITTED INCINERATORS AND BURN BARRELS. THIS DOES NOT INCLUDE RECREATIONAL FIRES SUCH AS BONFIRES, CAMPFIRE OR CEREMONIAL FIRES AND THE USE OF FIRE PITS.

5. THESE RESTRICTIONS SHALL NOT APPLY DURING A POWER FAILURE. OR TO EPA-CERTIFIED SOLID FUEL BURNING APPLIANCES, EPA PHASE II QUALIFIED HYDRONIC HEATERS WITH AN ANNUAL AVERAGE EMISSION RATING OF 2.5 GRAMS OR LESS, MASONRY HEATERS OR PELLET FUEL BURNING APPLIANCES WHEN THE TEMPERATURE IS BELOW -15 FAHRENHEIT AS RECORDED AT THE FAIRBANKS INTERNATIONAL AIRPORT.]

Section 7. FNSBC 21.28.060, **No other adequate source of heat determination**, shall be amended as follows:

A. A building owner or other person with a property or managerial interest in a building located within the air quality control zone may obtain a "no other adequate source of heat" determination from the division if:

1. The SFBA being used to heat the structure is EPA certified, unless an application has been made to the Enhanced Voluntary Removal, Replacement and Repair Program (FNSBC 21.28.040) to remove or replace the non-certified SFBA and it has been denied, a pellet fuel burning appliance installed prior to April 1, 2017, a masonry heater, or a cook stove;

[1]2. The building owner(s) or other person with a property or managerial interest in the building applies with the division on a form developed by the division;

[2]3. The building owner(s) or other person with a property or managerial interest in the building files an affidavit with the application that the subject structure must be heated and the structure has no adequate heating source without using a solid

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fuel or waste oil burning appliance or that economic hardships require the applicant's use of a solid fuel or waste oil burning appliance or complying with a restriction would result in damage to property including damage to the appliance itself and its heating system components; and

[3]4. The building was constructed on or before December 31, 2016.

B. There shall be no fee for applying for or obtaining a determination.

C. It shall be a violation to submit a false affidavit for a "no other adequate source of heat" determination.

D. If the "no other adequate source of heat" appliance does not meet the standards set in this chapter, the division shall provide the applicant with information concerning the borough's voluntary removal, replacement and repair program.

E. Applications denied by the division may be appealed to the air pollution control commission within 30 days of the decision.

F. An applicant that has been denied a "no alternative source of heat determination" by the division because the appliance does not meet the criteria of this section may apply to the air pollution control commission for a variance within 10 days of this decision. A temporary "no alternative source of heat" determination shall be granted pending the decision of the commission. In determining whether to grant a variance, the commission shall consider the location of the appliance, impact on surrounding neighborhood, emission levels of the appliance, the financial investment and ability of the applicant to replace the appliance and any other relevant conditions that indicate the operation of the appliance at that location is not a nuisance or health-hazard. If the commission denies a variance, the "no alternative source of heat" determination shall expire 60 days from the date of denial.

Section 8. FNSBC 21.28.070, **Voluntary burn cessation program**, is repealed as follows:

[THE FAIRBANKS NORTH STAR BOROUGH WILL, TO THE EXTENT FUNDS ARE AVAILABLE AND APPROPRIATED BY THE ASSEMBLY, ESTABLISH A PROGRAM TO ENCOURAGE, INCENTIVIZE, AND FACILITATE THE VOLUNTARY CESSATION OF THE USE OF WOOD BURNING APPLIANCES (I.E., WOOD STOVES, WOOD-FIRED HYDRONIC HEATERS, WOOD-FIRED FURNACES, FIREPLACES, FIREPLACE INSERTS, MASONRY HEATERS OR PELLET FUEL BURNING APPLIANCES) IN THE AIR QUALITY CONTROL ZONE DURING AIR QUALITY ALERTS. IT IS RECOGNIZED THAT IT WILL BE DIFFICULT OR IMPOSSIBLE FOR SOME HOUSEHOLDS TO PARTICIPATE IN THIS PROGRAM (E.G., THOSE THAT HEAT SOLELY WITH WOOD OR FOR WHICH WOOD IS A NECESSARY SUPPLEMENT DURING PERIODS OF COLD WEATHER).

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THEREFORE, THIS PROGRAM IS INTENDED FOR HOUSEHOLDS THAT ARE ABLE TO USE SPACE HEATING ALTERNATIVES WITH SIGNIFICANTLY LOWER PM_{2.5} EMISSIONS, INCLUDING THOSE FUELED BY GAS, OIL, ELECTRICITY, PROPANE OR DISTRICT HEAT, BUT NOT WOOD OR PELLET STOVES OR OTHER WOOD BURNING APPLIANCES. THIS PROGRAM WILL AT A MINIMUM CONSIST OF THE FOLLOWING COMPONENTS:

A. THE BOROUGH MAY CONTRACT WITH AN AGENCY THAT WILL PROVIDE SERVICES TO PROMOTE THE PROGRAM. THIS AGENCY MUST HAVE THE STANDING, EXPERIENCE, AND CAPABILITY TO CARRY OUT A CAMPAIGN TO ADVERTISE, REACH OUT, AND ATTRACT A LARGE NUMBER OF PARTICIPANTS IN THE NONATTAINMENT AREA WHO ARE WILLING TO CEASE THE USE OF A WOOD BURNING APPLIANCE DURING AIR QUALITY ALERTS.

B. FACILITATION OF THIS PROGRAM BY THE BOROUGH WILL INCLUDE, BUT NOT BE LIMITED TO, THE PROVISION OF NOTICE OF AIR QUALITY ALERTS TO INDIVIDUAL HOUSEHOLDS BY METHODS SUCH AS ELECTRONIC MAIL MESSAGES, TEXT MESSAGES, AUTOMATED PHONE CALLS, NOTICES TO RADIO AND TELEVISION STATIONS, AND INFORMATION POSTED ON ELECTRONIC READER OR DISPLAY BOARDS LOCATED THROUGHOUT THE BOROUGH IN LOCATIONS BEST SUITED TO NOTIFY RESIDENTS OF AIR QUALITY ALERTS.

C. PRIVATE CONTRIBUTIONS, INCLUDING GOODS AND/OR SERVICES, WILL BE SOUGHT FOR ALL APPROPRIATE ELEMENTS OF THE PROGRAM. IN GENERAL THIS WILL FOCUS ON THE PROVISION OF MATERIALS, EQUIPMENT, AND CERTAIN ONE-TIME SERVICES, BUT NOT TO FUND BOROUGH STAFF POSITIONS.]

Section 9. FNSBC 1.20.080, **Fine Schedule**, is hereby amended as follows:

Code Section	Offense	Penalty/Fine	Mandatory Warning Required
[21.28.030(B)]	FAILURE TO DISCLOSE AN UNLISTED APPLIANCE BEFORE SALE	\$500.00	NO]
21.28.050[(D)](C)	Violation of a Stage [2]1 air alert restriction.	\$500	Yes
21.28.050[(E)](D)	Violation of a Stage [3]2 air alert restriction.	\$1,000	Yes

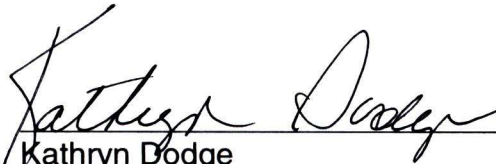
Section 10. Effective Date. This ordinance shall be effective thirty days following its adoption.

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PASSED AND APPROVED THIS 9TH DAY OF MARCH, 2017.


Kathryn Dodge
Presiding Officer

ATTEST:


Nanci Ashford-Bingham, MMC
Borough Clerk

Yeses: Cooper, Quist, Gray, Lawrence, Dodge, Davies

Noes: Roberts, Sattley

Other: Tacke (Excused)

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By: Karl Kassel, Mayor
Introduced: 05/18/2017
Advanced: 05/18/2017
Amended: 06/19/2017
Adopted: 06/19/2017
Immediate Reconsideration
Failed: 06/19/2017
Adopted: 06/19/2017

FAIRBANKS NORTH STAR BOROUGH

ORDINANCE NO. 2017-44

AN ORDINANCE AMENDING CHAPTER 21.28 FNSBC
REGARDING THE PM_{2.5} AIR QUALITY CONTROL PROGRAM, AMENDING
TITLE 4 REGARDING AIR POLLUTION CONTROL COMMISSION DUTIES,
AMENDING FNSBC 1.20.080, FINE SCHEDULE, AND AMENDING APPENDIX E—
USER FEE SCHEDULE/TRANSPORTATION OF ORDINANCE NO. 2017-20 (FY 2017-
18) TO ADD PERMIT APPLICATION FEES FOR SOLID FUEL BURNING
APPLIANCES IN NEW CONSTRUCTION

WHEREAS, The United States Environmental Protection Agency (EPA) in
December 2009, declared part of the Fairbanks North Star Borough (Borough) a non-
attainment area for fine particulate pollution (PM_{2.5}); and

WHEREAS, On December 16, 2016 the EPA published public notice in
the Federal Register of its intent to reclassify the Borough non-attainment area from
Moderate to Serious status, and the Final Rule was signed on April 28, 2017; and

WHEREAS, The serious non-attainment designation requires a new
serious State Implementation Plan (SIP) to be submitted to the EPA by December 31,
2017 which must include implementation of all Best Available Control Measures
(BACM); and

WHEREAS, The Borough should consider implementing some of the
control measures by June 2017 so goodwill for these control measures can be
recognized in the Serious SIP.

NOW, THEREFORE, BE IT ORDAINED by the Assembly of the Fairbanks
North Star Borough:

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Section 1. Sections 2, 3, 4, 5, 6, 7, and 8 of this ordinance are of a general and permanent nature and shall be codified. Sections 9 and 10 of this ordinance are not of a general and permanent nature and shall not be codified.

Section 2. FNSBC 21.28.010, Definitions, shall be amended as follows:
 "Air quality control zone" means the area of the borough currently contained in the EPA designated nonattainment area, which uses the nonattainment area southern, western and eastern boundaries as modified by their respective intersection with the following northern boundary described as: beginning at the intersection of Isberg Road with Chena Ridge Road on the western boundary of the EPA designated nonattainment area, then following Chena Ridge Road back to Chena Pump Road and continuing north on the Parks Highway to Sheep Creek Road, then Sheep Creek Road to Miller Hill Road, then north on Miller Hill Road, then east on Yankovich, then north from Yankovich Road along the east boundary of the Large Animal Research Station to a point just north of its intersection with Nottingham Drive and follows the ridge crest across Nottingham Estates to approximately the point where Swallow Drive intersects Dalton Trail to north on Dalton Trail to the crest of the Farmer's Loop Ridge, then follow the geographic crest of Farmer's Loop Ridge to its intersection with the New Steese Highway, then southeast on Bennett Road, and along Steele Creek Road to the intersection of Chena Hot Springs Road, and Chena Hot Springs Road to the eastern boundary of the EPA designated nonattainment area.

"Air quality index" (AQI) is an index for reporting daily air quality, which indicates how polluted the air currently is or how polluted it is forecast to become. The higher the AQI value, the greater the level of air pollution and the greater the health concern. AQI is divided into six categories with correspondingly higher levels of health concern as outlined in the table below:

AQI (Air Quality Index)	AQI Category	Cautionary Statement	Health Statement
0 – 50	Good	None	None
51 – 100	Moderate	Unusually sensitive people should consider reducing prolonged or heavy exertion.	None
101 – 150	Unhealthy for Sensitive Groups	People with respiratory or heart disease, the elderly, and children should limit prolonged exertion.	Increasing likelihood of respiratory symptoms in sensitive individuals, aggravation of heart or lung disease and premature mortality in persons with cardiopulmonary disease and

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AQI (Air Quality Index)	AQI Category	Cautionary Statement	Health Statement
			the elderly.
151 – 200	Unhealthy	People with respiratory or heart disease, the elderly, and children should avoid prolonged exertion; everyone else should limit prolonged exertion.	Increased aggravation of heart or lung disease and premature mortality in persons with cardiopulmonary disease and the elderly; increased respiratory effects in general population.
201 – 300	Very Unhealthy	People with respiratory or heart disease, the elderly, and children should avoid outdoor activity; everyone else should avoid prolonged exertion.	Significant aggravation of the heart or lung disease and premature mortality in persons with cardiopulmonary disease and the elderly; significant increase in respiratory effects in the general population.
301 – 500	Hazardous	Everyone should avoid any outdoor exertion; people with respiratory or heart disease, the elderly and children should remain indoors.	Significant aggravation of heart or lung disease and premature mortality in persons with cardiopulmonary disease and the elderly; significant increase in respiratory effects in the general population.

“Alert” means a notice issued by the division when the division determines, using available data or modeling, that PM_{2.5} concentration levels have reached or are forecasted to reach 25 µg/m³ or higher for at least 12 consecutive hours.

“Appliance” means a device or apparatus that is manufactured and designed to utilize energy and which does not require a stationary source air quality permit from the state of Alaska under 18 AAC 50.

“Clean wood” means natural wood that has not been painted, varnished, or coated with a similar material, has not been treated with preservatives, and does not contain resins or glues as in plywood or other composite wood products.

“Commence” means (i) begin, or cause to begin, actual on-site construction or (ii) enter into binding agreements or contractual obligations to begin construction, which cannot be cancelled or modified without substantial loss to the owner.

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88 “Construction and demolition debris” means a conglomeration of materials from
89 construction, repair, remodeling or demolition of buildings and structures containing any
90 prohibited fuels.

91
92 “Cook stove” means a wood burning appliance that is designed primarily for cooking
93 food and that has the following characteristics:

94 1. An oven, with a volume of 0.028 cubic meters (one cubic foot) or greater,
95 and an oven rack;

96 2. A device for measuring oven temperatures;

97 3. A flame path that is routed around the oven;

98 4. A shaker grate;

99 5. An ash pan;

100 6. An ash clean-out door below the oven; and

101 7. The absence of a fan or heat channels to dissipate heat from the device.

102
103 “Division” means the Fairbanks North Star Borough air quality division.

104
105 “Emergency power system” is an independent source of electrical power that supports
106 important electrical systems on loss of normal power supply. An emergency power
107 system may include a standby generator, batteries, and other apparatus. Emergency
108 power systems are installed to protect life and property from the consequences of loss
109 of normal electric power supply.

110
111 “EPA” means the United States Environmental Protection Agency.

112
113 “EPA certified” means that the solid fuel burning appliance meets emission performance
114 standards when tested by an accredited independent laboratory and is labeled
115 according to procedures specified by the EPA in 40 CFR Part 60 Subpart AAA or
116 QQQQ.

117
118 “Fireplace” means an assembly consisting of a hearth and open fire chamber of
119 noncombustible factory-built or masonry materials and provided with a chimney, for use
120 with solid fuels, which cannot be operated with an air to fuel ratio of less than 35 to one.

121
122 “Fireplace insert” means a solid fuel burning appliance similar in function and
123 performance to a freestanding wood burning stove, which is made from cast iron or
124 steel designed to be installed in an existing masonry or prefabricated fireplace.

125
126 “Forecast” means a description of the current dispersion conditions described as good,
127 fair, or poor and including the expected PM2.5 NowCast AQI categorized as good,
128 moderate, unhealthy for sensitive groups, unhealthy, very unhealthy, or hazardous.

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“Heating appliances” means, but is not limited to: wood, coal, or pellet fired hydronic heaters, stoves, and furnaces; oil or gas fired boilers and furnaces; and masonry heaters, pellet stoves, cook stoves, and fireplaces.

“Hydronic” means having to do with a system moving heat from one location to another by means of the circulation of a heat transfer liquid through piping or tubing.

“Hydronic heater” means a fuel burning appliance designed to (1) burn wood or other solid fuels and (2) heat building space and/or domestic hot water via the distribution, typically through pipes, of a fluid heated in the appliance.

“Masonry heater” means a wood burning appliance that complies with the guidelines of ASTM E1602-08, Standard Guide for Construction of Masonry Heaters, and:

1. Is designed and intended for operation only in a closed combustion chamber configuration; and

2. Has enough thermal storage capacity to maintain no less than 50.0 percent of the maximum masonry-mass temperature for at least four hours after the maximum masonry-mass temperature has been reached; and

3. The masonry heater design and installation has been confirmed and documented by a qualified person or entity approved by the borough.

“New Construction” means construction of entirely new structures designed for heated occupancy and any structural alteration that adds heated square footage to an existing structure whether or not the structure was previously occupied.

“Nonattainment area” is the area depicted on the map attached to the ordinance codified in this chapter and is further defined as follows:

Township Range Delineated Boundary for the Fairbanks
Nonattainment Area

MTRS F001N001 – All Sections, MTRS F001N001E – Sections 2-11, 14-23, 26-34, MTRS F001N002 – Sections 1-5, 8-17, 20-29, 32-36, MTRS F001S001E – Sections 1, 3-30, 32-36, MTRS F001S001W – Sections 1-30, MTRS F001S002E – Sections 6-8, 17-20, 29-36, MTRS F001S002W – Sections 1-5, 8-17, 20-29, 32-33, MTRS F001S003E – Sections 31-32, MTRS F002N001E – Sections 31-35, MTRS F002N001 – Sections 28, 31-36, MTRS F002N002 – Sections 32-33, 36, MTRS F002S001E – Sections 1-2, MTRS F002S002E – Sections 1-17, 21-24, MTRS F002S003E – Sections 5-8, 18.

“NowCast” means a weighted average of hourly air monitoring data used by the EPA for real-time reporting of the AQI for PM.

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“Opacity” means the reduction in transmitted light through a column of smoke as measured by an observer certified in using EPA Reference Method 9 as defined by federal law or EPA approved Alternative Method 82 which is defined as American Society for Testing and Materials (ASTM) D 7520-09.

“Particulate matter” or “PM” means total particulate matter including PM10 and PM2.5 (condensable and noncondensable fraction) and is a complex airborne mixture of extremely small particles and liquid droplets that are made up of a number of components, including acids, organic chemicals, metals, soil, or dust.

“Pellet fuel burning appliance” or “pellet stove” means a closed combustion, vented pellet burning appliance with automatic components creating an active air flow system, sold with the hopper and auger combination as integral parts, and designed, warranted, safety listed, and advertised by the manufacturer specifically to be fueled by pellets of sawdust, wood products and other biomass materials while prohibiting the use of cordwood.

“PM2.5” means particulate matter comprised of particles that have diameters of two and one-half microns or less.

“Proper Wood Storage” means specific and dedicated space to store clean wood in such a manner that the clean wood is not in contact with soil, the top of the clean wood is adequately protected from precipitation, and with airflow available to the clean wood.

“Sale” means the transfer of ownership or control.

“Solid fuel burning appliance” (SFBA) means any appliance designed to produce heat by burning nongaseous and nonliquid fuels. This definition includes, but is not limited to:

1. Wood stoves;
2. Coal stoves;
3. Wood-fired hydronic heaters;
4. Wood-fired furnaces;
5. Coal-fired hydronic heaters;
6. Coal-fired furnaces;
7. Fireplace inserts;
8. Pellet fuel burning appliances;
9. Masonry heaters;
10. Cook stoves; and
11. Fireplaces.

“Waste oil burning appliance” means an appliance that burns used or waste oil.

Section 3. FNSBC 21.28.030 **Prohibited acts**, shall be amended as follows:

AMENDMENTS ARE SHOWN IN LEGISLATIVE FORMAT

Text to be *added* is underlined

Text to be *deleted* is [BRACKETED, CAPITALIZED]

218
219 A. Installation of Certain Solid Fuel Burning Appliances in the Nonattainment Area.
220 Within the nonattainment area no person shall install or allow the installation of a solid
221 fuel burning appliance unless it is listed by the borough as qualifying under this chapter
222 and the installation complies with all other requirements imposed in this chapter. It is a
223 separate violation to fail to remove a solid fuel burning appliance installed in violation of
224 this chapter.

225
226 B. No person who has been convicted of or pled no contest to two or more
227 violations of this chapter involving visible emissions or emissions crossing property lines
228 shall, in the air quality control zone, operate, use or keep installed a hydronic heater
229 unless the hydronic heater is:

- 230 1. Borough listed or was listed at the time of installation,
231 2. A closed combustion system with automatic components that feed solid
232 fuel, including wood pellets, into a firebox where the combustion is enhanced by an
233 active airflow system, or
234 3. Connected to a thermal mass system that is certified by the contractor or
235 installer as sufficient to allow the hydronic heater to burn at maximum capacity
236 minimizing on/off cycling. The division may require an owner to provide documentation
237 supporting the certification.

238
239 This prohibition shall be effective 90 days after the second conviction or entry of a no
240 contest plea.

241
242 C. Visible Emissions Standard in the Air Quality Control Zone.

243 1. Standard. No person shall cause, permit, or allow particulate emissions
244 from a nonmobile source in the air quality control zone to create opacity greater than 20
245 percent for a period or periods aggregating more than 10 minutes in any hour except
246 during the first 40 minutes after the initial firing when the opacity limit shall be less than
247 50 percent.

248 2. Procedures and Enforcement. When ambient weather and light conditions
249 permit, methods and procedures specified by the EPA in 40 CFR 60 Appendix A
250 Reference Method 9 (Visual determination of the Opacity of Emissions From Stationary
251 Sources), or an alternative technology that replaces Method 9, when the technology is
252 available and the choice is feasible, upon request of the person being investigated, shall
253 be used to determine compliance with this section. Smoke visible from a chimney, flue
254 or exhaust duct in excess of the opacity standard for a period in excess of 30 minutes
255 shall constitute prima facie evidence of unlawful operation of an applicable solid fuel
256 burning appliance.

257
258 D. PM_{2.5} Emissions Crossing Property Lines. No person shall cause or permit
259 particulate emissions from a nonmobile source to impact the resident(s) of a
260 neighboring property through the creation of an emissions plume that:

- 261 1. Crosses a property line;

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262 2. Is observable using EPA Method 22 (40 CFR 60 Appendix A); and
263 3. Is 25 $\mu\text{g}/\text{m}^3$ greater than the surrounding immediate vicinity background
264 $\text{PM}_{2.5}$ level using methods defined by the borough division of air quality. For purposes of
265 this subsection, the surrounding "immediate vicinity" means land within an area
266 measured 1,200 feet in all directions from the boundaries of the emitting property.
267

268 E. Requirements for Installation of Solid Fuel Burning Appliances in New
269 Construction.

270 1. For all new construction that commences on or after January 1, 2018 and
271 is located within the air quality control zone the following will apply:

272 a. Installation of a solid fuel burning appliance is prohibited unless a
273 permit has been issued by the division. A permit must be obtained for any solid
274 fuel burning appliance installed in new construction prior to installation of the
275 appliance.

276 b. Application. The permit application will require the owner(s) to
277 certify they will meet the following requirements:

278 i. The proposed solid fuel burning appliance meets all federal,
279 state, and borough air quality regulations;

280 ii. The proposed solid fuel burning appliance meets the
281 requirements of this chapter;

282 iii. The proposed solid fuel burning appliance is properly sized
283 for the structure in the opinion of a Borough listed vendor/installer;

284 iv. The proposed solid fuel burning appliance will be installed by
285 a Borough listed vendor/installer attesting to proper installation of the
286 device based on the manufacturer's installation manual;

287 v. Proper wood storage will be available; and

288 vi. Training will be provided to the occupants on proper wood
289 burning techniques.

290 c. Permit. An installation permit will be issued upon receipt of an
291 application meeting the requirements of subsection (b) and payment of any
292 required fee. Within 24 months of issuance, the owner must verify with
293 supporting documentation that the requirements of subsection (b) have been
294 completed, upon which an operating permit will be issued. If verification has not
295 been submitted or approved within 24 months the permit application will
296 automatically expire.

297 d. After a public hearing, and prior to installation of the solid fuel
298 burning appliance, the air pollution control commission may grant a variance, the
299 commission shall consider any alternate proposal that the applicant submits, the
300 location of the appliance, impact on surrounding neighborhood of the requested
301 variance, emission levels of the appliance, and any other relevant conditions that
302 indicate the operation of the appliance at that location or the requirement that is
303 being varied will not result in a nuisance or health-hazard.

304
305 E[E]. Borough-Wide Installation Requirements for Hydronic Heaters.

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306 1. Setback. Unless permitted by a variance, or if replacing an existing
307 hydronic heater with a listed appliance, no person shall install or allow the installation of
308 a hydronic heater located less than:

- 309 a. Three hundred thirty feet from the closest property line; or
310 b. Six hundred sixty feet from a school, clinic, hospital, or senior
311 housing unit.

312 2. Any hydronic heater installed in violation of this section shall be
313 immediately remedied or made inoperable and removed as soon as practicable;
314 however, in no case shall the time of removal be longer than 180 days after notice from
315 the division of a violation.

316 3. Variance. After a public hearing, the commission shall determine whether
317 a person may receive a variance from the installation requirements of this subsection
318 allowing them to install a hydronic heater. In determining whether to grant the variance,
319 the commission shall consider the proposed location of the appliance, impact on
320 surrounding neighborhood, emission levels of the appliance, terrain, meteorological
321 conditions, and other relevant conditions that may render the operation of the appliance
322 at that location a nuisance or a health hazard.
323

324 G[F]. Prohibited Fuels. No person shall burn in the borough any fuel, except coal in an
325 appliance designed to use coal, which is not listed in the manufacturer's owner's
326 manual as an acceptable fuel for that device or any of the following items in a solid fuel
327 burning appliance:

328 1. Any wood that does not meet the definition of clean wood or has more
329 than 20 percent moisture content;

- 330 2. Garbage;
331 3. Tires;
332 4. Materials containing plastic or rubber;
333 5. Waste petroleum products;
334 6. Paints and paint thinners;
335 7. Chemicals;
336 8. Glossy or colored papers;
337 9. Construction and demolition debris;
338 10. Plywood;
339 11. Particleboard;
340 12. Saltwater driftwood;
341 13. Manure;
342 14. Animal carcasses;
343 15. Asphalt products;
344 16. Flooring products.
345

346 H[G]. Sales or Leasing of Solid Fuel Burning Appliances.

347 1. No person shall sell or lease an unlisted solid fuel burning appliance or
348 barrel stove kit in the borough unless the buyer signs an affidavit, on a form prescribed
349 by the borough, attesting that the appliance will not be installed or used in the air quality

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control zone. This section does not apply to appliances or stoves that transfer pursuant to a sale of property;

2. No person shall commercially sell or offer for sale or lease a solid fuel burning appliance in the borough unless the commercial seller or dealer provides the prospective buyer or lessee, prior to any sales or lease agreement, with a written notice, prepared or approved by the division, that includes, but is not limited to, the following:

a. The fuel restrictions imposed in this chapter;

b. Proper installation, property location, operation, and maintenance of the appliance;

c. An advisory statement noting that operation of solid fuel burning appliances may not be appropriate in some areas due to terrain, meteorological conditions, or other relevant conditions that render the operation of the appliance a public nuisance or health hazard even though it is otherwise legally installed and operated;

3. The written notice required in this section shall be signed and dated by the prospective buyer or lessee prior to purchase or lease to indicate receipt of the notification requirements of this section;

4. The commercial dealer or seller shall mail or otherwise provide a copy of the notice and any required affidavit to the division within 30 days of the sale. All commercial dealers or sellers shall also include with the notice documentation showing whether the appliance sold or leased meets the borough's emissions standard.

J[H]. Nuisance. No person within the Fairbanks North Star Borough shall cause or allow particulate emissions from a nonmobile source that are injurious to human life or to property or that unreasonably interfere with the comfortable enjoyment of life or property. No person within the Fairbanks North Star Borough shall operate a solid fuel or waste oil burning appliance in a manner so as to create a public or private nuisance. A violation of a provision of this chapter is hereby declared to be a nuisance.

J[I]. Other Laws. Nothing in this section precludes other local jurisdictions from having more restrictive codes.

K[J]. Penalties. Upon first conviction of an offense in this chapter, the penalty(ies)/fine(s) set forth in FNSBC Title 1 regarding violations of the PM2.5 air quality control program may be satisfied by completion within 60 days of a borough-approved class covering PM2.5 health concerns, nonattainment, importance of dry wood and proper operation of solid fuel burning appliances. The borough may on its own initiative file notice of satisfaction of attendance requirements with the court, or the defendant may file a certificate of completion with the court within the applicable time frame.

Section 4. 21.28.040 **Enhanced voluntary removal, replacement and repair program**, shall be amended as follows:

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The Fairbanks North Star Borough shall, to the extent funds are available and appropriated by the assembly, offer an enhanced removal, replacement and repair program to help offset the costs of removing, replacing or repairing a solid fuel burning appliance (SFBA) or fireplace. This program shall be subject to the following eligibility requirements, conditions, and criteria:

A. General Requirements.

1. Application. An application approved by the division and signed by all property owner(s) must be submitted along with any documentation required by the division. Applications for either the removal of a solid fuel burning appliance (SFBA), or replacement of a SFBA with an emergency power system, or an appliance designed to use natural gas, propane, or home heating oil shall include a signed recordable document restricting future installations of SFBAs and requiring appropriate notice to purchasers in the seller's disclosure statement. Applicants must fully comply with the division's inspection process which shall verify the existence of a qualifying SFBA.

2. Priority Ranking. Applications may be prioritized and may be limited by the division in its discretion based on geographical location, the overall air quality benefit and the type of SFBA or fireplace being removed, replaced or repaired.

3. Eligibility. The program is limited to properties within the air quality control zone boundary in which a qualifying SFBA or fireplace is installed. If an application is approved for the program, the applicant will be given up to 90 days to meet all of the requirements. Applicants must have no delinquent property tax or penalty or interest owing at the time of application and at completion of the program requirements.

4. Additional Requirements. In addition to the general requirements set forth in this section, applicants must also meet the following requirements:

a. Fully comply with the inspection process required by the division that shall ensure that the existence of the qualifying appliance to be removed, replaced or repaired is properly documented.

b. Removal of appliance.

c. Delivery of appliance to an authorized decommission station.

d. Certificate of destruction delivered to the division, if applicable.

e. Final installation of a qualified appliance visually verified.

f. The qualified appliance must be properly installed by a Borough listed vendor/installer attesting to proper installation of the device based on manufacturer's installation manual, compliance with any building code requirements, and that the device is properly sized for the building in question.

g. The applicant will be required to demonstrate proper wood storage.

h. The applicant will be required to complete training with the vendor, ensuring that they understand how their particular device operates, including education on proper wood burning techniques.

i.[F] All aspects of this section may be performed by borough-approved personnel or a borough-approved vendor.

AMENDMENTS ARE SHOWN IN LEGISLATIVE FORMAT

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435 5. Payments. Applicants will be eligible for reimbursements or, at the option
436 of the applicant, payment may be made directly to a borough-approved vendor.
437 Reimbursements and payments shall be available as follows:

438 a. Replacement of a hydronic heater:

439 i. With either an EPA certified wood or pellet stove with an
440 emission rate less than or equal to two grams of PM2.5 per hour, or an
441 EPA phase II certified pellet burning hydronic heater with an emission rate
442 equal to or less than 0.1 pounds per million BTU, or an emergency power
443 system, up to \$10,000 for purchase and installation.

444 ii. With an appliance designed to use home heating oil
445 (excluding waste or used oil) or a masonry heater (including parts, labor
446 and any costs associated with upgrading the chimney to the extent
447 required by the manufacturer of the appliance for proper installation), up to
448 \$12,000 for purchase and installation of the appliance.

449 iii. With an appliance designed to use natural gas, propane, hot
450 water district heat, or electricity, up to \$14,000 for purchase and
451 installation of the appliance.

452 b. Replacement of a non-borough-listed SFBA:

453 i. With either an EPA certified wood stove, or fireplace insert
454 that has an emission rate less than or equal to two grams of PM2.5 per
455 hour, or in the case of an EPA certified wood stove, PM2.5 emissions
456 must be reduced by 50 percent and emit two grams of PM2.5 per hour or
457 less, up to \$4,000 for purchase and installation of the appliance.

458 ii. With an EPA certified pellet stove that has an emission rate
459 less than or equal to two grams of PM2.5 per hour, up to \$5,000 for
460 purchase and installation of the appliance.

461 iii. With an appliance designed to use home heating oil
462 (excluding waste oil), hot water district heat, electricity, or a masonry
463 heater (including parts, labor and any costs associated with upgrading the
464 chimney to the extent required by the manufacturer of the appliance for
465 proper installation), or an emergency power system, up to \$6,000 for the
466 purchase and installation.

467 iv. With an appliance designed to use natural gas or propane,
468 up to \$10,000 per purchase and installation of the appliance. Multiple non-
469 borough-listed solid fuel burning appliances or fireplaces, or combinations
470 thereof, may be replaced with a single heating device that meets the
471 requirements above, except for those that are fired by solid fuels. Payment
472 will be based on the number of devices removed, up to a maximum of
473 three, and may not exceed the replacement cost.

474 c. Removal of a SFBA (limited to a one-time participation in this
475 program per property).

476 i. Removal of a hydronic heater through a one-time payment of
477 \$5,000.

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- 478 ii. Removal of other SFBAs through a one-time payment of
479 \$2,000.
480 d. Repair Program.
481 i. The repair program will pay for the:
482 (A) Replacement of a wood stove's catalytic converter that
483 has exceeded its life span through the one-time payment of up to
484 \$750.00.
485 (B) Replacement of any emissions-reducing component of
486 an EPA certified wood stove up to the maximum amount of \$750.00.
487 ii. In addition to the general requirements set forth in this
488 section, applicants must fully comply with any inspection process required
489 by the division, which may be performed by a borough-approved vendor.
490

491 Section 5. FNSBC 21.28.050, **Forecasting exceedances and**
492 **restrictions in the air quality control zone during an alert**, shall be amended as
493 follows:
494

495 A. During the winter months of October through March, the borough shall issue a
496 daily PM2.5 forecast by 4:30 p.m. When the PM2.5 concentration reaches the onset
497 level for an alert and is expected to remain at that level for 12 hours or more, an alert
498 will be declared. An alert may apply to the air quality control zone as a whole, or to one
499 or more sub-areas designated by the division. Once an alert is declared, PM2.5 control
500 measures set forth in this section shall be implemented and continued until the alert is
501 cancelled. There are two levels of alerts: Stage 1 and Stage 2. The obligations imposed
502 in this subsection do not require, absent specific funding for that purpose, any actions to
503 be taken outside of the borough's normal business days and hours of operation. These
504 restrictions shall not apply during a power failure. When an alert is in effect, outdoor
505 burning is prohibited, including nonpermitted incinerators and burn barrels. This outdoor
506 burning prohibition does not include recreational fires such as bonfires, campfires, or
507 ceremonial fires and the use of fire pits.
508

509 B. The division will notify local media to ensure the declared alert is broadcast. The
510 division shall also use social media and methods of direct communication such as text
511 messages as feasible. Information within the notification will contain the PM2.5 forecast,
512 stage level for areas, and actions required to reduce sources of PM2.5. The obligations
513 imposed in this subsection do not require, absent specific funding for that purpose, any
514 actions to be taken outside of the borough's normal business days and hours of
515 operation.
516

517 C. Stage 1: Restrictions in the Air Quality Control Zone during an Alert.

518 1. A Stage 1 air alert is implemented when concentrations exceed or are
519 forecasted to exceed 25 $\mu\text{g}/\text{m}^3$.

520 2. No fuel source may be added to the combustion chamber of a firebox of
521 any solid fuel burning appliance or waste oil burning appliance. Residents should rely

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522 instead on their home's alternate, cleaner source of heat (such as a furnace, boiler or
523 electric baseboard heaters) until the Stage 1 air alert is cancelled.[BURNING IS
524 PERMITTED IN ALL EPA CERTIFIED SOLID FUEL BURNING APPLIANCES, AND
525 EPA CERTIFIED HYDRONIC HEATERS, MASONRY HEATERS, AND COOK
526 STOVES. NO FUEL SOURCE MAY BE ADDED TO THE COMBUSTION CHAMBER
527 OR FIREBOX OF ANY SOLID FUEL BURNING APPLIANCE OR WASTE OIL
528 BURNING APPLIANCE NOT LISTED ABOVE. RESIDENTS SHOULD RELY INSTEAD
529 ON THEIR HOME'S ALTERNATE, CLEANER SOURCE OF HEAT (SUCH AS A GAS
530 OR FUEL OIL FIRED FURNACE OR BOILER OR ELECTRIC BASEBOARD
531 HEATERS) UNTIL THE STAGE 1 AIR ALERT IS CANCELLED.]

532 3. If a building owner or other person with a property or managerial interest
533 in the building has an approved "no other adequate source of heat" designation, the
534 building owner is exempted from complying with the Stage 1 air alert restrictions for that
535 building.

536 4. If a building owner or other person with a property or managerial interest
537 in the building has an approved Stage 1 Waiver the building owner is exempted from
538 complying with the Stage 1 air alert restrictions for that building. A Stage 1 Waiver will
539 be granted if the person with property or managerial interest verifies that the SFBA
540 being operated during a Stage 1 air alert is a Borough listed appliance. A Stage 1
541 Waiver may be obtained by completing an application on a form developed by the
542 division, that includes the following information:

543 a. Documentation of approved appliance must be submitted, including
544 pictures, make and model.

545 b. Documentation of the applicant's ability to properly store wood.

546 c. Documentation the applicant has taken a class or training in proper wood
547 burning techniques.

548
549 D. Stage 2: Required Restrictions in the Air Quality Control Zone during an Alert.

550 1. A Stage 2 air alert is implemented when concentrations exceed or are
551 forecasted to exceed 35 $\mu\text{g}/\text{m}^3$.

552 2. No fuel source may be added to the combustion chamber or firebox of
553 any solid fuel burning appliance or waste oil burning appliance. Residents should rely
554 instead on their home's alternate, cleaner source of heat (such as a furnace, boiler or
555 electric baseboard heaters) until the Stage 2 air alert is cancelled.

556 3. If a building owner or other person with a property or managerial interest
557 in the building has an approved "no other adequate source of heat" designation the
558 building owner is exempted from complying with the Stage 2 air alert restrictions for that
559 building.

560
561 Section 6. FNSBC 21.28.060 **No other adequate source of heat**
562 **determination**, shall be amended as follows:
563

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A. A building owner or other person with a property or managerial interest in a building located within the air quality control zone may obtain a “no other adequate source of heat” determination from the division if:

1. The SFBA being used to heat the structure is a Borough listed appliance;[EPA CERTIFIED UNLESS AN APPLICATION HAS BEEN MADE TO THE ENHANCED VOLUNTARY REMOVAL, REPLACEMENT AND REPAIR PROGRAM TO REMOVE OR REPLACE THE NONCERTIFIED SFBA AND HAS BEEN DENIED, A PELLET FUEL BURNING APPLIANCE INSTALLED PRIOR TO APRIL 1, 2017, A MASONRY HEATER, OR A COOK STOVE.]

a.

2. The building owner(s) or other person with a property or managerial interest in the building applies with the division on a form developed by the division, including the following:

a. Documentation of approved appliance must be submitted, including pictures, make, model, and serial number.

b. Documentation of the applicant's ability to properly store wood.

c. Documentation the applicant has taken a class or training in proper wood burning techniques;

3. The building owner(s) or other person with a property or managerial interest in the building files an affidavit with the application that the subject structure must be heated and the structure has no adequate heating source without using a solid fuel [OR WASTE OIL] burning appliance or that economic hardships require the applicant's use of a solid fuel [OR WASTE OIL] burning appliance or complying with a restriction would result in damage to property including damage to the appliance itself and its heating system components. If economic hardship is the reason the applicant has no other adequate source of heat, validating documentation is required. Validating documentation may be established by showing approval for assistance from a list of agencies or programs that provide economic assistance (e.g., programs based on HHS poverty guidelines, unemployment insurance, nutrition assistance) to be made available by the division;

4. The building was constructed on or before December 31, 2016.

B. There shall be no fee for applying for or obtaining a determination.

C. It shall be a violation to submit a false affidavit for a “no other adequate source of heat” determination.

D. If the “no other adequate source of heat” appliance does not meet the standards set in this chapter, the division shall provide the applicant with information concerning the borough's voluntary removal, replacement and repair program.

E. Applications denied by the division may be appealed to the air pollution control commission within 30 days of the decision.

AMENDMENTS ARE SHOWN IN LEGISLATIVE FORMAT

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F. An applicant that has been denied a “no alternative source of heat determination” by the division because the appliance does not meet the criteria of this section may apply to the air pollution control commission for a variance within 10 days of this decision. A temporary “no alternative source of heat” determination shall be granted pending the decision of the commission. In determining whether to grant a variance, the commission shall consider the location of the appliance, impact on surrounding neighborhood, emission levels of the appliance, the financial investment and ability of the applicant to replace the appliance and any other relevant conditions that indicate the operation of the appliance at that location is not a nuisance or health hazard. If the commission denies a variance, the “no alternative source of heat” determination shall expire 60 days from the date of denial.

Section 7. FNSBC 1.20.080, **Fine Schedule**, is hereby amended as follows:

21.28.030(E)	Failure to obtain, submit and execute a permit for installing a SFBA in new construction.	\$1,000	No
21.28.030(F[E])	Illegal installation of hydronic heaters.	\$500.00	No
21.28.030(F[E])	Failure to remove hydronic heaters.	\$500.00	No
21.28.030(G[F])	Use of prohibited fuels. 1st offense	\$100.00	Yes
21.28.030(G[F])	Use of prohibited fuels. 2nd offense	\$500.00	No
21.28.030(H[G])	Violation of commercial sale requirements.	\$500.00	No

Section 8. Subsection G of FNSBC 4.12.110 shall be amended as follows:

G. The commission shall hear variance requests as set forth in FNSBC Title 21. [AFTER A PUBLIC HEARING, THE COMMISSION SHALL DETERMINE WHETHER A PERSON MAY RECEIVE A VARIANCE FROM THE INSTALLATION REQUIREMENTS OF FNSBC 21.28.030(E) ALLOWING THEM TO INSTALL A HYDRONIC HEATER. IN DETERMINING WHETHER TO GRANT THE VARIANCE, THE COMMISSION SHALL CONSIDER THE PROPOSED LOCATION OF THE APPLIANCE, IMPACT ON SURROUNDING NEIGHBORHOOD, EMISSION LEVELS OF THE APPLIANCE, TERRAIN, METEOROLOGICAL CONDITIONS, AND OTHER RELEVANT CONDITIONS THAT MAY RENDER THE OPERATION OF THE APPLIANCE AT THAT LOCATION A NUISANCE OR A HEALTH HAZARD.]

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Section 9. Appendix E- User Fee Schedule of the FY 2017-18 budget is hereby amended to add the following to the Transportation User Fee Schedule:

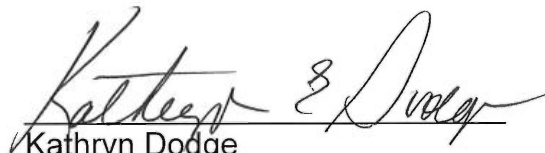
Air Quality

Permit application fee for SFBA in new construction \$375.00

Section 10. Effective Date. This ordinance shall be effective at 5:00 p.m. of the first Borough business day following its adoption.

PASSED AND APPROVED THIS 19th DAY OF JUNE, 2017.




Kathryn Dodge
Presiding Officer

ATTEST:


Nanci Ashford-Bingham, MMC
Borough Clerk

Yeses: Tacke, Davies, Cooper, Quist, Gray, Lawrence, Dodge
Noes: Roberts, Sattley

AMENDMENTS ARE SHOWN IN LEGISLATIVE FORMAT
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Text to be *deleted* is [BRACKETED, CAPITALIZED]

By: Karl Kassel, Mayor
Introduced: 05/18/2017
Advanced: 05/18/2017
Amended: 06/19/2017
Adopted: 06/19/2017
Immediate Reconsideration
Failed: 06/19/2017
Adopted: 06/19/2017

FAIRBANKS NORTH STAR BOROUGH

ORDINANCE NO. 2017-44

AN ORDINANCE AMENDING CHAPTER 21.28 FNSBC
REGARDING THE PM_{2.5} AIR QUALITY CONTROL PROGRAM, AMENDING
TITLE 4 REGARDING AIR POLLUTION CONTROL COMMISSION DUTIES,
AMENDING FNSBC 1.20.080, FINE SCHEDULE, AND AMENDING APPENDIX E—
USER FEE SCHEDULE/TRANSPORTATION OF ORDINANCE NO. 2017-20 (FY 2017-
18) TO ADD PERMIT APPLICATION FEES FOR SOLID FUEL BURNING
APPLIANCES IN NEW CONSTRUCTION

WHEREAS, The United States Environmental Protection Agency (EPA) in
December 2009, declared part of the Fairbanks North Star Borough (Borough) a non-
attainment area for fine particulate pollution (PM_{2.5}); and

WHEREAS, On December 16, 2016 the EPA published public notice in
the Federal Register of its intent to reclassify the Borough non-attainment area from
Moderate to Serious status, and the Final Rule was signed on April 28, 2017; and

WHEREAS, The serious non-attainment designation requires a new
serious State Implementation Plan (SIP) to be submitted to the EPA by December 31,
2017 which must include implementation of all Best Available Control Measures
(BACM); and

WHEREAS, The Borough should consider implementing some of the
control measures by June 2017 so goodwill for these control measures can be
recognized in the Serious SIP.

NOW, THEREFORE, BE IT ORDAINED by the Assembly of the Fairbanks
North Star Borough:

AMENDMENTS ARE SHOWN IN LEGISLATIVE FORMAT

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Section 1. Sections 2, 3, 4, 5, 6, 7, and 8 of this ordinance are of a general and permanent nature and shall be codified. Sections 9 and 10 of this ordinance are not of a general and permanent nature and shall not be codified.

Section 2. FNSBC 21.28.010, Definitions, shall be amended as follows:
 "Air quality control zone" means the area of the borough currently contained in the EPA designated nonattainment area, which uses the nonattainment area southern, western and eastern boundaries as modified by their respective intersection with the following northern boundary described as: beginning at the intersection of Isberg Road with Chena Ridge Road on the western boundary of the EPA designated nonattainment area, then following Chena Ridge Road back to Chena Pump Road and continuing north on the Parks Highway to Sheep Creek Road, then Sheep Creek Road to Miller Hill Road, then north on Miller Hill Road, then east on Yankovich, then north from Yankovich Road along the east boundary of the Large Animal Research Station to a point just north of its intersection with Nottingham Drive and follows the ridge crest across Nottingham Estates to approximately the point where Swallow Drive intersects Dalton Trail to north on Dalton Trail to the crest of the Farmer's Loop Ridge, then follow the geographic crest of Farmer's Loop Ridge to its intersection with the New Steese Highway, then southeast on Bennett Road, and along Steele Creek Road to the intersection of Chena Hot Springs Road, and Chena Hot Springs Road to the eastern boundary of the EPA designated nonattainment area.

"Air quality index" (AQI) is an index for reporting daily air quality, which indicates how polluted the air currently is or how polluted it is forecast to become. The higher the AQI value, the greater the level of air pollution and the greater the health concern. AQI is divided into six categories with correspondingly higher levels of health concern as outlined in the table below:

AQI (Air Quality Index)	AQI Category	Cautionary Statement	Health Statement
0 – 50	Good	None	None
51 – 100	Moderate	Unusually sensitive people should consider reducing prolonged or heavy exertion.	None
101 – 150	Unhealthy for Sensitive Groups	People with respiratory or heart disease, the elderly, and children should limit prolonged exertion.	Increasing likelihood of respiratory symptoms in sensitive individuals, aggravation of heart or lung disease and premature mortality in persons with cardiopulmonary disease and

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AQI (Air Quality Index)	AQI Category	Cautionary Statement	Health Statement
			the elderly.
151 – 200	Unhealthy	People with respiratory or heart disease, the elderly, and children should avoid prolonged exertion; everyone else should limit prolonged exertion.	Increased aggravation of heart or lung disease and premature mortality in persons with cardiopulmonary disease and the elderly; increased respiratory effects in general population.
201 – 300	Very Unhealthy	People with respiratory or heart disease, the elderly, and children should avoid outdoor activity; everyone else should avoid prolonged exertion.	Significant aggravation of the heart or lung disease and premature mortality in persons with cardiopulmonary disease and the elderly; significant increase in respiratory effects in the general population.
301 – 500	Hazardous	Everyone should avoid any outdoor exertion; people with respiratory or heart disease, the elderly and children should remain indoors.	Significant aggravation of heart or lung disease and premature mortality in persons with cardiopulmonary disease and the elderly; significant increase in respiratory effects in the general population.

“Alert” means a notice issued by the division when the division determines, using available data or modeling, that PM_{2.5} concentration levels have reached or are forecasted to reach 25 µg/m³ or higher for at least 12 consecutive hours.

“Appliance” means a device or apparatus that is manufactured and designed to utilize energy and which does not require a stationary source air quality permit from the state of Alaska under 18 AAC 50.

“Clean wood” means natural wood that has not been painted, varnished, or coated with a similar material, has not been treated with preservatives, and does not contain resins or glues as in plywood or other composite wood products.

“Commence” means (i) begin, or cause to begin, actual on-site construction or (ii) enter into binding agreements or contractual obligations to begin construction, which cannot be cancelled or modified without substantial loss to the owner.

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88 "Construction and demolition debris" means a conglomeration of materials from
89 construction, repair, remodeling or demolition of buildings and structures containing any
90 prohibited fuels.

91
92 "Cook stove" means a wood burning appliance that is designed primarily for cooking
93 food and that has the following characteristics:

94 1. An oven, with a volume of 0.028 cubic meters (one cubic foot) or greater,
95 and an oven rack;

96 2. A device for measuring oven temperatures;

97 3. A flame path that is routed around the oven;

98 4. A shaker grate;

99 5. An ash pan;

100 6. An ash clean-out door below the oven; and

101 7. The absence of a fan or heat channels to dissipate heat from the device.

102
103 "Division" means the Fairbanks North Star Borough air quality division.

104
105 "Emergency power system" is an independent source of electrical power that supports
106 important electrical systems on loss of normal power supply. An emergency power
107 system may include a standby generator, batteries, and other apparatus. Emergency
108 power systems are installed to protect life and property from the consequences of loss
109 of normal electric power supply.

110
111 "EPA" means the United States Environmental Protection Agency.

112
113 "EPA certified" means that the solid fuel burning appliance meets emission performance
114 standards when tested by an accredited independent laboratory and is labeled
115 according to procedures specified by the EPA in 40 CFR Part 60 Subpart AAA or
116 QQQQ.

117
118 "Fireplace" means an assembly consisting of a hearth and open fire chamber of
119 noncombustible factory-built or masonry materials and provided with a chimney, for use
120 with solid fuels, which cannot be operated with an air to fuel ratio of less than 35 to one.

121
122 "Fireplace insert" means a solid fuel burning appliance similar in function and
123 performance to a freestanding wood burning stove, which is made from cast iron or
124 steel designed to be installed in an existing masonry or prefabricated fireplace.

125
126 "Forecast" means a description of the current dispersion conditions described as good,
127 fair, or poor and including the expected PM2.5 NowCast AQI categorized as good,
128 moderate, unhealthy for sensitive groups, unhealthy, very unhealthy, or hazardous.

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“Heating appliances” means, but is not limited to: wood, coal, or pellet fired hydronic heaters, stoves, and furnaces; oil or gas fired boilers and furnaces; and masonry heaters, pellet stoves, cook stoves, and fireplaces.

“Hydronic” means having to do with a system moving heat from one location to another by means of the circulation of a heat transfer liquid through piping or tubing.

“Hydronic heater” means a fuel burning appliance designed to (1) burn wood or other solid fuels and (2) heat building space and/or domestic hot water via the distribution, typically through pipes, of a fluid heated in the appliance.

“Masonry heater” means a wood burning appliance that complies with the guidelines of ASTM E1602-08, Standard Guide for Construction of Masonry Heaters, and:

1. Is designed and intended for operation only in a closed combustion chamber configuration; and

2. Has enough thermal storage capacity to maintain no less than 50.0 percent of the maximum masonry-mass temperature for at least four hours after the maximum masonry-mass temperature has been reached; and

3. The masonry heater design and installation has been confirmed and documented by a qualified person or entity approved by the borough.

“New Construction” means construction of entirely new structures designed for heated occupancy and any structural alteration that adds heated square footage to an existing structure whether or not the structure was previously occupied.

“Nonattainment area” is the area depicted on the map attached to the ordinance codified in this chapter and is further defined as follows:

Township Range Delineated Boundary for the Fairbanks
Nonattainment Area

MTRS F001N001 – All Sections, MTRS F001N001E – Sections 2-11, 14-23, 26-34, MTRS F001N002 – Sections 1-5, 8-17, 20-29, 32-36, MTRS F001S001E – Sections 1, 3-30, 32-36, MTRS F001S001W – Sections 1-30, MTRS F001S002E – Sections 6-8, 17-20, 29-36, MTRS F001S002W – Sections 1-5, 8-17, 20-29, 32-33, MTRS F001S003E – Sections 31-32, MTRS F002N001E – Sections 31-35, MTRS F002N001 – Sections 28, 31-36, MTRS F002N002 – Sections 32-33, 36, MTRS F002S001E – Sections 1-2, MTRS F002S002E – Sections 1-17, 21-24, MTRS F002S003E – Sections 5-8, 18.

“NowCast” means a weighted average of hourly air monitoring data used by the EPA for real-time reporting of the AQI for PM.

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“Opacity” means the reduction in transmitted light through a column of smoke as measured by an observer certified in using EPA Reference Method 9 as defined by federal law or EPA approved Alternative Method 82 which is defined as American Society for Testing and Materials (ASTM) D 7520-09.

“Particulate matter” or “PM” means total particulate matter including PM10 and PM2.5 (condensable and noncondensable fraction) and is a complex airborne mixture of extremely small particles and liquid droplets that are made up of a number of components, including acids, organic chemicals, metals, soil, or dust.

“Pellet fuel burning appliance” or “pellet stove” means a closed combustion, vented pellet burning appliance with automatic components creating an active air flow system, sold with the hopper and auger combination as integral parts, and designed, warranted, safety listed, and advertised by the manufacturer specifically to be fueled by pellets of sawdust, wood products and other biomass materials while prohibiting the use of cordwood.

“PM2.5” means particulate matter comprised of particles that have diameters of two and one-half microns or less.

“Proper Wood Storage” means specific and dedicated space to store clean wood in such a manner that the clean wood is not in contact with soil, the top of the clean wood is adequately protected from precipitation, and with airflow available to the clean wood.

“Sale” means the transfer of ownership or control.

“Solid fuel burning appliance” (SFBA) means any appliance designed to produce heat by burning nongaseous and nonliquid fuels. This definition includes, but is not limited to:

1. Wood stoves;
2. Coal stoves;
3. Wood-fired hydronic heaters;
4. Wood-fired furnaces;
5. Coal-fired hydronic heaters;
6. Coal-fired furnaces;
7. Fireplace inserts;
8. Pellet fuel burning appliances;
9. Masonry heaters;
10. Cook stoves; and
11. Fireplaces.

“Waste oil burning appliance” means an appliance that burns used or waste oil.

Section 3. FNSBC 21.28.030 **Prohibited acts**, shall be amended as follows:

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218
219 A. Installation of Certain Solid Fuel Burning Appliances in the Nonattainment Area.
220 Within the nonattainment area no person shall install or allow the installation of a solid
221 fuel burning appliance unless it is listed by the borough as qualifying under this chapter
222 and the installation complies with all other requirements imposed in this chapter. It is a
223 separate violation to fail to remove a solid fuel burning appliance installed in violation of
224 this chapter.

225
226 B. No person who has been convicted of or pled no contest to two or more
227 violations of this chapter involving visible emissions or emissions crossing property lines
228 shall, in the air quality control zone, operate, use or keep installed a hydronic heater
229 unless the hydronic heater is:

- 230 1. Borough listed or was listed at the time of installation,
231 2. A closed combustion system with automatic components that feed solid
232 fuel, including wood pellets, into a firebox where the combustion is enhanced by an
233 active airflow system, or
234 3. Connected to a thermal mass system that is certified by the contractor or
235 installer as sufficient to allow the hydronic heater to burn at maximum capacity
236 minimizing on/off cycling. The division may require an owner to provide documentation
237 supporting the certification.

238
239 This prohibition shall be effective 90 days after the second conviction or entry of a no
240 contest plea.

241
242 C. Visible Emissions Standard in the Air Quality Control Zone.

243 1. Standard. No person shall cause, permit, or allow particulate emissions
244 from a nonmobile source in the air quality control zone to create opacity greater than 20
245 percent for a period or periods aggregating more than 10 minutes in any hour except
246 during the first 40 minutes after the initial firing when the opacity limit shall be less than
247 50 percent.

248 2. Procedures and Enforcement. When ambient weather and light conditions
249 permit, methods and procedures specified by the EPA in 40 CFR 60 Appendix A
250 Reference Method 9 (Visual determination of the Opacity of Emissions From Stationary
251 Sources), or an alternative technology that replaces Method 9, when the technology is
252 available and the choice is feasible, upon request of the person being investigated, shall
253 be used to determine compliance with this section. Smoke visible from a chimney, flue
254 or exhaust duct in excess of the opacity standard for a period in excess of 30 minutes
255 shall constitute prima facie evidence of unlawful operation of an applicable solid fuel
256 burning appliance.

257
258 D. PM_{2.5} Emissions Crossing Property Lines. No person shall cause or permit
259 particulate emissions from a nonmobile source to impact the resident(s) of a
260 neighboring property through the creation of an emissions plume that:

- 261 1. Crosses a property line;

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2. Is observable using EPA Method 22 (40 CFR 60 Appendix A); and
3. Is 25 $\mu\text{g}/\text{m}^3$ greater than the surrounding immediate vicinity background $\text{PM}_{2.5}$ level using methods defined by the borough division of air quality. For purposes of this subsection, the surrounding "immediate vicinity" means land within an area measured 1,200 feet in all directions from the boundaries of the emitting property.

E. Requirements for Installation of Solid Fuel Burning Appliances in New Construction.

1. For all new construction that commences on or after January 1, 2018 and is located within the air quality control zone the following will apply:

a. Installation of a solid fuel burning appliance is prohibited unless a permit has been issued by the division. A permit must be obtained for any solid fuel burning appliance installed in new construction prior to installation of the appliance.

b. Application. The permit application will require the owner(s) to certify they will meet the following requirements:

i. The proposed solid fuel burning appliance meets all federal, state, and borough air quality regulations;

ii. The proposed solid fuel burning appliance meets the requirements of this chapter;

iii. The proposed solid fuel burning appliance is properly sized for the structure in the opinion of a Borough listed vendor/installer;

iv. The proposed solid fuel burning appliance will be installed by a Borough listed vendor/installer attesting to proper installation of the device based on the manufacturer's installation manual;

v. Proper wood storage will be available; and

vi. Training will be provided to the occupants on proper wood burning techniques.

c. Permit. An installation permit will be issued upon receipt of an application meeting the requirements of subsection (b) and payment of any required fee. Within 24 months of issuance, the owner must verify with supporting documentation that the requirements of subsection (b) have been completed, upon which an operating permit will be issued. If verification has not been submitted or approved within 24 months the permit application will automatically expire.

d. After a public hearing, and prior to installation of the solid fuel burning appliance, the air pollution control commission may grant a variance, the commission shall consider any alternate proposal that the applicant submits, the location of the appliance, impact on surrounding neighborhood of the requested variance, emission levels of the appliance, and any other relevant conditions that indicate the operation of the appliance at that location or the requirement that is being varied will not result in a nuisance or health-hazard.

[E]. Borough-Wide Installation Requirements for Hydronic Heaters.

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1. Setback. Unless permitted by a variance, or if replacing an existing hydronic heater with a listed appliance, no person shall install or allow the installation of a hydronic heater located less than:

- a. Three hundred thirty feet from the closest property line; or
- b. Six hundred sixty feet from a school, clinic, hospital, or senior housing unit.

2. Any hydronic heater installed in violation of this section shall be immediately remedied or made inoperable and removed as soon as practicable; however, in no case shall the time of removal be longer than 180 days after notice from the division of a violation.

3. Variance. After a public hearing, the commission shall determine whether a person may receive a variance from the installation requirements of this subsection allowing them to install a hydronic heater. In determining whether to grant the variance, the commission shall consider the proposed location of the appliance, impact on surrounding neighborhood, emission levels of the appliance, terrain, meteorological conditions, and other relevant conditions that may render the operation of the appliance at that location a nuisance or a health hazard.

G[F]. Prohibited Fuels. No person shall burn in the borough any fuel, except coal in an appliance designed to use coal, which is not listed in the manufacturer's owner's manual as an acceptable fuel for that device or any of the following items in a solid fuel burning appliance:

1. Any wood that does not meet the definition of clean wood or has more than 20 percent moisture content;
2. Garbage;
3. Tires;
4. Materials containing plastic or rubber;
5. Waste petroleum products;
6. Paints and paint thinners;
7. Chemicals;
8. Glossy or colored papers;
9. Construction and demolition debris;
10. Plywood;
11. Particleboard;
12. Saltwater driftwood;
13. Manure;
14. Animal carcasses;
15. Asphalt products;
16. Flooring products.

H[G]. Sales or Leasing of Solid Fuel Burning Appliances.

1. No person shall sell or lease an unlisted solid fuel burning appliance or barrel stove kit in the borough unless the buyer signs an affidavit, on a form prescribed by the borough, attesting that the appliance will not be installed or used in the air quality

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control zone. This section does not apply to appliances or stoves that transfer pursuant to a sale of property;

2. No person shall commercially sell or offer for sale or lease a solid fuel burning appliance in the borough unless the commercial seller or dealer provides the prospective buyer or lessee, prior to any sales or lease agreement, with a written notice, prepared or approved by the division, that includes, but is not limited to, the following:

a. The fuel restrictions imposed in this chapter;

b. Proper installation, property location, operation, and maintenance of the appliance;

c. An advisory statement noting that operation of solid fuel burning appliances may not be appropriate in some areas due to terrain, meteorological conditions, or other relevant conditions that render the operation of the appliance a public nuisance or health hazard even though it is otherwise legally installed and operated;

3. The written notice required in this section shall be signed and dated by the prospective buyer or lessee prior to purchase or lease to indicate receipt of the notification requirements of this section;

4. The commercial dealer or seller shall mail or otherwise provide a copy of the notice and any required affidavit to the division within 30 days of the sale. All commercial dealers or sellers shall also include with the notice documentation showing whether the appliance sold or leased meets the borough's emissions standard.

J[H]. Nuisance. No person within the Fairbanks North Star Borough shall cause or allow particulate emissions from a nonmobile source that are injurious to human life or to property or that unreasonably interfere with the comfortable enjoyment of life or property. No person within the Fairbanks North Star Borough shall operate a solid fuel or waste oil burning appliance in a manner so as to create a public or private nuisance. A violation of a provision of this chapter is hereby declared to be a nuisance.

J[I]. Other Laws. Nothing in this section precludes other local jurisdictions from having more restrictive codes.

K[J]. Penalties. Upon first conviction of an offense in this chapter, the penalty(ies)/fine(s) set forth in FNSBC Title 1 regarding violations of the PM2.5 air quality control program may be satisfied by completion within 60 days of a borough-approved class covering PM2.5 health concerns, nonattainment, importance of dry wood and proper operation of solid fuel burning appliances. The borough may on its own initiative file notice of satisfaction of attendance requirements with the court, or the defendant may file a certificate of completion with the court within the applicable time frame.

Section 4. 21.28.040 **Enhanced voluntary removal, replacement and repair program**, shall be amended as follows:

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The Fairbanks North Star Borough shall, to the extent funds are available and appropriated by the assembly, offer an enhanced removal, replacement and repair program to help offset the costs of removing, replacing or repairing a solid fuel burning appliance (SFBA) or fireplace. This program shall be subject to the following eligibility requirements, conditions, and criteria:

A. General Requirements.

1. Application. An application approved by the division and signed by all property owner(s) must be submitted along with any documentation required by the division. Applications for either the removal of a solid fuel burning appliance (SFBA), or replacement of a SFBA with an emergency power system, or an appliance designed to use natural gas, propane, or home heating oil shall include a signed recordable document restricting future installations of SFBAs and requiring appropriate notice to purchasers in the seller's disclosure statement. Applicants must fully comply with the division's inspection process which shall verify the existence of a qualifying SFBA.

2. Priority Ranking. Applications may be prioritized and may be limited by the division in its discretion based on geographical location, the overall air quality benefit and the type of SFBA or fireplace being removed, replaced or repaired.

3. Eligibility. The program is limited to properties within the air quality control zone boundary in which a qualifying SFBA or fireplace is installed. If an application is approved for the program, the applicant will be given up to 90 days to meet all of the requirements. Applicants must have no delinquent property tax or penalty or interest owing at the time of application and at completion of the program requirements.

4. Additional Requirements. In addition to the general requirements set forth in this section, applicants must also meet the following requirements:

a. Fully comply with the inspection process required by the division that shall ensure that the existence of the qualifying appliance to be removed, replaced or repaired is properly documented.

b. Removal of appliance.

c. Delivery of appliance to an authorized decommission station.

d. Certificate of destruction delivered to the division, if applicable.

e. Final installation of a qualified appliance visually verified.

f. The qualified appliance must be properly installed by a Borough listed vendor/installer attesting to proper installation of the device based on manufacturer's installation manual, compliance with any building code requirements, and that the device is properly sized for the building in question.

g. The applicant will be required to demonstrate proper wood storage.

h. The applicant will be required to complete training with the vendor, ensuring that they understand how their particular device operates, including education on proper wood burning techniques.

i.[F] All aspects of this section may be performed by borough-approved personnel or a borough-approved vendor.

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435 5. Payments. Applicants will be eligible for reimbursements or, at the option
436 of the applicant, payment may be made directly to a borough-approved vendor.
437 Reimbursements and payments shall be available as follows:

438 a. Replacement of a hydronic heater:

439 i. With either an EPA certified wood or pellet stove with an
440 emission rate less than or equal to two grams of PM2.5 per hour, or an
441 EPA phase II certified pellet burning hydronic heater with an emission rate
442 equal to or less than 0.1 pounds per million BTU, or an emergency power
443 system, up to \$10,000 for purchase and installation.

444 ii. With an appliance designed to use home heating oil
445 (excluding waste or used oil) or a masonry heater (including parts, labor
446 and any costs associated with upgrading the chimney to the extent
447 required by the manufacturer of the appliance for proper installation), up to
448 \$12,000 for purchase and installation of the appliance.

449 iii. With an appliance designed to use natural gas, propane, hot
450 water district heat, or electricity, up to \$14,000 for purchase and
451 installation of the appliance.

452 b. Replacement of a non-borough-listed SFBA:

453 i. With either an EPA certified wood stove, or fireplace insert
454 that has an emission rate less than or equal to two grams of PM2.5 per
455 hour, or in the case of an EPA certified wood stove, PM2.5 emissions
456 must be reduced by 50 percent and emit two grams of PM2.5 per hour or
457 less, up to \$4,000 for purchase and installation of the appliance.

458 ii. With an EPA certified pellet stove that has an emission rate
459 less than or equal to two grams of PM2.5 per hour, up to \$5,000 for
460 purchase and installation of the appliance.

461 iii. With an appliance designed to use home heating oil
462 (excluding waste oil), hot water district heat, electricity, or a masonry
463 heater (including parts, labor and any costs associated with upgrading the
464 chimney to the extent required by the manufacturer of the appliance for
465 proper installation), or an emergency power system, up to \$6,000 for the
466 purchase and installation.

467 iv. With an appliance designed to use natural gas or propane,
468 up to \$10,000 per purchase and installation of the appliance. Multiple non-
469 borough-listed solid fuel burning appliances or fireplaces, or combinations
470 thereof, may be replaced with a single heating device that meets the
471 requirements above, except for those that are fired by solid fuels. Payment
472 will be based on the number of devices removed, up to a maximum of
473 three, and may not exceed the replacement cost.

474 c. Removal of a SFBA (limited to a one-time participation in this
475 program per property).

476 i. Removal of a hydronic heater through a one-time payment of
477 \$5,000.

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- 478 ii. Removal of other SFBAs through a one-time payment of
479 \$2,000.
480 d. Repair Program.
481 i. The repair program will pay for the:
482 (A) Replacement of a wood stove's catalytic converter that
483 has exceeded its life span through the one-time payment of up to
484 \$750.00.
485 (B) Replacement of any emissions-reducing component of
486 an EPA certified wood stove up to the maximum amount of \$750.00.
487 ii. In addition to the general requirements set forth in this
488 section, applicants must fully comply with any inspection process required
489 by the division, which may be performed by a borough-approved vendor.
490

491 Section 5. FNSBC 21.28.050, **Forecasting exceedances and**
492 **restrictions in the air quality control zone during an alert**, shall be amended as
493 follows:
494

495 A. During the winter months of October through March, the borough shall issue a
496 daily PM2.5 forecast by 4:30 p.m. When the PM2.5 concentration reaches the onset
497 level for an alert and is expected to remain at that level for 12 hours or more, an alert
498 will be declared. An alert may apply to the air quality control zone as a whole, or to one
499 or more sub-areas designated by the division. Once an alert is declared, PM2.5 control
500 measures set forth in this section shall be implemented and continued until the alert is
501 cancelled. There are two levels of alerts: Stage 1 and Stage 2. The obligations imposed
502 in this subsection do not require, absent specific funding for that purpose, any actions to
503 be taken outside of the borough's normal business days and hours of operation. These
504 restrictions shall not apply during a power failure. When an alert is in effect, outdoor
505 burning is prohibited, including nonpermitted incinerators and burn barrels. This outdoor
506 burning prohibition does not include recreational fires such as bonfires, campfires, or
507 ceremonial fires and the use of fire pits.
508

509 B. The division will notify local media to ensure the declared alert is broadcast. The
510 division shall also use social media and methods of direct communication such as text
511 messages as feasible. Information within the notification will contain the PM2.5 forecast,
512 stage level for areas, and actions required to reduce sources of PM2.5. The obligations
513 imposed in this subsection do not require, absent specific funding for that purpose, any
514 actions to be taken outside of the borough's normal business days and hours of
515 operation.
516

517 C. Stage 1: Restrictions in the Air Quality Control Zone during an Alert.

518 1. A Stage 1 air alert is implemented when concentrations exceed or are
519 forecasted to exceed 25 $\mu\text{g}/\text{m}^3$.

520 2. No fuel source may be added to the combustion chamber of a firebox of
521 any solid fuel burning appliance or waste oil burning appliance. Residents should rely

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instead on their home's alternate, cleaner source of heat (such as a furnace, boiler or electric baseboard heaters) until the Stage 1 air alert is cancelled.[BURNING IS PERMITTED IN ALL EPA CERTIFIED SOLID FUEL BURNING APPLIANCES, AND EPA CERTIFIED HYDRONIC HEATERS, MASONRY HEATERS, AND COOK STOVES. NO FUEL SOURCE MAY BE ADDED TO THE COMBUSTION CHAMBER OR FIREBOX OF ANY SOLID FUEL BURNING APPLIANCE OR WASTE OIL BURNING APPLIANCE NOT LISTED ABOVE. RESIDENTS SHOULD RELY INSTEAD ON THEIR HOME'S ALTERNATE, CLEANER SOURCE OF HEAT (SUCH AS A GAS OR FUEL OIL FIRED FURNACE OR BOILER OR ELECTRIC BASEBOARD HEATERS) UNTIL THE STAGE 1 AIR ALERT IS CANCELLED.]

3. If a building owner or other person with a property or managerial interest in the building has an approved "no other adequate source of heat" designation, the building owner is exempted from complying with the Stage 1 air alert restrictions for that building.

4. If a building owner or other person with a property or managerial interest in the building has an approved Stage 1 Waiver the building owner is exempted from complying with the Stage 1 air alert restrictions for that building. A Stage 1 Waiver will be granted if the person with property or managerial interest verifies that the SFBA being operated during a Stage 1 air alert is a Borough listed appliance. A Stage 1 Waiver may be obtained by completing an application on a form developed by the division, that includes the following information:

a. Documentation of approved appliance must be submitted, including pictures, make and model.

b. Documentation of the applicant's ability to properly store wood.

c. Documentation the applicant has taken a class or training in proper wood burning techniques.

D. Stage 2: Required Restrictions in the Air Quality Control Zone during an Alert.

1. A Stage 2 air alert is implemented when concentrations exceed or are forecasted to exceed $35 \mu\text{g}/\text{m}^3$.

2. No fuel source may be added to the combustion chamber or firebox of any solid fuel burning appliance or waste oil burning appliance. Residents should rely instead on their home's alternate, cleaner source of heat (such as a furnace, boiler or electric baseboard heaters) until the Stage 2 air alert is cancelled.

3. If a building owner or other person with a property or managerial interest in the building has an approved "no other adequate source of heat" designation the building owner is exempted from complying with the Stage 2 air alert restrictions for that building.

Section 6. FNSBC 21.28.060 **No other adequate source of heat determination**, shall be amended as follows:

AMENDMENTS ARE SHOWN IN LEGISLATIVE FORMAT

Text to be added is underlined

Text to be deleted is [BRACKETED, CAPITALIZED]

564 A. A building owner or other person with a property or managerial interest in a
565 building located within the air quality control zone may obtain a “no other adequate
566 source of heat” determination from the division if:

567 1. The SFBA being used to heat the structure is a Borough listed
568 appliance;[EPA CERTIFIED UNLESS AN APPLICATION HAS BEEN MADE TO THE
569 ENHANCED VOLUNTARY REMOVAL, REPLACEMENT AND REPAIR PROGRAM TO
570 REMOVE OR REPLACE THE NONCERTIFIED SFBA AND HAS BEEN DENIED, A
571 PELLET FUEL BURNING APPLIANCE INSTALLED PRIOR TO APRIL 1, 2017, A
572 MASONRY HEATER, OR A COOK STOVE.]

573 a.

574 2. The building owner(s) or other person with a property or managerial
575 interest in the building applies with the division on a form developed by the division,
576 including the following:

577 a. Documentation of approved appliance must be submitted, including
578 pictures, make, model, and serial number.

579 b. Documentation of the applicant's ability to properly store wood.

580 c. Documentation the applicant has taken a class or training in proper
581 wood burning techniques;

582 3. The building owner(s) or other person with a property or managerial
583 interest in the building files an affidavit with the application that the subject structure
584 must be heated and the structure has no adequate heating source without using a solid
585 fuel [OR WASTE OIL] burning appliance or that economic hardships require the
586 applicant's use of a solid fuel [OR WASTE OIL] burning appliance or complying with a
587 restriction would result in damage to property including damage to the appliance itself
588 and its heating system components. If economic hardship is the reason the applicant
589 has no other adequate source of heat, validating documentation is required. Validating
590 documentation may be established by showing approval for assistance from a list of
591 agencies or programs that provide economic assistance (e.g., programs based on HHS
592 poverty guidelines, unemployment insurance, nutrition assistance) to be made available
593 by the division;

594 4. The building was constructed on or before December 31, 2016.

595
596 B. There shall be no fee for applying for or obtaining a determination.

597
598 C. It shall be a violation to submit a false affidavit for a “no other adequate source
599 of heat” determination.

600
601 D. If the “no other adequate source of heat” appliance does not meet the standards
602 set in this chapter, the division shall provide the applicant with information concerning
603 the borough's voluntary removal, replacement and repair program.

604
605 E. Applications denied by the division may be appealed to the air pollution control
606 commission within 30 days of the decision.

607
AMENDMENTS ARE SHOWN IN LEGISLATIVE FORMAT

Text to be added is underlined

Text to be deleted is [BRACKETED, CAPITALIZED]

F. An applicant that has been denied a “no alternative source of heat determination” by the division because the appliance does not meet the criteria of this section may apply to the air pollution control commission for a variance within 10 days of this decision. A temporary “no alternative source of heat” determination shall be granted pending the decision of the commission. In determining whether to grant a variance, the commission shall consider the location of the appliance, impact on surrounding neighborhood, emission levels of the appliance, the financial investment and ability of the applicant to replace the appliance and any other relevant conditions that indicate the operation of the appliance at that location is not a nuisance or health hazard. If the commission denies a variance, the “no alternative source of heat” determination shall expire 60 days from the date of denial.

Section 7. FNSBC 1.20.080, **Fine Schedule**, is hereby amended as follows:

21.28.030(E)	Failure to obtain, submit and execute a permit for installing a SFBA in new construction.	\$1,000	No
21.28.030(F[E])	Illegal installation of hydronic heaters.	\$500.00	No
21.28.030(F[E])	Failure to remove hydronic heaters.	\$500.00	No
21.28.030(G[F])	Use of prohibited fuels. 1st offense	\$100.00	Yes
21.28.030(G[F])	Use of prohibited fuels. 2nd offense	\$500.00	No
21.28.030(H[G])	Violation of commercial sale requirements.	\$500.00	No

Section 8. Subsection G of FNSBC 4.12.110 shall be amended as follows:

G. The commission shall hear variance requests as set forth in FNSBC Title 21. [AFTER A PUBLIC HEARING, THE COMMISSION SHALL DETERMINE WHETHER A PERSON MAY RECEIVE A VARIANCE FROM THE INSTALLATION REQUIREMENTS OF FNSBC 21.28.030(E) ALLOWING THEM TO INSTALL A HYDRONIC HEATER. IN DETERMINING WHETHER TO GRANT THE VARIANCE, THE COMMISSION SHALL CONSIDER THE PROPOSED LOCATION OF THE APPLIANCE, IMPACT ON SURROUNDING NEIGHBORHOOD, EMISSION LEVELS OF THE APPLIANCE, TERRAIN, METEOROLOGICAL CONDITIONS, AND OTHER RELEVANT CONDITIONS THAT MAY RENDER THE OPERATION OF THE APPLIANCE AT THAT LOCATION A NUISANCE OR A HEALTH HAZARD.]

AMENDMENTS ARE SHOWN IN LEGISLATIVE FORMAT

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Section 9. Appendix E- User Fee Schedule of the FY 2017-18 budget is hereby amended to add the following to the Transportation User Fee Schedule:

Air Quality

Permit application fee for SFBA in new construction \$375.00

Section 10. Effective Date. This ordinance shall be effective at 5:00 p.m. of the first Borough business day following its adoption.

PASSED AND APPROVED THIS 19th DAY OF JUNE, 2017.




Kathryn Dodge
Presiding Officer

ATTEST:


Nanci Ashford-Bingham, MMC
Borough Clerk

Yeses: Tacke, Davies, Cooper, Quist, Gray, Lawrence, Dodge
Noes: Roberts, Sattley

AMENDMENTS ARE SHOWN IN LEGISLATIVE FORMAT

Text to be *added* is underlined

Text to be *deleted* is [BRACKETED, CAPITALIZED]

By: Lance Roberts
Introduced: 01/25/2018
Advanced: 01/25/2018
Substituted: 02/08/2018
Amended: 02/08/2018
Adopted: 02/08/2018

FAIRBANKS NORTH STAR BOROUGH

ORDINANCE NO. 2018-04

AN ORDINANCE AMENDING CHAPTER 21.28 FNSBC REGARDING CRITERIA FOR NO
OTHER ADEQUATE SOURCE OF HEAT DETERMINATIONS AND AMENDING BOROUGH
LISTED APPLIANCES

WHEREAS, A No Other Adequate Source of Heat Determination (NOASH)
is only available to applicants with a solid fuel burning appliance that is a borough listed
appliance; and

WHEREAS, An appliance that is EPA certified may not qualify for a NOASH
because it does not meet the emissions requirements for a borough listed appliance;
and

WHEREAS, Applicants who are denied a NOASH but who have EPA
certified appliances may also not qualify for the change-out program due to grant
restrictions; and

WHEREAS, The NOASH determination should include all eligible EPA
certified appliances.

NOW, THEREFORE, BE IT ORDAINED by the Assembly of the Fairbanks
North Star Borough:

Section 1. Classification. This ordinance is of a general and permanent
nature and shall be codified.

Section 2. Subsection A of FNSBC 21.28.060, No other adequate source
of heat determination, is hereby amended as follows:

A. A building owner or other person with a property or managerial interest in a
building located within the air quality control zone may obtain a "no other adequate
source of heat" determination from the division if:

AMENDMENTS ARE SHOWN IN LEGISLATIVE FORMAT
Text to be *added* is underlined
Text to be *deleted* is [BRACKETED & CAPITALIZED]

- 43 1. The SFBA being used to heat the structure is:
- 44 a. a borough listed appliance, or
- 45 b. an EPA certified appliance manufactured after 1998, and if the
- 46 appliance has a catalyst, the catalyst has been replaced by a new catalyst in the
- 47 accordance with manufacturer recommendation or specifications;
- 48 2. The building owner(s) or other person with a property or managerial
- 49 interest in the building applies with the division on a form developed by the division,
- 50 including the following:
- 51 a. Documentation of approved appliance must be submitted, including
- 52 pictures, make, model, and serial number.
- 53 b. Documentation of the applicant's ability to properly store wood.
- 54 c. Documentation the applicant has taken a class or training in proper
- 55 wood burning techniques;
- 56 3. The building owner(s) or other person with a property or managerial
- 57 interest in the building files an affidavit with the application that the subject structure
- 58 must be heated and the structure has no adequate heating source without using a solid
- 59 fuel burning appliance or that economic hardships require the applicant's use of a solid
- 60 fuel burning appliance or complying with a restriction would result in damage to
- 61 property including damage to the appliance itself and its heating system components. If
- 62 economic hardship is the reason the applicant has no other adequate source of heat,
- 63 validating documentation is required. Validating documentation may be established by
- 64 showing approval for assistance from a list of agencies or programs that provide
- 65 economic assistance (e.g., programs based on HHS poverty guidelines, unemployment
- 66 insurance, nutrition assistance) to be made available by the division;
- 67 4. The building was constructed on or before December 31, 2016.

68

69 Section 3. FNSBC 21.28.020, Borough listed appliances, is hereby

70 amended as follows:

71 A solid fuel burning appliance shall be listed by the borough if:

72 A. The solid fuel burning appliance is EPA certified as meeting the federal emissions

73 rate of 2.5 grams of PM2.5 per hour or less, or, for hydronic heaters, is EPA certified

74 and has an emission rating of 0.10 pounds per million BTU or less; or

75 B. The solid fuel burning appliance is a masonry heater[,] or cook stove[, OR

76 FIREPLACE]; or

77 C. The solid fuel burning appliance is tested, including by use of a handheld or

78 other portable device, by an accredited independent laboratory, or other qualified

79 person or entity approved by the borough, establishing that it meets the emissions rate

80 of 2.5 grams per hour or less.

81

82 Section 4. Effective Date. This ordinance shall be effective at 5:00 p.m.

83 of the first Borough business day following its adoption.

84

AMENDMENTS ARE SHOWN IN LEGISLATIVE FORMAT

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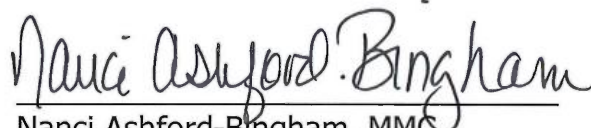
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PASSED AND APPROVED THIS 8TH DAY OF FEBRUARY, 2018.




Kathryn Dodge
Presiding Officer

ATTEST:


Nanci Ashford-Bingham, MMC
Borough Clerk

Yeses: Quist, Cooper, Tacke, Roberts, Lojewski, Major, Lawrence, Dodge
Noes: None
Other: Gray (Excused)

AMENDMENTS ARE SHOWN IN LEGISLATIVE FORMAT
Text to be *added* is underlined
Text to be *deleted* is [BRACKETED & CAPITALIZED]

1 By: Karl Kassel, Mayor
2 Lance Roberts
3 Matt Cooper
4 Van Lawrence
5 Introduced: 08/09/2018
6 Advanced: 08/09/2018
7 Referred to the
8 Air Pollution Control
9 Commission: 08/09/2018
10 Amended: 09/13/2018
11 Adopted: 09/13/2018

12 FAIRBANKS NORTH STAR BOROUGH

13 ORDINANCE NO. 2018-26

14 AN ORDINANCE AMENDING CHAPTER 21.28 FNSBC TO ADD DEFINITIONS AND
15 STANDARDS FOR RETROFIT CONTROL DEVICES, INCLUDING ELECTROSTATIC
16 PRECIPITATORS

17 WHEREAS, Due to the high and varying cost of heating oil, there is
18 considerable interest in identifying technologies capable of reducing PM2.5 emissions
19 from wood and pellet stoves in order to allow them to operate during air quality stage
20 alerts; and

21 WHEREAS, Retrofit controls devices such as electrostatic precipitators that
22 are used in conjunction with a solid fuel burning appliance (SFBA) may be reduce the
23 SFBA's emissions to levels equal to or less than levels emitted by residential fuel oil
24 boilers and furnaces; and

25 WHEREAS, The administration is actively working with the Environmental
26 Protection Agency to establish protocols for testing after-market emission control
27 devices for SFBAs, and this ordinance will help set forth the standards to be
28 implemented as soon as they are developed.

29 NOW, THEREFORE, BE IT ORDAINED by the Assembly of the Fairbanks
30 North Star Borough:

31 Section 1. This ordinance is of a general and permanent nature and shall
32 be codified.

33 AMENDMENTS ARE SHOWN IN LEGISLATIVE FORMAT

34 Text to be *added* is underlined

35 Text to be *deleted* is [BRACKETED, CAPITALIZE]

41 Section 2. FNSBC 21.28.010, **Definitions**, shall be amended to add the
42 following definition [the Clerk shall add the definition in alphabetical order]:

43 "Electrostatic Precipitator (ESP)" means a device that removes suspended particulate
44 matter from an exhaust stream by applying a high-voltage electrostatic charge and
45 collecting the particles on charged plates.

46
47 "Retrofit Control Device (RCD)" means an after-market device used in conjunction with
48 an SFBA and designed to reduce particulate matter emissions. A Retrofit Control Device
49 includes an electrostatic precipitator.

50
51 Section 3. FNSBC 21.28.050, **Forecasting exceedances and**
52 **restrictions in the air quality control zone during an alert**, is amended as
53 follows:

54 C. Stage 1: Restrictions in the Air Quality Control Zone during an Alert.

55 1. A Stage 1 air alert is implemented when concentrations exceed or are
56 forecasted to exceed 25 $\mu\text{g}/\text{m}^3$.

57 2. No fuel source may be added to the combustion chamber of a firebox of
58 any solid fuel burning appliance or waste oil burning appliance. Residents should rely
59 instead on their home's alternate, cleaner source of heat (such as a furnace, boiler or
60 electric baseboard heaters) until the Stage 1 air alert is canceled.

61 3. If a building owner or other person with a property or managerial interest
62 in the building has an approved "no other adequate source of heat" designation, the
63 building owner is exempted from complying with the Stage 1 air alert restrictions for
64 that building.

65 4. If a building owner or other person with a property or managerial interest
66 in the building has an approved Stage 1 waiver the building owner is exempted from
67 complying with the Stage 1 air alert restrictions for that building. A Stage 1 waiver will
68 be granted if the person with property or managerial interest verifies that the SFBA
69 being operated during a Stage 1 air alert is a borough listed appliance. A Stage 1 waiver
70 may be obtained by completing an application on a form developed by the division,
71 which includes the following information:

72 a. Documentation of approved appliance must be submitted, including pictures,
73 make and model.

74 b. Documentation of the applicant's ability to properly store wood.

75 c. Documentation the applicant has taken a class or training in proper wood
76 burning techniques.

77 5. If a building owner or other person with a property or managerial interest
78 in the building has an Approved RCD, the solid fuel burning appliance is exempted from
79 Stage 1 air alert restrictions.

80 D. Stage 2: Required Restrictions in the Air Quality Control Zone during an Alert.

81 1. A Stage 2 air alert is implemented when concentrations exceed or are
82 forecasted to exceed 35 $\mu\text{g}/\text{m}^3$.

AMENDMENTS ARE SHOWN IN LEGISLATIVE FORMAT

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2. No fuel source may be added to the combustion chamber or firebox of any solid fuel burning appliance or waste oil burning appliance. Residents should rely instead on their home's alternate, cleaner source of heat (such as a furnace, boiler or electric baseboard heaters) until the Stage 2 air alert is canceled.

3. If a building owner or other person with a property or managerial interest in the building has an approved "no other adequate source of heat" designation the building owner is exempted from complying with the Stage 2 air alert restrictions for that building.

4. If a building owner or other person with a property or managerial interest in the building has an Approved RCD, the solid fuel burning appliance is exempted from Stage 2 air alert restrictions.

E. Stage RCD: Required Restrictions in the Air Quality Control Zone during an Alert

1. A Stage RCD air alert is implemented when concentrations exceed or are forecasted to exceed 55 µg/m³.

2. Stage RCD air alerts apply only to solid fuel burning appliances with an Approved RCD.

3. No fuel source may be added to the combustion chamber or firebox of a solid fuel burning appliance with an Approved RCD. Residents should rely instead on their home's alternate, cleaner source of heat (such as a furnace, boiler or electric baseboard heaters) until the Stage RCD air alert is canceled.

4. If a building owner or other person with a property or managerial interest in the building has an approved "no other adequate source of heat" designation the building owner is exempted from complying with the Stage RCD air alert restrictions for that building.

5. A Stage RCD air alert is not required to be issued unless one or more Approved RCDs are on file with the division.

Section 4. FNSBC 21.28.060, shall be renamed **Exemptions**, and shall be amended to read as follows:

A. No Other Adequate Source Of Heat

[A]1. A building owner or other person with a property or managerial interest in a building located within the air quality control zone may obtain a "no other adequate source of heat" determination from the division if:

[1]a. The SFBA being used to heat the structure is:

[A]i. A borough listed appliance, or

[B]ii. An EPA certified appliance manufactured after 1998, and if the appliance has a catalyst, the catalyst has been replaced by a new catalyst in the accordance with manufacturer recommendation or specifications;

[2]b. The building owner(s) or other person with a property or managerial interest in the building applies with the division on a form developed by the division, including the following:

AMENDMENTS ARE SHOWN IN LEGISLATIVE FORMAT

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[A]i. Documentation of approved appliance must be submitted, including pictures, make, model, and serial number.

[B]ii. Documentation of the applicant's ability to properly store wood.

[C]iii. Documentation the applicant has taken a class or training in proper wood burning techniques;

[3]c. The building owner(s) or other person with a property or managerial interest in the building files an affidavit with the application that the subject structure must be heated and the structure has no adequate heating source without using a solid fuel burning appliance or that economic hardships require the applicant's use of a solid fuel burning appliance or complying with a restriction would result in damage to property including damage to the appliance itself and its heating system components. If economic hardship is the reason the applicant has no other adequate source of heat, validating documentation is required. Validating documentation may be established by showing approval for assistance from a list of agencies or programs that provide economic assistance (e.g., programs based on HHS poverty guidelines, unemployment insurance, nutrition assistance) to be made available by the division;

[4]d. The building was constructed on or before December 31, 2016.

[B]2. There shall be no fee for applying for or obtaining a determination.

[C]3. It shall be a violation to submit a false affidavit for a "no other adequate source of heat" determination.

[D]4. If the "no other adequate source of heat" appliance does not meet the standards set in this chapter, the division shall provide the applicant with information concerning the borough's voluntary removal, replacement and repair program.

[E]5. Applications denied by the division may be appealed to the air pollution control commission within 30 days of the decision.

[F]6. An applicant that has been denied a "no alternative source of heat determination" by the division because the appliance does not meet the criteria of this section may apply to the air pollution control commission for a variance within 10 days of this decision. A temporary "no alternative source of heat" determination shall be granted pending the decision of the commission. In determining whether to grant a variance, the commission shall consider the location of the appliance, impact on surrounding neighborhood, emission levels of the appliance, the financial investment and ability of the applicant to replace the appliance and any other relevant conditions that indicate the operation of the appliance at that location is not a nuisance or health hazard. Interested persons may testify and submit other admissible evidence for the commission's consideration. If the commission denies a variance, the "no alternative source of heat" determination shall expire 60 days from the date of denial.

B. Approved RCDs

A building owner or other person with a property or managerial interest in a building located within the air quality control zone may obtain an "Approved RCD" designation from the division for a borough listed appliance that is a pellet fuel stove

AMENDMENTS ARE SHOWN IN LEGISLATIVE FORMAT

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166 appliance, a catalytically controlled wood stove appliance, or a non-catalytically
167 controlled wood stove appliance, if the requirements of this section are met:

168 1. Performance testing. Performance testing of the appliance with the RCD
169 has been conducted in accordance with this section and demonstrates post-RCD PM
170 emissions of less than 0.01 lb/MMbtu.

171 a. Performance testing for PM emissions on a wood stove, using cord
172 wood as a fuel source, shall be conducted using EPA Reference Methods 1, 5H, ASTM
173 Method E3053 and CSA-B415.1-10.

174 b. Performance testing for PM emissions on pellet fuel burning
175 appliances shall be conducted using EPA Reference Methods 1, 5H, ASTM E2779(10)
176 and CSA-B415.1-10.

177 c. Particulate matter sampling, per EPA Reference Method 5H, shall
178 be performed simultaneously upstream and downstream of the RCD.

179 d. A total of six (6) completed tests, each consisting of all applicable
180 test runs at required burn rates, is required per appliance-RCD combination.

181 e. Performance testing shall be performed by either (1) a test
182 laboratory that is EPA approved for wood heater certification testing under 40 CFR
183 60.535 or (2) an independent third-party test laboratory that is accredited under ISO-
184 IEC Standard 17025 to perform testing using the test methods specified in 40 CFR
185 60.534 by an accreditation body that is a full member signatory to the International
186 laboratory Accreditation Cooperation Mutual Recognition Arrangement and approved by
187 the EPA for conducting testing under 40 CFR 60 Subpart AAA.

188 f. Testing protocols shall be submitted to the division for approval 30
189 days prior to testing. One complete set of performance tests conducted in accordance
190 with this section is required per appliance category. A written report of the results with
191 sufficient information to guarantee that the emissions requirements of this section are
192 met shall be submitted to the division.

193 2. Application. The building owner(s) or other person with a property or
194 managerial interest in the building may apply to the division on a form developed by the
195 division, including the following:

196 a. Documentation of an approved appliance category-RCD
197 combination must be submitted, including pictures, make, model, and serial number of
198 both appliance and RCD.

199 b. Documentation of the applicant's ability to properly store wood, if
200 applicable.

201 c. Documentation the applicant has taken a class or training in proper
202 wood burning techniques, if applicable.

203 d. Documentation that the RCD was installed by a certified installer.

204 3. Conditions of approval. A person receiving an Approved RCD must certify
205 that they (a) will ensure that the subject appliance obtains an annual chimney sweep
206 and submit proof to the division; (b) will provide data to establish maintenance and
207 monitoring protocols to ensure the RCD performs effectively; (c) will perform any

AMENDMENTS ARE SHOWN IN LEGISLATIVE FORMAT

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additional maintenance and monitoring determined necessary to maintain emissions standards as established through field tests; and (d) maintain and operate per the manufacturer's instructions.

Section 5. Subsection C of FNSBC 21.28.030, Prohibited Acts, shall be amended as follows:

C. Visible Emissions Standard in the Air Quality Control Zone.

1. Standard. No person shall cause, permit, or allow particulate emissions from a nonmobile source in the air quality control zone to create opacity greater than 20 percent for a period or periods aggregating more than 10 minutes in any hour except during the first 40 minutes after the initial firing when the opacity limit shall be less than 50 percent.

2. Approved RCD Standard. Other standards set forth in this chapter notwithstanding, no person shall cause, permit, or allow visible emissions with an opacity great than 0% from an appliance with an Approved RCD other than during the first 40 minutes after the initial firing when the opacity limit shall be less than 50 percent.

[2]3. Procedures and Enforcement. When ambient weather and light conditions permit, methods and procedures specified by the EPA in 40 CFR 60 Appendix A Reference Method 9 (Visual determination of the Opacity of Emissions From Stationary Sources), or an alternative technology that replaces Method 9, when the technology is available and the choice is feasible, upon request of the person being investigated, shall be used to determine compliance with this section. Smoke visible from a chimney, flue or exhaust duct in excess of the opacity standard for a period in excess of 30 minutes shall constitute prima facie evidence of unlawful operation of an applicable solid fuel burning appliance.

Section 6. Effective Date. This ordinance shall be effective thirty days following its adoption.

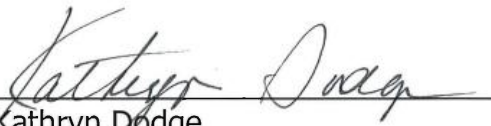
AMENDMENTS ARE SHOWN IN LEGISLATIVE FORMAT

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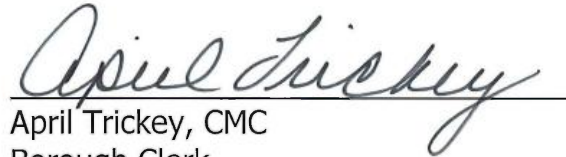
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PASSED AND APPROVED THIS 13TH DAY OF SEPTEMBER, 2018.




Kathryn Dodge
Presiding Officer

ATTEST:


April Trickey, CMC
Borough Clerk

Yeses: Tacke, Roberts, Cooper, Quist, Major, Gray, Lawrence, Dodge

Noes: None

Other: Lojewski (Excused)

AMENDMENTS ARE SHOWN IN LEGISLATIVE FORMAT

Text to be *added* is underlined

Text to be *deleted* is [BRACKETED, CAPITALIZE]

By: Bryce J. Ward, Mayor
Introduced: 11/08/2018
Advanced: 11/08/2018
Referred to Air
Pollution Control
Commission: 11/08/2018
Adopted: 12/13/2018

FAIRBANKS NORTH STAR BOROUGH

ORDINANCE NO. 2018 - 45

AN ORDINANCE AMENDING CHAPTER 21.28 FNSBC REGARDING AIR QUALITY
CONTROL PROGRAM, FNSBC 1.20.080 FINE SCHEDULE, AND CHAPTER 4.12 FNSBC
REGARDING AIR POLLUTION CONTROL COMMISSION

WHEREAS, Voters recently adopted an ordinance by initiative, "The Home Heating Reclamation Act," which prohibits the Borough from in any way regulating, prohibiting, curtailing, banning, or issuing fines or fees association with the sale, distribution, installation, or operation of solid fuel heating appliances or combustible fuels; and

WHEREAS, Portions of Chapter 21.28 FNSBC are effectively repealed with the enactment of the initiative ordinance, and amending code will provide clarity for the public.

NOW, THEREFORE, BE IT ORDAINED by the Assembly of the Fairbanks North Star Borough:

Section 1. This ordinance is of a general and permanent nature and shall be codified.

Section 2. Chapter 21.28 FNSBC, PM2.5 Air Quality Control Program, is hereby amended as follows:

AMENDMENTS ARE SHOWN IN LEGISLATIVE FORMAT

Text to be *added* is underlined

Text to be *deleted* is [BRACKETED, CAPITALIZED]

Chapter 21.28
PM2.5 AIR QUALITY CONTROL PROGRAM

Sections:

- 21.28.010 Definitions.
 21.28.020 Borough listed appliances.
 21.28.030 [PROHIBITED ACTS.] Repealed.
 21.28.040 Enhanced voluntary removal, replacement and repair program.
 21.28.050 Forecasting [EXCEEDANCES AND RESTRICTIONS] in the air quality control zone [DURING AN ALERT].
 21.28.060 [NO OTHER ADEQUATE SOURCE OF HEAT DETERMINATION.] Repealed.
21.28.070 The Home Heating Reclamation Act

21.28.010 Definitions.

In this chapter, the following definitions apply:

"Air quality control zone" means the area of the borough currently contained in the EPA designated nonattainment area, which uses the nonattainment area southern, western and eastern boundaries as modified by their respective intersection with the following northern boundary described as: beginning at the intersection of Isberg Road with Chena Ridge Road on the western boundary of the EPA designated nonattainment area, then following Chena Ridge Road back to Chena Pump Road and continuing north on the Parks Highway to Sheep Creek Road, then Sheep Creek Road to Miller Hill Road, then north on Miller Hill Road, then east on Yankovich, then north from Yankovich Road along the east boundary of the Large Animal Research Station to a point just north of its intersection with Nottingham Drive and follows the ridge crest across Nottingham Estates to approximately the point where Swallow Drive intersects Dalton Trail to north on Dalton Trail to the crest of the Farmer's Loop Ridge, then follow the geographic crest of Farmer's Loop Ridge to its intersection with the New Steese Highway, then southeast on Bennett Road, and along Steele Creek Road to the intersection of Chena Hot Springs Road, and Chena Hot Springs Road to the eastern boundary of the EPA designated nonattainment area.

"Air quality index" (AQI) is an index for reporting daily air quality, which indicates how polluted the air currently is or how polluted it is forecast to become. The higher the AQI value, the greater the level of air pollution and the greater the health concern. AQI is divided into six categories with correspondingly higher levels of health concern as outlined in the table below:

AQI (Air Quality Index)	AQI Category	Cautionary Statement	Health Statement
0 – 50	Good	None	None

AMENDMENTS ARE SHOWN IN LEGISLATIVE FORMAT

Text to be *added* is underlined

Text to be *deleted* is [BRACKETED, CAPITALIZED]

AQI (Air Quality Index)	AQI Category	Cautionary Statement	Health Statement
51 – 100	Moderate	Unusually sensitive people should consider reducing prolonged or heavy exertion.	None
101 – 150	Unhealthy for Sensitive Groups	People with respiratory or heart disease, the elderly, and children should limit prolonged exertion.	Increasing likelihood of respiratory symptoms in sensitive individuals, aggravation of heart or lung disease and premature mortality in persons with cardiopulmonary disease and the elderly.
151 – 200	Unhealthy	People with respiratory or heart disease, the elderly, and children should avoid prolonged exertion; everyone else should limit prolonged exertion.	Increased aggravation of heart or lung disease and premature mortality in persons with cardiopulmonary disease and the elderly; increased respiratory effects in general population.
201 – 300	Very Unhealthy	People with respiratory or heart disease, the elderly, and children should avoid outdoor activity; everyone else should avoid prolonged exertion.	Significant aggravation of the heart or lung disease and premature mortality in persons with cardiopulmonary disease and the elderly; significant increase in respiratory effects in the general population.
301 – 500	Hazardous	Everyone should avoid any outdoor exertion; people with respiratory or heart disease, the elderly and children should remain indoors.	Significant aggravation of heart or lung disease and premature mortality in persons with cardiopulmonary disease and the elderly; significant increase in respiratory effects in the general population.

70
71 ["ALERT" MEANS A NOTICE ISSUED BY THE DIVISION WHEN THE DIVISION
72 DETERMINES, USING AVAILABLE DATA OR MODELING, THAT PM2.5 CONCENTRATION
73 LEVELS HAVE REACHED OR ARE FORECASTED TO REACH 25 "G/M" OR HIGHER FOR
74 AT LEAST 12 CONSECUTIVE HOURS.]

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75 "Appliance" means a device or apparatus that is manufactured and designed to utilize
76 energy and which does not require a stationary source air quality permit from the state
77 of Alaska under 18 AAC 50.

78 "Clean wood" means natural wood that has not been painted, varnished, or coated with
79 a similar material, has not been treated with preservatives, and does not contain resins
80 or glues as in plywood or other composite wood products.

81 ["COMMENCE" MEANS (1) BEGIN, OR CAUSE TO BEGIN, ACTUAL ON-SITE
82 CONSTRUCTION OR (2) ENTER INTO BINDING AGREEMENTS OR CONTRACTUAL
83 OBLIGATIONS TO BEGIN CONSTRUCTION, WHICH CANNOT BE CANCELED OR
84 MODIFIED WITHOUT SUBSTANTIAL LOSS TO THE OWNER.

85 "CONSTRUCTION AND DEMOLITION DEBRIS" MEANS A CONGLOMERATION OF
86 MATERIALS FROM CONSTRUCTION, REPAIR, REMODELING OR DEMOLITION OF
87 BUILDINGS AND STRUCTURES CONTAINING ANY PROHIBITED FUELS.]

88 "Cook stove" means a wood burning appliance that is designed primarily for cooking
89 food and that has the following characteristics:

- 90 1. An oven, with a volume of 0.028 cubic meters (one cubic foot) or greater,
91 and an oven rack;
- 92 2. A device for measuring oven temperatures;
- 93 3. A flame path that is routed around the oven;
- 94 4. A shaker grate;
- 95 5. An ash pan;
- 96 6. An ash clean-out door below the oven; and
- 97 7. The absence of a fan or heat channels to dissipate heat from the device.

98 "Division" means the Fairbanks North Star Borough air quality division.

99 ["ELECTROSTATIC PRECIPITATOR (ESP)" MEANS A DEVICE THAT REMOVES
100 SUSPENDED PARTICULATE MATTER FROM AN EXHAUST SYSTEM BY APPLYING A
101 HIGH-VOLTAGE ELECTROSTATIC CHARGE AND COLLECTING THE PARTICLES ON
102 CHARGED PLATES.]

103 "Emergency power system" is an independent source of electrical power that supports
104 important electrical systems on loss of normal power supply. An emergency power
105 system may include a standby generator, batteries, and other apparatus. Emergency
106 power systems are installed to protect life and property from the consequences of loss
107 of normal electric power supply.

108 "EPA" means the United States Environmental Protection Agency.

109 "EPA certified" means that the solid fuel burning appliance meets emission performance
110 standards when tested by an accredited independent laboratory and is labeled
111 according to procedures specified by the EPA in 40 CFR Part 60 Subpart AAA or QQQQ.

112 "Fireplace" means an assembly consisting of a hearth and open fire chamber of
113 noncombustible factory-built or masonry materials and provided with a chimney, for use
114 with solid fuels, which cannot be operated with an air to fuel ratio of less than 35 to
115 one.

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116 "Fireplace insert" means a solid fuel burning appliance similar in function and
117 performance to a freestanding wood burning stove, which is made from cast iron or
118 steel designed to be installed in an existing masonry or prefabricated fireplace.

119 "Forecast" means a description of the current dispersion conditions described as good,
120 fair, or poor and including the expected PM2.5 NowCast AQI categorized as good,
121 moderate, unhealthy for sensitive groups, unhealthy, very unhealthy, or hazardous.

122 ["HEATING APPLIANCES" MEANS, BUT IS NOT LIMITED TO: WOOD, COAL, OR PELLET
123 FIRED HYDRONIC HEATERS, STOVES, AND FURNACES; OIL OR GAS FIRED BOILERS
124 AND FURNACES; AND MASONRY HEATERS, PELLET STOVES, COOK STOVES, AND
125 FIREPLACES.]

126 "Hydronic" means having to do with a system moving heat from one location to another
127 by means of the circulation of a heat transfer liquid through piping or tubing.

128 "Hydronic heater" means a fuel burning appliance designed to (1) burn wood or other
129 solid fuels and (2) heat building space and/or domestic hot water via the distribution,
130 typically through pipes, of a fluid heated in the appliance.

131 ["INTERESTED PERSONS" MEANS THOSE INDIVIDUALS WHO TIMELY APPLY TO
132 PARTICIPATE IN A MATTER AND DEMONSTRATE THAT THEY POSSESS A SPECIFIC
133 PROPERTY INTEREST THAT MAY BE SIGNIFICANTLY AFFECTED BY THE PROPOSED
134 ACTION IN A WAY DIFFERENT THAN THAT OF THE GENERAL PUBLIC.]

135 "Masonry heater" means a wood burning appliance that complies with the guidelines of
136 ASTM E1602-08, Standard Guide for Construction of Masonry Heaters, and:

137 1. Is designed and intended for operation only in a closed combustion chamber
138 configuration; and

139 2. Has enough thermal storage capacity to maintain no less than 50.0 percent of
140 the maximum masonry-mass temperature for at least four hours after the maximum
141 masonry-mass temperature has been reached; and

142 3. The masonry heater design and installation has been confirmed and
143 documented by a qualified person or entity approved by the borough.

144 ["NEW CONSTRUCTION" MEANS CONSTRUCTION OF ENTIRELY NEW STRUCTURES
145 DESIGNED FOR HEATED OCCUPANCY AND ANY STRUCTURAL ALTERATION THAT
146 ADDS HEATED SQUARE FOOTAGE TO AN EXISTING STRUCTURE WHETHER OR NOT
147 THE STRUCTURE WAS PREVIOUSLY OCCUPIED.]

148 "Nonattainment area" is the area depicted on the map attached to the ordinance
149 codified in this chapter and is further defined as follows:

150 Township Range Delineated Boundary for the Fairbanks Nonattainment Area
151 MTRS F001N001 – All Sections, MTRS F001N001E – Sections 2-11, 14-23, 26-
152 34, MTRS F001N002 – Sections 1-5, 8-17, 20-29, 32-36, MTRS F001S001E –
153 Sections 1, 3-30, 32-36, MTRS F001S001W – Sections 1-30, MTRS
154 F001S002E – Sections 6-8, 17-20, 29-36, MTRS F001S002W – Sections 1-5,
155 8-17, 20-29, 32-33, MTRS F001S003E – Sections 31-32, MTRS F002N001E –
156 Sections 31-35, MTRS F002N001 – Sections 28, 31-36, MTRS F002N002 –

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Sections 32-33, 36, MTRS F002S001E – Sections 1-2, MTRS F002S002E –
Sections 1-17, 21-24, MTRS F002S003E – Sections 5-8, 18.

"NowCast" means a weighted average of hourly air monitoring data used by the EPA for real-time reporting of the AQI for PM.

["OPACITY" MEANS THE REDUCTION IN TRANSMITTED LIGHT THROUGH A COLUMN OF SMOKE AS MEASURED BY AN OBSERVER CERTIFIED IN USING EPA REFERENCE METHOD 9 AS DEFINED BY FEDERAL LAW OR EPA APPROVED ALTERNATIVE METHOD 82 WHICH IS DEFINED AS AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) D 7520-09.]

"Particulate matter" or "PM" means total particulate matter including PM₁₀ and PM_{2.5} (condensable and noncondensable fraction) and is a complex airborne mixture of extremely small particles and liquid droplets that are made up of a number of components, including acids, organic chemicals, metals, soil, or dust.

"Pellet fuel burning appliance" or "pellet stove" means a closed combustion, vented pellet burning appliance with automatic components creating an active air flow system, sold with the hopper and auger combination as integral parts, and designed, warranted, safety listed, and advertised by the manufacturer specifically to be fueled by pellets of sawdust, wood products and other biomass materials while prohibiting the use of cordwood.

"PM_{2.5}" means particulate matter comprised of particles that have diameters of two and one-half microns or less.

"Proper wood storage" means specific and dedicated space to store clean wood in such a manner that the clean wood is not in contact with soil, the top of the clean wood is adequately protected from precipitation, and with airflow available to the clean wood.

["RETROFIT CONTROL DEVICE (RCD)" MEANS AN AFTER-MARKET DEVICE USED IN CONJUNCTION WITH AN SFBA AND DESIGNED TO REDUCE PARTICULATE MATTER EMISSIONS. A RETROFIT CONTROL DEVICE INCLUDES AN ELECTROSTATIC PRECIPITATOR.

"SALE" MEANS THE TRANSFER OF OWNERSHIP OR CONTROL.]

"Solid fuel burning appliance" (SFBA) means any appliance designed to produce heat by burning nongaseous and nonliquid fuels. This definition includes, but is not limited to:

1. Wood stoves;
2. Coal stoves;
3. Wood-fired hydronic heaters;
4. Wood-fired furnaces;
5. Coal-fired hydronic heaters;
6. Coal-fired furnaces;
7. Fireplace inserts;
8. Pellet fuel burning appliances;
9. Masonry heaters;
10. Cook stoves; and

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Text to be deleted is [BRACKETED, CAPITALIZED]

198 11. Fireplaces.

199 "Waste oil burning appliance" means an appliance that burns used or waste oil.
200201 **21.28.020 Borough listed appliances.**

202 A solid fuel burning appliance shall be listed by the borough if:

203 A. The solid fuel burning appliance is EPA certified as meeting the federal emissions
204 rate of 2.5 grams of PM2.5 per hour or less, or, for hydronic heaters, is EPA certified
205 and has an emission rating of 0.10 pounds per million BTU or less; or

206 B. The solid fuel burning appliance is a masonry heater or cook stove; or

207 C. The solid fuel burning appliance is tested, including by use of a handheld or
208 other portable device, by an accredited independent laboratory, or other qualified
209 person or entity approved by the borough, establishing that it meets the emissions rate
210 of 2.5 grams per hour or less.
211212 **[21.28.030 PROHIBITED ACTS.]**213 A. INSTALLATION OF CERTAIN SOLID FUEL BURNING APPLIANCES IN THE
214 NONATTAINMENT AREA. WITHIN THE NONATTAINMENT AREA NO PERSON SHALL
215 INSTALL OR ALLOW THE INSTALLATION OF A SOLID FUEL BURNING APPLIANCE
216 UNLESS IT IS LISTED BY THE BOROUGH AS QUALIFYING UNDER THIS CHAPTER AND
217 THE INSTALLATION COMPLIES WITH ALL OTHER REQUIREMENTS IMPOSED IN THIS
218 CHAPTER. IT IS A SEPARATE VIOLATION TO FAIL TO REMOVE A SOLID FUEL
219 BURNING APPLIANCE INSTALLED IN VIOLATION OF THIS CHAPTER.220 B. NO PERSON WHO HAS BEEN CONVICTED OF OR PLED NO CONTEST TO TWO
221 OR MORE VIOLATIONS OF THIS CHAPTER INVOLVING VISIBLE EMISSIONS OR
222 EMISSIONS CROSSING PROPERTY LINES SHALL, IN THE AIR QUALITY CONTROL
223 ZONE, OPERATE, USE OR KEEP INSTALLED A HYDRONIC HEATER UNLESS THE
224 HYDRONIC HEATER IS:

- 225 1. BOROUGH LISTED OR WAS LISTED AT THE TIME OF INSTALLATION,
-
- 226 2. A CLOSED COMBUSTION SYSTEM WITH AUTOMATIC COMPONENTS
-
- 227 THAT FEED SOLID FUEL, INCLUDING WOOD PELLETS, INTO A FIREBOX WHERE THE
-
- 228 COMBUSTION IS ENHANCED BY AN ACTIVE AIRFLOW SYSTEM, OR
-
- 229 3. CONNECTED TO A THERMAL MASS SYSTEM THAT IS CERTIFIED BY THE
-
- 230 CONTRACTOR OR INSTALLER AS SUFFICIENT TO ALLOW THE HYDRONIC HEATER TO
-
- 231 BURN AT MAXIMUM CAPACITY MINIMIZING ON/OFF CYCLING. THE DIVISION MAY
-
- 232 REQUIRE AN OWNER TO PROVIDE DOCUMENTATION SUPPORTING THE
-
- 233 CERTIFICATION.

234 THIS PROHIBITION SHALL BE EFFECTIVE 90 DAYS AFTER THE SECOND CONVICTION
235 OR ENTRY OF A NO CONTEST PLEA.

236 C. VISIBLE EMISSIONS STANDARD IN THE AIR QUALITY CONTROL ZONE.

- 237 1. STANDARD. NO PERSON SHALL CAUSE, PERMIT, OR ALLOW
-
- 238 PARTICULATE EMISSIONS FROM A NONMOBILE SOURCE IN THE AIR QUALITY

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239 CONTROL ZONE TO CREATE OPACITY GREATER THAN 20 PERCENT FOR A PERIOD OR
240 PERIODS AGGREGATING MORE THAN 10 MINUTES IN ANY HOUR EXCEPT DURING
241 THE FIRST 40 MINUTES AFTER THE INITIAL FIRING WHEN THE OPACITY LIMIT SHALL
242 BE LESS THAN 50 PERCENT.

243 2. APPROVED RCD STANDARD. OTHER STANDARDS SET FORTH IN THIS
244 CHAPTER NOTWITHSTANDING, NO PERSON SHALL CAUSE, PERMIT, OR ALLOW
245 VISIBLE EMISSIONS WITH AN OPACITY GREAT THAN 0% FROM AN APPLIANCE WITH
246 AN APPROVED RCD OTHER THAN DURING THE FIRST 40 MINUTES AFTER THE
247 INITIAL FIRING WHEN THE OPACITY LIMIT SHALL BE LESS THAN 50 PERCENT.

248 3. PROCEDURES AND ENFORCEMENT. WHEN AMBIENT WEATHER AND
249 LIGHT CONDITIONS PERMIT, METHODS AND PROCEDURES SPECIFIED BY THE EPA IN
250 40 CFR 60 APPENDIX A REFERENCE METHOD 9 (VISUAL DETERMINATION OF THE
251 OPACITY OF EMISSIONS FROM STATIONARY SOURCES), OR AN ALTERNATIVE
252 TECHNOLOGY THAT REPLACES METHOD 9, WHEN THE TECHNOLOGY IS AVAILABLE
253 AND THE CHOICE IS FEASIBLE, UPON REQUEST OF THE PERSON BEING
254 INVESTIGATED, SHALL BE USED TO DETERMINE COMPLIANCE WITH THIS SECTION.
255 SMOKE VISIBLE FROM A CHIMNEY, FLUE OR EXHAUST DUCT IN EXCESS OF THE
256 OPACITY STANDARD FOR A PERIOD IN EXCESS OF 30 MINUTES SHALL CONSTITUTE
257 PRIMA FACIE EVIDENCE OF UNLAWFUL OPERATION OF AN APPLICABLE SOLID FUEL
258 BURNING APPLIANCE.

259 D. $PM_{2.5}$ EMISSIONS CROSSING PROPERTY LINES. NO PERSON SHALL CAUSE OR
260 PERMIT PARTICULATE EMISSIONS FROM A NONMOBILE SOURCE TO IMPACT THE
261 RESIDENT(S) OF A NEIGHBORING PROPERTY THROUGH THE CREATION OF AN
262 EMISSIONS PLUME THAT:

263 1. CROSSES A PROPERTY LINE;
264 2. IS OBSERVABLE USING EPA METHOD 22 (40 CFR 60 APPENDIX A); AND
265 3. IS 25 G/M^3 GREATER THAN THE SURROUNDING IMMEDIATE VICINITY
266 BACKGROUND $PM_{2.5}$ LEVEL USING METHODS DEFINED BY THE BOROUGH DIVISION
267 OF AIR QUALITY. FOR PURPOSES OF THIS SUBSECTION, THE SURROUNDING
268 "IMMEDIATE VICINITY" MEANS LAND WITHIN AN AREA MEASURED 1,200 FEET IN ALL
269 DIRECTIONS FROM THE BOUNDARIES OF THE EMITTING PROPERTY.

270 E. REQUIREMENTS FOR INSTALLATION OF SOLID FUEL BURNING APPLIANCES IN
271 NEW CONSTRUCTION.

272 1. FOR ALL NEW CONSTRUCTION THAT COMMENCES ON OR AFTER
273 JANUARY 1, 2018, AND IS LOCATED WITHIN THE AIR QUALITY CONTROL ZONE THE
274 FOLLOWING WILL APPLY:

275 A. INSTALLATION OF A SOLID FUEL BURNING APPLIANCE IS
276 PROHIBITED UNLESS A PERMIT HAS BEEN ISSUED BY THE DIVISION. A PERMIT
277 MUST BE OBTAINED FOR ANY SOLID FUEL BURNING APPLIANCE INSTALLED IN NEW
278 CONSTRUCTION PRIOR TO INSTALLATION OF THE APPLIANCE.

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279 B. APPLICATION. THE PERMIT APPLICATION WILL REQUIRE THE
280 OWNER(S) TO CERTIFY THEY WILL MEET THE FOLLOWING REQUIREMENTS:

281 I. THE PROPOSED SOLID FUEL BURNING APPLIANCE MEETS
282 ALL FEDERAL, STATE, AND BOROUGH AIR QUALITY REGULATIONS;

283 II. THE PROPOSED SOLID FUEL BURNING APPLIANCE MEETS
284 THE REQUIREMENTS OF THIS CHAPTER;

285 III. THE PROPOSED SOLID FUEL BURNING APPLIANCE IS
286 PROPERLY SIZED FOR THE STRUCTURE IN THE OPINION OF A BOROUGH LISTED
287 VENDOR/INSTALLER;

288 IV. THE PROPOSED SOLID FUEL BURNING APPLIANCE WILL BE
289 INSTALLED BY A BOROUGH LISTED VENDOR/INSTALLER ATTESTING TO PROPER
290 INSTALLATION OF THE DEVICE BASED ON THE MANUFACTURER'S INSTALLATION
291 MANUAL;

292 V. PROPER WOOD STORAGE WILL BE AVAILABLE; AND

293 VI. TRAINING WILL BE PROVIDED TO THE OCCUPANTS ON
294 PROPER WOOD BURNING TECHNIQUES.

295 C. PERMIT. AN INSTALLATION PERMIT WILL BE ISSUED UPON
296 RECEIPT OF AN APPLICATION MEETING THE REQUIREMENTS OF SUBSECTION
297 (E)(1)(B) OF THIS SECTION AND PAYMENT OF ANY REQUIRED FEE. WITHIN 24
298 MONTHS OF ISSUANCE, THE OWNER MUST VERIFY WITH SUPPORTING
299 DOCUMENTATION THAT THE REQUIREMENTS OF SUBSECTION (E)(1)(B) OF THIS
300 SECTION HAVE BEEN COMPLETED, UPON WHICH AN OPERATING PERMIT WILL BE
301 ISSUED. IF VERIFICATION HAS NOT BEEN SUBMITTED OR APPROVED WITHIN 24
302 MONTHS THE PERMIT APPLICATION WILL AUTOMATICALLY EXPIRE.

303 D. AFTER A PUBLIC HEARING, AND PRIOR TO INSTALLATION OF THE
304 SOLID FUEL BURNING APPLIANCE, THE AIR POLLUTION CONTROL COMMISSION MAY
305 GRANT A VARIANCE TO ANY REQUIREMENT OF THIS SUBSECTION. IN DETERMINING
306 WHETHER TO GRANT A VARIANCE THE COMMISSION SHALL CONSIDER ANY
307 ALTERNATE PROPOSAL THAT THE APPLICANT SUBMITS, THE LOCATION OF THE
308 APPLIANCE, IMPACT ON SURROUNDING NEIGHBORHOOD OF THE REQUESTED
309 VARIANCE, EMISSION LEVELS OF THE APPLIANCE, AND ANY OTHER RELEVANT
310 CONDITIONS THAT INDICATE THE OPERATION OF THE APPLIANCE AT THAT
311 LOCATION OR THE REQUIREMENT THAT IS BEING VARIED WILL NOT RESULT IN A
312 NUISANCE OR HEALTH HAZARD. INTERESTED PERSONS MAY TESTIFY AND SUBMIT
313 OTHER ADMISSIBLE EVIDENCE FOR THE COMMISSION'S CONSIDERATION.

314 F. BOROUGH-WIDE INSTALLATION REQUIREMENTS FOR HYDRONIC HEATERS.

315 1. SETBACK. UNLESS PERMITTED BY A VARIANCE, OR IF REPLACING AN
316 EXISTING HYDRONIC HEATER WITH A LISTED APPLIANCE, NO PERSON SHALL
317 INSTALL OR ALLOW THE INSTALLATION OF A HYDRONIC HEATER LOCATED LESS
318 THAN:

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319 A. THREE HUNDRED THIRTY FEET FROM THE CLOSEST PROPERTY
320 LINE; OR

321 B. SIX HUNDRED SIXTY FEET FROM A SCHOOL, CLINIC, HOSPITAL,
322 OR SENIOR HOUSING UNIT.

323 2. ANY HYDRONIC HEATER INSTALLED IN VIOLATION OF THIS SECTION
324 SHALL BE IMMEDIATELY REMEDIED OR MADE INOPERABLE AND REMOVED AS SOON
325 AS PRACTICABLE; HOWEVER, IN NO CASE SHALL THE TIME OF REMOVAL BE LONGER
326 THAN 180 DAYS AFTER NOTICE FROM THE DIVISION OF A VIOLATION.

327 3. VARIANCE. AFTER A PUBLIC HEARING, THE COMMISSION SHALL
328 DETERMINE WHETHER A PERSON MAY RECEIVE A VARIANCE FROM THE
329 INSTALLATION REQUIREMENTS OF THIS SUBSECTION ALLOWING THEM TO INSTALL
330 A HYDRONIC HEATER. IN DETERMINING WHETHER TO GRANT THE VARIANCE, THE
331 COMMISSION SHALL CONSIDER THE PROPOSED LOCATION OF THE APPLIANCE,
332 IMPACT ON SURROUNDING NEIGHBORHOOD, EMISSION LEVELS OF THE APPLIANCE,
333 TERRAIN, METEOROLOGICAL CONDITIONS, AND OTHER RELEVANT CONDITIONS
334 THAT MAY RENDER THE OPERATION OF THE APPLIANCE AT THAT LOCATION A
335 NUISANCE OR A HEALTH HAZARD. INTERESTED PERSONS MAY TESTIFY AND SUBMIT
336 OTHER ADMISSIBLE EVIDENCE FOR THE COMMISSION'S CONSIDERATION.

337 G. PROHIBITED FUELS. NO PERSON SHALL BURN IN THE BOROUGH ANY FUEL,
338 EXCEPT COAL IN AN APPLIANCE DESIGNED TO USE COAL, WHICH IS NOT LISTED IN
339 THE MANUFACTURER'S OWNER'S MANUAL AS AN ACCEPTABLE FUEL FOR THAT
340 DEVICE OR ANY OF THE FOLLOWING ITEMS IN A SOLID FUEL BURNING APPLIANCE:

341 1. ANY WOOD THAT DOES NOT MEET THE DEFINITION OF CLEAN WOOD
342 OR HAS MORE THAN 20 PERCENT MOISTURE CONTENT;

343 2. GARBAGE;

344 3. TIRES;

345 4. MATERIALS CONTAINING PLASTIC OR RUBBER;

346 5. WASTE PETROLEUM PRODUCTS;

347 6. PAINTS AND PAINT THINNERS;

348 7. CHEMICALS;

349 8. GLOSSY OR COLORED PAPERS;

350 9. CONSTRUCTION AND DEMOLITION DEBRIS;

351 10. PLYWOOD;

352 11. PARTICLEBOARD;

353 12. SALTWATER DRIFTWOOD;

354 13. MANURE;

355 14. ANIMAL CARCASSES;

356 15. ASPHALT PRODUCTS;

357 16. FLOORING PRODUCTS.

358 H. SALES OR LEASING OF SOLID FUEL BURNING APPLIANCES.

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359 1. NO PERSON SHALL SELL OR LEASE AN UNLISTED SOLID FUEL BURNING
360 APPLIANCE OR BARREL STOVE KIT IN THE BOROUGH UNLESS THE BUYER SIGNS AN
361 AFFIDAVIT, ON A FORM PRESCRIBED BY THE BOROUGH, ATTESTING THAT THE
362 APPLIANCE WILL NOT BE INSTALLED OR USED IN THE AIR QUALITY CONTROL ZONE.
363 THIS SECTION DOES NOT APPLY TO APPLIANCES OR STOVES THAT TRANSFER
364 PURSUANT TO A SALE OF PROPERTY;

365 2. NO PERSON SHALL COMMERCIALY SELL OR OFFER FOR SALE OR LEASE
366 A SOLID FUEL BURNING APPLIANCE IN THE BOROUGH UNLESS THE COMMERCIAL
367 SELLER OR DEALER PROVIDES THE PROSPECTIVE BUYER OR LESSEE, PRIOR TO ANY
368 SALES OR LEASE AGREEMENT, WITH A WRITTEN NOTICE, PREPARED OR APPROVED
369 BY THE DIVISION, THAT INCLUDES, BUT IS NOT LIMITED TO, THE FOLLOWING:

370 A. THE FUEL RESTRICTIONS IMPOSED IN THIS CHAPTER;
371 B. PROPER INSTALLATION, PROPERTY LOCATION, OPERATION, AND
372 MAINTENANCE OF THE APPLIANCE;

373 C. AN ADVISORY STATEMENT NOTING THAT OPERATION OF SOLID
374 FUEL BURNING APPLIANCES MAY NOT BE APPROPRIATE IN SOME AREAS DUE TO
375 TERRAIN, METEOROLOGICAL CONDITIONS, OR OTHER RELEVANT CONDITIONS THAT
376 RENDER THE OPERATION OF THE APPLIANCE A PUBLIC NUISANCE OR HEALTH
377 HAZARD EVEN THOUGH IT IS OTHERWISE LEGALLY INSTALLED AND OPERATED;

378 3. THE WRITTEN NOTICE REQUIRED IN THIS SECTION SHALL BE SIGNED
379 AND DATED BY THE PROSPECTIVE BUYER OR LESSEE PRIOR TO PURCHASE OR LEASE
380 TO INDICATE RECEIPT OF THE NOTIFICATION REQUIREMENTS OF THIS SECTION;

381 4. THE COMMERCIAL DEALER OR SELLER SHALL MAIL OR OTHERWISE
382 PROVIDE A COPY OF THE NOTICE AND ANY REQUIRED AFFIDAVIT TO THE DIVISION
383 WITHIN 30 DAYS OF THE SALE. ALL COMMERCIAL DEALERS OR SELLERS SHALL ALSO
384 INCLUDE WITH THE NOTICE DOCUMENTATION SHOWING WHETHER THE APPLIANCE
385 SOLD OR LEASED MEETS THE BOROUGH'S EMISSIONS STANDARD.

386 I. NUISANCE. NO PERSON WITHIN THE FAIRBANKS NORTH STAR BOROUGH
387 SHALL CAUSE OR ALLOW PARTICULATE EMISSIONS FROM A NONMOBILE SOURCE
388 THAT ARE INJURIOUS TO HUMAN LIFE OR TO PROPERTY OR THAT UNREASONABLY
389 INTERFERE WITH THE COMFORTABLE ENJOYMENT OF LIFE OR PROPERTY. NO
390 PERSON WITHIN THE FAIRBANKS NORTH STAR BOROUGH SHALL OPERATE A SOLID
391 FUEL OR WASTE OIL BURNING APPLIANCE IN A MANNER SO AS TO CREATE A PUBLIC
392 OR PRIVATE NUISANCE. A VIOLATION OF A PROVISION OF THIS CHAPTER IS
393 HEREBY DECLARED TO BE A NUISANCE.

394 J. OTHER LAWS. NOTHING IN THIS SECTION PRECLUDES OTHER LOCAL
395 JURISDICTIONS FROM HAVING MORE RESTRICTIVE CODES.

396 K. PENALTIES. UPON FIRST CONVICTION OF AN OFFENSE IN THIS CHAPTER, THE
397 PENALTY(IES)/FINE(S) SET FORTH IN FNSBC TITLE 1 REGARDING VIOLATIONS OF
398 THE PM_{2.5} AIR QUALITY CONTROL PROGRAM MAY BE SATISFIED BY COMPLETION
399 WITHIN 60 DAYS OF A BOROUGH-APPROVED CLASS COVERING PM_{2.5} HEALTH

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CONCERNS, NONATTAINMENT, IMPORTANCE OF DRY WOOD AND PROPER OPERATION OF SOLID FUEL BURNING APPLIANCES. THE BOROUGH MAY ON ITS OWN INITIATIVE FILE NOTICE OF SATISFACTION OF ATTENDANCE REQUIREMENTS WITH THE COURT, OR THE DEFENDANT MAY FILE A CERTIFICATE OF COMPLETION WITH THE COURT WITHIN THE APPLICABLE TIME FRAME.]

21.28.040 Enhanced voluntary removal, replacement and repair program.

The Fairbanks North Star Borough shall, to the extent funds are available and appropriated by the assembly, offer an enhanced removal, replacement and repair program to help offset the costs of removing, replacing or repairing a solid fuel burning appliance (SFBA) or fireplace. This program shall be subject to the following eligibility requirements, conditions, and criteria:

A. General Requirements.

1. Application. An application approved by the division and signed by all property owner(s) must be submitted along with any documentation required by the division. Applications for either the removal of a solid fuel burning appliance (SFBA), or replacement of a SFBA with an emergency power system, or an appliance designed to use natural gas, propane, or home heating oil shall include a signed recordable document restricting future installations of SFBAs and requiring appropriate notice to purchasers in the seller's disclosure statement if required by the terms and conditions of the funding source. Applicants must fully comply with the division's inspection process which shall verify the existence of a qualifying SFBA.

2. Priority Ranking. Applications may be prioritized and may be limited by the division in its discretion based on geographical location, the overall air quality benefit and the type of SFBA or fireplace being removed, replaced or repaired.

3. Eligibility. The program is limited to properties within the air quality control zone boundary in which a qualifying SFBA or fireplace is installed. If an application is approved for the program, the applicant will be given up to 90 days to meet all of the requirements. Applicants must have no delinquent property tax or penalty or interest owing at the time of application and at completion of the program requirements.

4. Additional Requirements. In addition to the general requirements set forth in this section, applicants must also meet the following requirements:

a. Fully comply with the inspection process required by the division that shall ensure that the existence of the qualifying appliance to be removed, replaced or repaired is properly documented.

b. Removal of appliance.

c. Delivery of appliance to an authorized decommission station.

d. Certificate of destruction delivered to the division, if applicable.

e. Final installation of a qualified appliance visually verified.

AMENDMENTS ARE SHOWN IN LEGISLATIVE FORMAT

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440 f. The qualified appliance must be properly installed by a borough
441 listed vendor/installer attesting to proper installation of the device based on
442 manufacturer's installation manual, compliance with any building code requirements,
443 and that the device is properly sized for the building in question.

444 g. The applicant will be required to demonstrate proper wood storage.

445 h. The applicant will be required to complete training with the vendor,
446 ensuring that they understand how their particular device operates, including education
447 on proper wood burning techniques.

448 i. All aspects of this section may be performed by borough-approved
449 personnel or a borough-approved vendor.

450 5. Payments. Applicants will be eligible for reimbursements or, at the option
451 of the applicant, payment may be made directly to a borough-approved vendor.
452 Reimbursements and payments shall be available as follows:

453 a. Replacement of a hydronic heater:

454 i. With either an EPA certified wood or pellet stove with an
455 emission rate less than or equal to two grams of PM_{2.5} per hour, or an EPA phase II
456 certified pellet burning hydronic heater with an emission rate equal to or less than 0.1
457 pounds per million BTU, or an emergency power system, up to \$10,000 for purchase
458 and installation.

459 ii. With an appliance designed to use home heating oil
460 (excluding waste or used oil) or a masonry heater (including parts, labor and any costs
461 associated with upgrading the chimney to the extent required by the manufacturer of
462 the appliance for proper installation), up to \$12,000 for purchase and installation of the
463 appliance.

464 iii. With an appliance designed to use natural gas, propane, hot
465 water district heat, or electricity, up to \$14,000 for purchase and installation of the
466 appliance.

467 b. Replacement of a non-borough-listed SFBA:

468 i. With either an EPA certified wood stove, or fireplace insert
469 that has an emission rate less than or equal to two grams of PM_{2.5} per hour, or in the
470 case of an EPA certified wood stove, PM_{2.5} emissions must be reduced by 50 percent
471 and emit two grams of PM_{2.5} per hour or less, up to \$4,000 for purchase and installation
472 of the appliance.

473 ii. With an EPA certified pellet stove that has an emission rate
474 less than or equal to two grams of PM_{2.5} per hour, up to \$5,000 for purchase and
475 installation of the appliance.

476 iii. With an appliance designed to use home heating oil
477 (excluding waste oil), hot water district heat, electricity, or a masonry heater (including
478 parts, labor and any costs associated with upgrading the chimney to the extent required
479 by the manufacturer of the appliance for proper installation), or an emergency power
480 system, up to \$6,000 for the purchase and installation.

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iv. With an appliance designed to use natural gas or propane, up to \$10,000 per purchase and installation of the appliance. Multiple non-borough-listed solid fuel burning appliances or fireplaces, or combinations thereof, may be replaced with a single heating device that meets the requirements above, except for those that are fired by solid fuels. Payment will be based on the number of devices removed, up to a maximum of three, and may not exceed the replacement cost.

c. Removal of a SFBA (limited to a one-time participation in this program per property).

i. Removal of a hydronic heater through a one-time payment of \$5,000.

ii. Removal of other SFBAs through a one-time payment of \$2,000.

d. Repair Program.

i. The repair program will pay for the:

(A) Replacement of a wood stove's catalytic converter that has exceeded its life span through the one-time payment of up to \$750.00.

(B) Replacement of any emissions-reducing component of an EPA certified wood stove up to the maximum amount of \$750.00.

ii. In addition to the general requirements set forth in this section, applicants must fully comply with any inspection process required by the division, which may be performed by a borough-approved vendor.

21.28.050 Forecasting [EXCEEDANCES AND RESTRICTIONS] in the air quality control zone [DURING AN ALERT].

A. During the winter months of October through March, the borough [SHALL] may issue a daily PM2.5 forecast [BY 4:30 P.M.] and, when the division determines that the AQI category is forecasted to be moderate or higher, issue an advisory. [WHEN THE PM2.5 CONCENTRATION REACHES THE ONSET LEVEL FOR AN ALERT AND IS EXPECTED TO REMAIN AT THAT LEVEL FOR 12 HOURS OR MORE, AN ALERT WILL BE DECLARED. AN ALERT MAY APPLY TO THE AIR QUALITY CONTROL ZONE AS A WHOLE, OR TO ONE OR MORE SUB-AREAS DESIGNATED BY THE DIVISION. ONCE AN ALERT IS DECLARED, PM2.5 CONTROL MEASURES SET FORTH IN THIS SECTION SHALL BE IMPLEMENTED AND CONTINUED UNTIL THE ALERT IS CANCELED. THERE ARE TWO LEVELS OF ALERTS: STAGE 1 AND STAGE 2. THE OBLIGATIONS IMPOSED IN THIS SUBSECTION DO NOT REQUIRE, ABSENT SPECIFIC FUNDING FOR THAT PURPOSE, ANY ACTIONS TO BE TAKEN OUTSIDE OF THE BOROUGH'S NORMAL BUSINESS DAYS AND HOURS OF OPERATION. THESE RESTRICTIONS SHALL NOT APPLY DURING A POWER FAILURE. WHEN AN ALERT IS IN EFFECT, OUTDOOR BURNING IS PROHIBITED, INCLUDING NONPERMITTED INCINERATORS AND BURN BARRELS. THIS OUTDOOR BURNING PROHIBITION DOES NOT INCLUDE

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RECREATIONAL FIRES SUCH AS BONFIRES, CAMPFIRES, OR CEREMONIAL FIRES AND THE USE OF FIRE PITS.]

B. The division [WILL] may notify local media to ensure the [DECLARED ALERT] advisory is broadcast. The division [SHALL] may also use social media and methods of direct communication such as text messages as feasible. [INFORMATION WITHIN THE NOTIFICATION WILL CONTAIN THE PM_{2.5} FORECAST, STAGE LEVEL FOR AREAS, AND ACTIONS REQUIRED TO REDUCE SOURCES OF PM_{2.5}. THE OBLIGATIONS IMPOSED IN THIS SUBSECTION DO NOT REQUIRE, ABSENT SPECIFIC FUNDING FOR THAT PURPOSE, ANY ACTIONS TO BE TAKEN OUTSIDE OF THE BOROUGH'S NORMAL BUSINESS DAYS AND HOURS OF OPERATION.

C. STAGE 1: RESTRICTIONS IN THE AIR QUALITY CONTROL ZONE DURING AN ALERT.

1. A STAGE 1 AIR ALERT IS IMPLEMENTED WHEN CONCENTRATIONS EXCEED OR ARE FORECASTED TO EXCEED 25 G/M³.

2. NO FUEL SOURCE BE ADDED TO THE COMBUSTION CHAMBER OF A FIREBOX OF ANY SOLID FUEL BURNING APPLIANCE OR WASTE OIL BURNING APPLIANCE. RESIDENTS SHOULD RELY INSTEAD ON THEIR HOME'S ALTERNATE, CLEANER SOURCE OF HEAT (SUCH AS A FURNACE, BOILER OR ELECTRIC BASEBOARD HEATERS) UNTIL THE STAGE 1 AIR ALERT IS CANCELED.

3. IF A BUILDING OWNER OR OTHER PERSON WITH A PROPERTY OR MANAGERIAL INTEREST IN THE BUILDING HAS AN APPROVED "NO OTHER ADEQUATE SOURCE OF HEAT" DESIGNATION, THE BUILDING OWNER IS EXEMPTED FROM COMPLYING WITH THE STAGE 1 AIR ALERT RESTRICTIONS FOR THAT BUILDING.

4. IF A BUILDING OWNER OR OTHER PERSON WITH A PROPERTY OR MANAGERIAL INTEREST IN THE BUILDING HAS AN APPROVED STAGE 1 WAIVER THE BUILDING OWNER IS EXEMPTED FROM COMPLYING WITH THE STAGE 1 AIR ALERT RESTRICTIONS FOR THAT BUILDING. A STAGE 1 WAIVER WILL BE GRANTED IF THE PERSON WITH PROPERTY OR MANAGERIAL INTEREST VERIFIES THAT THE SFBA BEING OPERATED DURING A STAGE 1 AIR ALERT IS A BOROUGH LISTED APPLIANCE. A STAGE 1 WAIVER MAY BE OBTAINED BY COMPLETING AN APPLICATION ON A FORM DEVELOPED BY THE DIVISION, THAT INCLUDES THE FOLLOWING INFORMATION:

A. DOCUMENTATION OF APPROVED APPLIANCE MUST BE SUBMITTED, INCLUDING PICTURES, MAKE AND MODEL.

B. DOCUMENTATION OF THE APPLICANT'S ABILITY TO PROPERLY STORE WOOD.

C. DOCUMENTATION THE APPLICANT HAS TAKEN A CLASS OR TRAINING IN PROPER WOOD BURNING TECHNIQUES.

5. IF A BUILDING OWNER OR OTHER PERSON WITH A PROPERTY OR MANAGERIAL INTEREST IN THE BUILDING HAS AN APPROVED RCD, THE SOLID FUEL BURNING APPLIANCE IS EXEMPTED FROM STAGE 1 AIR ALERT RESTRICTIONS.

AMENDMENTS ARE SHOWN IN LEGISLATIVE FORMAT

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D. STAGE 2: REQUIRED RESTRICTIONS IN THE AIR QUALITY CONTROL ZONE DURING AN ALERT.

1. A STAGE 2 AIR ALERT IS IMPLEMENTED WHEN CONCENTRATIONS EXCEED OR ARE FORECASTED TO EXCEED 35 G/M³.

2. NO FUEL SOURCE MAY BE ADDED TO THE COMBUSTION CHAMBER OR FIREBOX OF ANY SOLID FUEL BURNING APPLIANCE OR WASTE OIL BURNING APPLIANCE. RESIDENTS SHOULD RELY INSTEAD ON THEIR HOME'S ALTERNATE, CLEANER SOURCE OF HEAT (SUCH AS A FURNACE, BOILER OR ELECTRIC BASEBOARD HEATERS) UNTIL THE STAGE 2 AIR ALERT IS CANCELED.

3. IF A BUILDING OWNER OR OTHER PERSON WITH A PROPERTY OR MANAGERIAL INTEREST IN THE BUILDING HAS AN APPROVED "NO OTHER ADEQUATE SOURCE OF HEAT" DESIGNATION THE BUILDING OWNER IS EXEMPTED FROM COMPLYING WITH THE STAGE 2 AIR ALERT RESTRICTIONS FOR THAT BUILDING.

4. IF A BUILDING OWNER OR OTHER PERSON WITH A PROPERTY OR MANAGERIAL INTEREST IN THE BUILDING HAS AN APPROVED RCD, THE SOLID FUEL BURNING APPLIANCE IS EXEMPTED FROM STAGE 2 AIR ALERT RESTRICTIONS.

E. STAGE RCD: REQUIRED RESTRICTIONS IN THE AIR QUALITY CONTROL ZONE DURING AN ALERT

1. A STAGE RCD AIR ALERT IS IMPLEMENTED WHEN CONCENTRATIONS EXCEED OR ARE FORECASTED TO EXCEED 55 µG/M³.

2. STAGE RCD AIR ALERTS APPLY ONLY TO SOLID FUEL BURNING APPLIANCES WITH AN APPROVED RCD.

3. NO FUEL SOURCE MAY BE ADDED TO THE COMBUSTION CHAMBER OR FIREBOX OF A SOLID FUEL BURNING APPLIANCE WITH AN APPROVED RCD. RESIDENTS SHOULD RELY INSTEAD ON THEIR HOME'S ALTERNATE, CLEANER SOURCE OF HEAT (SUCH AS A FURNACE, BOILER OR ELECTRIC BASEBOARD HEATERS) UNTIL THE STAGE RCD AIR ALERT IS CANCELED.

4. IF A BUILDING OWNER OR OTHER PERSON WITH A PROPERTY OR MANAGERIAL INTEREST IN THE BUILDING HAS AN APPROVED "NO OTHER ADEQUATE SOURCE OF HEAT" DESIGNATION THE BUILDING OWNER IS EXEMPTED FROM COMPLYING WITH THE STAGE RCD AIR ALERT RESTRICTIONS FOR THAT BUILDING.

5. A STAGE RCD AIR ALERT IS NOT REQUIRED TO BE ISSUED UNLESS ONE OR MORE APPROVED RCDs ARE ON FILE WITH THE DIVISION.]

[21.28.060 EXEMPTIONS.

A. NO OTHER ADEQUATE SOURCE OF HEAT

1. A BUILDING OWNER OR OTHER PERSON WITH A PROPERTY OR MANAGERIAL INTEREST IN A BUILDING LOCATED WITHIN THE AIR QUALITY CONTROL ZONE MAY OBTAIN A "NO OTHER ADEQUATE SOURCE OF HEAT" DETERMINATION FROM THE DIVISION IF:

A. THE SFBA BEING USED TO HEAT THE STRUCTURE IS:

AMENDMENTS ARE SHOWN IN LEGISLATIVE FORMAT

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- 602 I. A BOROUGH LISTED APPLIANCE, OR
603 II. AN EPA CERTIFIED APPLIANCE MANUFACTURED AFTER
604 1998, AND IF THE APPLIANCE HAS A CATALYST, THE CATALYST HAS BEEN REPLACED
605 BY A NEW CATALYST IN THE ACCORDANCE WITH MANUFACTURER
606 RECOMMENDATION OR SPECIFICATIONS;
607 B. THE BUILDING OWNER(S) OR OTHER PERSON WITH A PROPERTY
608 OR MANAGERIAL INTEREST IN THE BUILDING APPLIES WITH THE DIVISION ON A
609 FORM DEVELOPED BY THE DIVISION, INCLUDING THE FOLLOWING:
610 I. DOCUMENTATION OF APPROVED APPLIANCE MUST BE
611 SUBMITTED, INCLUDING PICTURES, MAKE, MODEL, AND SERIAL NUMBER.
612 II. DOCUMENTATION OF THE APPLICANT'S ABILITY TO
613 PROPERLY STORE WOOD.
614 III. DOCUMENTATION THE APPLICANT HAS TAKEN A CLASS OR
615 TRAINING IN PROPER WOOD BURNING TECHNIQUES;
616 C. THE BUILDING OWNER(S) OR OTHER PERSON WITH A PROPERTY
617 OR MANAGERIAL INTEREST IN THE BUILDING FILES AN AFFIDAVIT WITH THE
618 APPLICATION THAT THE SUBJECT STRUCTURE MUST BE HEATED AND THE
619 STRUCTURE HAS NO ADEQUATE HEATING SOURCE WITHOUT USING A SOLID FUEL
620 BURNING APPLIANCE OR THAT ECONOMIC HARDSHIPS REQUIRE THE APPLICANT'S
621 USE OF A SOLID FUEL BURNING APPLIANCE OR COMPLYING WITH A RESTRICTION
622 WOULD RESULT IN DAMAGE TO PROPERTY INCLUDING DAMAGE TO THE APPLIANCE
623 ITSELF AND ITS HEATING SYSTEM COMPONENTS. IF ECONOMIC HARDSHIP IS THE
624 REASON THE APPLICANT HAS NO OTHER ADEQUATE SOURCE OF HEAT, VALIDATING
625 DOCUMENTATION IS REQUIRED. VALIDATING DOCUMENTATION MAY BE
626 ESTABLISHED BY SHOWING APPROVAL FOR ASSISTANCE FROM A LIST OF AGENCIES
627 OR PROGRAMS THAT PROVIDE ECONOMIC ASSISTANCE (E.G., PROGRAMS BASED ON
628 HHS POVERTY GUIDELINES, UNEMPLOYMENT INSURANCE, NUTRITION ASSISTANCE)
629 TO BE MADE AVAILABLE BY THE DIVISION;
630 D. THE BUILDING WAS CONSTRUCTED ON OR BEFORE DECEMBER
631 31, 2016.
632 2. THERE SHALL BE NO FEE FOR APPLYING FOR OR OBTAINING A
633 DETERMINATION.
634 3. IT SHALL BE A VIOLATION TO SUBMIT A FALSE AFFIDAVIT FOR A "NO
635 OTHER ADEQUATE SOURCE OF HEAT" DETERMINATION.
636 4. IF THE "NO OTHER ADEQUATE SOURCE OF HEAT" APPLIANCE DOES NOT
637 MEET THE STANDARDS SET IN THIS CHAPTER, THE DIVISION SHALL PROVIDE THE
638 APPLICANT WITH INFORMATION CONCERNING THE BOROUGH'S VOLUNTARY
639 REMOVAL, REPLACEMENT AND REPAIR PROGRAM.
640 5. APPLICATIONS DENIED BY THE DIVISION MAY BE APPEALED TO THE
641 AIR POLLUTION CONTROL COMMISSION WITHIN 30 DAYS OF THE DECISION.

AMENDMENTS ARE SHOWN IN LEGISLATIVE FORMAT

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6. AN APPLICANT THAT HAS BEEN DENIED A "NO ALTERNATIVE SOURCE OF HEAT DETERMINATION" BY THE DIVISION BECAUSE THE APPLIANCE DOES NOT MEET THE CRITERIA OF THIS SECTION MAY APPLY TO THE AIR POLLUTION CONTROL COMMISSION FOR A VARIANCE WITHIN 10 DAYS OF THIS DECISION. A TEMPORARY "NO ALTERNATIVE SOURCE OF HEAT" DETERMINATION SHALL BE GRANTED PENDING THE DECISION OF THE COMMISSION. IN DETERMINING WHETHER TO GRANT A VARIANCE, THE COMMISSION SHALL CONSIDER THE LOCATION OF THE APPLIANCE, IMPACT ON SURROUNDING NEIGHBORHOOD, EMISSION LEVELS OF THE APPLIANCE, THE FINANCIAL INVESTMENT AND ABILITY OF THE APPLICANT TO REPLACE THE APPLIANCE AND ANY OTHER RELEVANT CONDITIONS THAT INDICATE THE OPERATION OF THE APPLIANCE AT THAT LOCATION IS NOT A NUISANCE OR HEALTH HAZARD. INTERESTED PERSONS MAY TESTIFY AND SUBMIT OTHER ADMISSIBLE EVIDENCE FOR THE COMMISSION'S CONSIDERATION. IF THE COMMISSION DENIES A VARIANCE, THE "NO ALTERNATIVE SOURCE OF HEAT" DETERMINATION SHALL EXPIRE 60 DAYS FROM THE DATE OF DENIAL.

B. APPROVED RCDS

A BUILDING OWNER OR OTHER PERSON WITH A PROPERTY OR MANAGERIAL INTEREST IN A BUILDING LOCATED WITHIN THE AIR QUALITY CONTROL ZONE MAY OBTAIN AN "APPROVED RCD" DESIGNATION FROM THE DIVISION FOR A BOROUGH LISTED APPLIANCE THAT IS A PELLET FUEL APPLIANCE, A CATALYTICALLY CONTROLLED WOOD STOVE APPLIANCE, OR A NON-CATALYTICALLY CONTROLLED WOOD STOVE APPLIANCE, IF THE REQUIREMENTS OF THIS SECTION ARE MET:

1. PERFORMANCE TESTING. PERFORMANCE TESTING OF THE APPLIANCE WITH THE RCD HAS BEEN CONDUCTED IN ACCORDANCE WITH THIS SECTION AND DEMONSTRATES POST-RCD PM EMISSIONS OF LESS THAN 0.01 LB/MMBTU.

A. PERFORMANCE TESTING FOR PM EMISSIONS ON A WOOD STOVE, USING CORD WOOD AS A FUEL SOURCE, SHALL BE CONDUCTED USING EPA REFERENCE METHODS 1, 5H, ASTM METHOD E3053 AND CSA-B415.1-10.

B. PERFORMANCE TESTING FOR PM EMISSIONS ON PELLET FUEL BURNING APPLIANCES SHALL BE CONDUCTED USING EPA REFERENCE METHODS 1, 5H, ASTM E2779(10) AND CSA-B415.1-10.

C. PARTICULATE MATTER SAMPLING, PER EPA REFERENCE METHOD 5H, SHALL BE PERFORMED SIMULTANEOUSLY UPSTREAM AND DOWNSTREAM OF THE RCD.

D. A TOTAL OF SIX (6) COMPLETED TESTS, EACH CONSISTING OF ALL APPLICABLE TEST RUNS AT REQUIRED BURN RATES, IS REQUIRED PER APPLIANCE-RCD COMBINATION.

E. PERFORMANCE TESTING SHALL BE PERFORMED BY EITHER (1) A TEST LABORATORY THAT IS EPA APPROVED FOR WOOD HEATER CERTIFICATION TESTING UNDER 40 CFR 60.535 OR (2) AN INDEPENDENT THIRD-PARTY TEST LABORATORY THAT IS ACCREDITED UNDER ISO IEC STANDARD 17025 TO PERFORM

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TESTING USING THE TEST METHODS SPECIFIED IN 40 CFR 60.534 BY AN ACCREDITATION BODY THAT IS A FULL MEMBER SIGNATORY TO THE INTERNATIONAL LABORATORY ACCREDITATION COOPERATION MUTUAL RECOGNITION ARRANGEMENT AND APPROVED BY THE EPA FOR CONDUCTING TESTING UNDER 40 CFR 60 SUBPART AAA.

F. TESTING PROTOCOLS SHALL BE SUBMITTED TO THE DIVISION FOR APPROVAL 30 DAYS PRIOR TO TESTING. ONE COMPLETE SET OF PERFORMANCE TESTS CONDUCTED IN ACCORDANCE WITH THIS SECTION IS REQUIRED PER APPLIANCE CATEGORY. A WRITTEN REPORT OF THE RESULTS WITH SUFFICIENT INFORMATION TO GUARANTEE THAT THE EMISSIONS REQUIREMENTS OF THIS SECTION ARE MET SHALL BE SUBMITTED TO THE DIVISION.

2. APPLICATION. THE BUILDING OWNER(S) OR OTHER PERSON WITH A PROPERTY OR MANAGERIAL INTEREST IN THE BUILDING MAY APPLY TO THE DIVISION ON A FORM DEVELOPED BY THE DIVISION, INCLUDING THE FOLLOWING:

A. DOCUMENTATION OF AN APPROVED APPLIANCE CATEGORY-RCD COMBINATION MUST BE SUBMITTED, INCLUDING PICTURES, MAKE, MODEL, AND SERIAL NUMBER OF BOTH APPLIANCE AND RCD.

B. DOCUMENTATION OF THE APPLICANT'S ABILITY TO PROPERLY STORE WOOD, IF APPLICABLE.

C. DOCUMENTATION THE APPLICANT HAS TAKEN A CLASS OR TRAINING IN PROPER WOOD BURNING TECHNIQUES, IF APPLICABLE.

D. DOCUMENTATION THAT THE RCD WAS INSTALLED BY A CERTIFIED INSTALLER.

3. CONDITIONS OF APPROVAL. A PERSON RECEIVING AN APPROVED RCD MUST CERTIFY THAT THEY (A) WILL ENSURE THAT THE SUBJECT APPLIANCE OBTAINS AN ANNUAL CHIMNEY SWEEP AND SUBMIT PROOF TO THE DIVISION; (B) WILL PROVIDE DATA TO ESTABLISH MAINTENANCE AND MONITORING PROTOCOLS TO ENSURE THE RCD PERFORMS EFFECTIVELY; AND (C) WILL PERFORM ANY ADDITIONAL MAINTENANCE AND MONITORING DETERMINED NECESSARY TO MAINTAIN EMISSIONS STANDARDS AS ESTABLISHED THROUGH FIELD TESTS.]

21.28.070 The Home Heating Reclamation Act

A. Definitions

In this section, unless the context requires otherwise, the following definitions shall apply:

1. "Coal stove" means a heater or stove that is fueled by coal.
2. "Cook stove" means a wood burning appliance that is designed primarily for cooking food and that has the following characteristics:
 - a. An oven, with a volume of one cubic foot or greater, and an oven rack;
 - b. A device for measuring oven temperatures;

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724 c. A flame path that is routed around the oven;
 725 d. A shaker grate;
 726 e. An ash pan;
 727 f. An ash clean-out door below the oven; and
 728 g. The absence of a fan or heat channels that dissipate the heat from
 729 the device.

730 3. "Fireplace" means an assembly consisting of a hearth and open fire
 731 chamber of noncombustible factory-built or masonry materials and provided with a
 732 chimney, for use with solid fuels.

733 4. "Fireplace insert" means a solid fuel burning appliance similar in function
 734 and performance to a freestanding wood burning stove, which is made from cast iron or
 735 steel, designed to be installed in an existing masonry or prefabricated fireplace.

736 5. "Furnace" means an appliance fired by gas, oil, pellets, coal or wood in
 737 which air or water is heated to be circulated throughout a building in a heating system.

738 6. "Hydronic heater" means a fuel burning appliance designed to (1) burn
 739 wood or other solid fuels and (2) heat building space and/or domestic hot water via the
 740 distribution, typically through pipes, of a fluid heated in the appliance.

741 7. "Masonry heater" means a device for warming an interior space through
 742 radiant heating, by capturing the heat from the periodic burning of fuel (usually wood),
 743 and then radiating the heat at a fairly constant temperature for a long period.

744 8. "Pellet fuel burning devices" means a closed combustion, vented pellet
 745 burning appliance with automatic components creating an active air flow system, sold
 746 with the hopper and auger combination as integral parts, and designed, warranted,
 747 safety listed, and advertised by the manufacturer specifically to be fueled by pellets of
 748 sawdust, wood products, and other biomass materials while prohibiting the use of
 749 cordwood.

750 9. "Solid fuel heating appliance" means any appliance designed to produce
 751 heat by burning non-gaseous and non-liquid fuels. This definition includes but is not
 752 limited to:

- 753 a. Wood stoves;
- 754 b. Coal stoves;
- 755 c. Wood-fired hydronic heaters;
- 756 d. Wood-fired furnaces;
- 757 e. Coal-fired hydronic heaters;
- 758 f. Coal-fired furnaces;
- 759 g. Fireplace inserts;
- 760 h. Pellet fuel burning devices;
- 761 i. Masonry heaters;
- 762 j. Cook stoves; and
- 763 k. Fireplaces.
- 764 10. "Wood stove" means a heater or stove that is fueled by wood.

AMENDMENTS ARE SHOWN IN LEGISLATIVE FORMAT

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B. The Fairbanks North Star Borough, excluding the natural gas utility, shall not in any way regulate, prohibit, curtail, ban , nor issue fines or fees associated with the sale, distribution, installation or operation of solid fuel heating appliances or any type of combustible fuels.

Section 3. FNSBC 1.20.080, Fine Schedule, is hereby amended as follows:

Code Section	Offense	Penalty/Fine	Mandatory Warning Required
[21.28.030(A)]	FAILURE TO REMOVE AN UNLISTED APPLIANCE.	\$500.00	YES
21.28.030(B)	FAILURE TO REMOVE, USING OR OPERATING A PROHIBITED HYDRONIC HEATER. 1ST OFFENSE	\$500.00	YES, WITH REMOVAL AS SOON AS PRACTICABLE
21.28.030(B)	FAILURE TO REMOVE, USING OR OPERATING A PROHIBITED HYDRONIC HEATER. 2ND OFFENSE	\$1,000	NO
21.28.030(C)	VIOLATION OF VISIBLE EMISSIONS STANDARD. 1ST OFFENSE	\$100.00	YES
21.28.030(C)	VIOLATION OF VISIBLE EMISSIONS STANDARD. 2ND OFFENSE	\$500.00	NO
21.28.030(D)	EMISSIONS CROSSING PROPERTY LINES. 1ST OFFENSE	\$500.00	YES
21.28.030(D)	EMISSIONS CROSSING PROPERTY LINES. 2ND OFFENSE	\$1,000	NO
21.28.030(E)	FAILURE TO OBTAIN, SUBMIT AND EXECUTE A PERMIT FOR INSTALLING A SFBA IN NEW CONSTRUCTION.	\$1,000	NO
21.28.030(F)	ILLEGAL INSTALLATION OF HYDRONIC HEATERS.	\$500.00	NO

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21.28.030(F)	FAILURE TO REMOVE HYDRONIC HEATERS.	\$500.00	NO
21.28.030(G)	USE OF PROHIBITED FUELS. 1ST OFFENSE	\$100.00	YES
21.28.030(G)	USE OF PROHIBITED FUELS. 2ND OFFENSE	\$500.00	NO
21.28.030(H)	VIOLATION OF COMMERCIAL SALE REQUIREMENTS.	\$500.00	NO
21.28.050(C)	VIOLATION OF A STAGE 1 AIR ALERT RESTRICTION.	\$500.00	YES
21.28.050(D)	VIOLATION OF A STAGE 2 AIR ALERT RESTRICTION.	\$1,000	YES
21.28.060	FILING A FALSE AFFIDAVIT.	\$500.00	NO]

Section 4. FNSBC 4.12.110, powers and duties of the Air Pollution Control Commission, is hereby amended as follows:

4.12.110 Powers and duties.

[A. THE COMMISSION SHALL BE NOTIFIED AND MAY MAKE RECOMMENDATIONS FOR AIR POLLUTION PROVISIONS IN ANY PROPOSED ORDINANCE RELATING TO BUILDING CONSTRUCTION AND/OR RELATING TO PERMITS FOR BUILDING CONSTRUCTION.]

[B.]A. The commission may propose ordinances or amendments to ordinances for consideration by the assembly that would serve to protect and enhance the quality of the air within the borough. Prior to the submission of proposed ordinances to the assembly, the commission shall hold public hearings for the purpose of receiving the testimony.

[C.]B. The commission shall review proposed revisions of regulations or other criteria related to the air quality program and make recommendations to the administration. The commission shall hold public hearings for the purpose of receiving testimony.

[D. ON REQUEST OF THE BOROUGH MAYOR, THE COMMISSION MAY FULLY INVESTIGATE NUISANCES, HEALTH HAZARDS AND OTHER HARMFUL EFFECTS RELATED TO OR CAUSED BY AIR POLLUTION.]

[E.]C. The commission may develop or review comprehensive plans for the prevention, abatement, and control of air pollution in the borough. Such plans may include recommendations on subjects including, but not limited to, transportation control measures, zoning, taxation, research, and public relations.

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[F. THE COMMISSION SHALL ACT AS A HEARING BOARD ON APPEALS ON MATTERS RELATING TO THE AIR QUALITY PROGRAM.
G. THE COMMISSION SHALL HEAR VARIANCE REQUESTS AS SET FORTH IN FNSBC TITLE 21.]

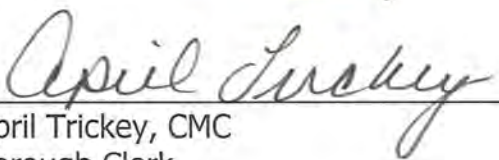
Section 5. Effective Date. This ordinance shall be effective at 5:00 p.m. of the first Borough business day following its adoption.

PASSED AND APPROVED THIS 13TH DAY OF DECEMBER, 2018.




Matt Cooper
Presiding Officer

ATTEST:


April Trickey, CMC
Borough Clerk

Ayes: Gray, Tacke, William, Sanford, Lojewski, Major, Cooper
Noes: Lyke
Other: Quist (Excused)

AMENDMENTS ARE SHOWN IN LEGISLATIVE FORMAT
Text to be added is underlined
Text to be deleted is [BRACKETED, CAPITALIZED]