

Alaska Heating Coal may Violate Manufacturer Fuel Use Requirements: Safety Risks from Burning High-moisture Alaska Coal

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A growing number of residential and commercial users in Interior Alaska are burning coal for heating. Insurance underwriters, mortgage lenders, firefighters, and users should be aware of the risk of explosion and fire from burning high-moisture coal in heating devices in Alaska.

“Improper use and the failure to follow manufacturer guidelines can result in a disaster for the occupants of the home,” states a recent warning from the **Division of Fire and Life Safety of the Alaska Department of Public Safety**. “Only use a grade of coal that is recommended by the manufacturer of your heating equipment and do not put coal in a heating device that is not recommended to burn coal. Make sure that your wood or coal burning stove has been tested and approved by a third party testing laboratory such as UL.” [FDNM 10/26/2013](#).

All coal is not the same. Coal stoves are typically designed for coal types not available in Alaska: high quality Anthracite and, uncommonly, Bituminous. Alaska coal is inferior quality Subbituminous and Lignite. The moisture content of Alaska coal is high relative to other types of coal. High-moisture coal burns with higher emissions and carries a far higher risk of explosions, chimney fires, and structure fires.

Misuse involving coal includes burning the incorrect rank of coal in violation of the manufacturer’s warranty, burning coal in a heater not designed for coal, and improper fuel storage leading to even higher moisture content. According to the [Alaska Fire Marshal 2012 report](#), the most common cause of residential structure fires was heating (28%) and the largest of those was from operating equipment (26%). Coal fires are not broken out as a subset.



Firefighters Respond to Burning Outdoor Coal Hydronic Heater, [Fairbanks, 1/16/2011](#)

Risks to safety and property losses are why manufacturer warranties restrict fuel use to low-moisture coal. UL certification is limited to fuels approved by the manufacturer. To load a stove with improper fuel—even just one time—voids the warranty and UL certification. UL certification is in the fine print of insurance policies, mortgage agreements, leases, and other contracts pertaining to property and liabilities. Use of Alaska coal for heating raises significant, unrecognized liabilities.

Current state regulations are silent on use of fuels not approved by the device manufacturer.

As part of a draft regulatory package to curb winter fine particle (PM2.5) pollution, the Alaska Department of Environmental Conservation has proposed to approve “coal” and “coal pellets” for coal heaters in the Fairbanks PM2.5 nonattainment area, [18 AAC 50.076](#). The proposed regulations do not address the statewide safety risk of explosion and fire or the cost from using Alaska coal contrary to manufacturer recommendations. State agencies must “pay special attention to the cost to private persons of the proposed regulatory action.” [AS 44.62.210](#).

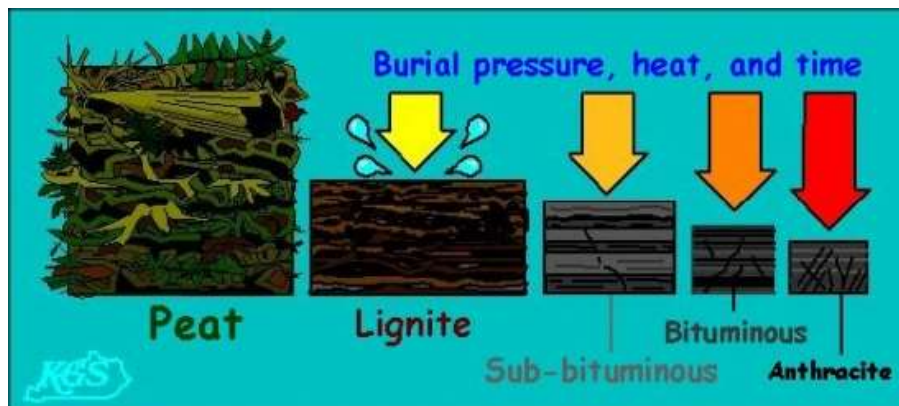
Recommendations:

- 1) To reduce PM2.5 emissions and the risk of dangerous, costly fires, Alaska DEC should prohibit “any material not intended by a manufacturer for use as a fuel.”
- 2) Urge action now, not next year. State agencies have authority to take emergency action under [AS 44.62.250](#).

The comment deadline on Alaska DEC’s proposed regulation is Jan. 23, 2014. For information on providing public comment, see Clean Air Fairbanks: [Take Action: Comment for Clean Air on Draft State Rules](#).

Types of Coal Available in Alaska

- Low ranks of coal, Lignite and Subbituminous, are mined in Alaska, but not high ranks of coal, Bituminous or Anthracite.
- Testing by OMNI ranks stoker coal as Subbituminous C and lump coal as Lignite A.
- Testing supplied by Usibelli Coal ranks Healy coal as Lignite A.
- Inferior quality Subbituminous contains less carbon, more water, and is a less efficient source of heat than Bituminous or Anthracite.
- Lignite is very soft coal, can have up to 70 percent moisture content, emits more pollution than other coals, and is one step away from peat.



The coal formation process. Kentucky Geological Survey, University of Kentucky
<http://theenergylibrary.com/node/12170>

Coal Heater Fuel Requirements

[Harman](#) is likely the largest and most well distributed manufacturer of coal-fired heaters. Harman currently offers [five indoor coal stove models](#).

Harman Super Magnum Stoker Coal Stove - ‘Designed for use with **Anthracite** “Rice” coal only.’ Tested to: UL 1482, UL 391, and ULC S627-00.
http://hearthnhome.com/downloads/installManuals/Super_Mag.pdf

Harman MagnafireSF Coal Stove - “approved for burning **anthracite** coal.” Tested to: UL 1482.
<http://hearthnhome.com/downloads/installManuals/SF250.pdf>

Harman Mark I and Mark III Coal Stoves - “CAUTION: RISK OF EXCESSIVE TEMPERATURE AND DAMAGE TO UNIT. PROPER OPERATION REQUIRES THE USE OF ONLY PEA, NUT & COAL STOVE SIZE **ANTHRACITE** COAL.”
OMNI-Test Laboratories, Inc. Report #135-S-07-4. Tested June 1985; Tested to: UL 737, UL 1482
http://hearthnhome.com/downloads/installManuals/Mark_I_II_III.pdf

Harman TLC-2000



FNSB Assembly member and KFAR radio personality Michael Dukes installed this model to heat his home in North Pole’s Rectangle of Death, fall 2012. Justified his choice as “*heat or eat*”: [LA Times 2/16/2013](#).

“**Anthracite** coal, pea or nut size, is the primary fuel for which the TLC2000 is designed. **Bituminous** coal may also be burned but the results will vary due to the variation in bituminous coal from region to region....CAUTION:

Use of fuels other than those specified will void the product warranty and may pose a risk to personal health and safety.”

OMNI-Test Laboratories Report #135-S-28-4. Tested to: UL 1482, UL 737, ULC-S627
<http://hearthnhome.com/downloads/installManuals/TLC2000.pdf>

This warranty does not cover the following:

Damages resulting from: “**use of fuels other than those specified in the operating instructions**”

Reading Coal Stove Co

Allegheny RS-96S, Lehigh RS-96C, Susquehanna RSDB-06, & Juniata RSFD-06

“FUEL: Premium **Anthracite** Rice or Buckwheat Coal”

“These warranties apply only if the device is installed and operated as recommended in this Owner’s Manual.”

Swatara CS-85

“This heater is only for burning **Anthracite** coal. Use of any other solid fuel except for coal ignition purposes is a **violation of federal law**.”

<http://www.readingstove.com/reading-stove-support>

Fire Chief Furnace, FC500E, FC700E, FC1100E

“NOTE: Do not burn coke, charcoal, highly volatile Bituminous coal, sub Bituminous, lignite or cannel coal (sometimes called channel coal or candle coal).”

<http://www.woodlanddirect.com/Wood-Stove-and-Accessories/Wood-Stoves-Large-Over-2000-sqft/Fire-Chief-FC1100E-Indoor-Wood-Coal-Burning-Furnace>

Keystoker Warm Air Furnace, A-80, A-120, A-150, A-250, A-350, & A-450

“Burn rice or buckwheat anthracite coal only”

<http://www.keystoker.com/service-manuals.php>

EFM Stoker Boiler Unit, DF520 & AF

‘Use only Pennsylvania Anthracite coal in the size known as “rice coal”’

<http://c326988.r88.cf1.rackcdn.com/DF520-Installation.pdf>

<http://c326988.r88.cf1.rackcdn.com/StokerFiredFurnace.pdf>

EFM Wood/Coal Boiler, WCB

“The WCB Boiler is designed to burn anthracite (hard) coal of the “Chestnut” or “Nut” size. We do not recommend the use of bituminous (soft) coal.”

<http://c326988.r88.cf1.rackcdn.com/Wood-Coal-Boiler-Manual.pdf>

Leisure Line Boiler, AA220

“CAUTION Burn only Rice or Buckwheat Sized Anthracite Coal in the AA220 Boiler.”

<http://leisurelinestoves.com/files/76285747.pdf>

Leisure Line Furnace, Anthraking 110 & 220

“BURN ANTHRACITE COAL ONLY”

<http://leisurelinestoves.com/files/55330556.pdf>

Hitzer E-Z Flo Hopper Stove, 50-93 & 30-95

“Type of fuel for use in these units is either anthracite or bituminous coal. CAUTION: USE ONLY THE TYPE OF FUEL SPECIFIED HERE AND ON THE HEATER. Burning bituminous coal in the hopper will void your warranty.”

<http://www.hitzer.com/documents/product/50%20and%20%2030%20%20instructions.doc>

Alaska Coal: Subbituminous C Grading into Lignite A

Interior Alaska coal is mined by [Usibelli Coal Mine](#) in Healy, Alaska.

According to [Usibelli Coal Mine](#), Healy coal is Subbituminous C. However, Usibelli’s Btu analysis identifies their coal may more properly be graded Lignite A.

Table 1:

Alaska Coal	Moisture Content	Btu/lb, as received	Rank
Healy coal*	27 to 30%	7,200 to 7,740	“Subbituminous C”
Stoker coal	33.5%**	8,602***	Subbituminous C
Lump coal	25.4%**	8,305***	Lignite A (borderline)

* Usibelli Coal Data <http://www.usibelli.com/Coal-data.php>

** OMNI-FNSB report 12/23/2011 <http://cleanairfairbanks.files.wordpress.com/2012/02/omni-space-heating-study-fairbanks-draft-report-rev-4.pdf>

*** OMNI-FNSB Appendix B <http://cleanairfairbanks.files.wordpress.com/2013/03/omni-draft-of-appendix-b-analytical-laboratory-reports.pdf>

Table 2:

Ranks of Coal	BTU/lb*	Mining Sites in Alaska**
Anthracite	13,500 to 15,600	
Bituminous	11,000 to 15,500	
Subbituminous	8,300 to 13,000	Healy, Jarvis, Wood River Cks
Lignite	5,500 to 8,300	Healy, Jarvis, Wood River Cks

* The Energy Library <http://theenergylibrary.com/node/12170>

** USGS Alaska Coal Assessment <http://pubs.usgs.gov/dds/dds-077/dds77text.html#heading154613008>

Table 3:

Grades of Low Rank Coal	Heat Content, Btu/lb*	Moisture Content**
Subbituminous A	10,500 to 11,500	10 to 45%
Subbituminous B	9,500 to 10,500	
Subbituminous C	8,300 to 9,500	
Lignite A	6,300 to 8,300	30 to 60%
Lignite B	<6,300	

* Gareth D. Mitchell, Coal and Organic Petrology Labs, Pennsylvania State University

<http://www.steel.org/en/Making%20Steel/How%20Its%20Made/Processes/Processes%20Info/Coal%20Utilization%20in%20the%20Steel%20Industry.aspx>

** Indiana Center for Coal Technology Research

<http://www.purdue.edu/discoverypark/energy/assets/pdfs/cctr/outreach/Basics8-CoalCharacteristics-Oct08.pdf>

OMNI Lab Testing for 2011 FNSB Study

OMNI-Test, an EPA certified lab, tested the Harman Mark II coal stove with Alaska coal, in violation of the manufacturer's warranty.

Was this testing in violation of OMNI's commercial general liability, umbrella policy, and workers' compensation contracts? OMNI performed both the \$392,000 FNSB study in 2011 and the original testing of the Harman Mark II coal stove for UL certification in 1985.

Harman Mark II - discontinued

"CAUTION: RISK OF EXCESSIVE TEMPERATURE AND DAMAGE TO UNIT. PROPER OPERATION REQUIRES THE USE OF **ONLY** PEA, NUT & COAL STOVE SIZE **ANTHRACITE** COAL."

This warranty does not cover the following:

Damages resulting from: "use of fuels other than those specified in the operating instructions"

OMNI-Test Laboratories, Inc. Report #135-S-07-4. Tested June 1985; Tested to: UL 737, UL 1482
Warranty: http://hearthnhome.com/downloads/installManuals/Mark_I_II_III.pdf

Heaters tested with coal by OMNI for FNSB study:

1. **Harman Mark II**: indoor coal stove, 72,000 Btu/hr, carried by [The Woodway](#) in Fairbanks, tested w/ both stoker and lump coal, UL 737, UL 1482 listed.
2. **Crown Royal Stoves RS7300**: outdoor hydronic heater, 240,000 Btu/hr, tested w/ stoker coal, with and w/o CS-100 afterburner, carried by [North Pole Coal](#), UL 391, UL 726 listed, CSA B366.1 certified [not EPA Phase 1 or 2].
3. **Decker Manufacturing Titan 2**: outdoor coal hydronic heater, auger-fed, 440,000 Btu/hr, tested w/ stoker coal, carried by [North Pole Coal](#), 3.5 ton hopper available, [CSA tested and certified](#).

2011 OMNI report draft and appendices have test results.

Models tested were identified to FNSB Finance Committee 1/7/2011. "Carried by" info is from that presentation and may no longer be accurate. Also from the presentation, "Harman is likely the largest and most well distributed manufacturer of coal-fired heaters."

[Usibelli coal](#) for OMNI testing was purchased from [North Pole Coal](#) and provided to OMNI by FNSB.

UL 1482 Standard for Solid-Fuel Type Room Heaters

http://www.ul.com/global/eng/pages/solutions/standards/accessstandards/catalogofstandards/standard/?id=1482_7

UL 1482 Sections Provided by UL (highlighting added for emphasis)

14 Fire Tests for Coal Heaters

14.1 Coal fire test

14.1.1 A room heater intended to burn coal is to be loaded to one-half the full depth of the fuel charging chamber volume with the **size and type of coal specified by the manufacturer's instructions**. The fuel charging chamber is to be identified as the volume of the chamber below the lower level of the feed door opening. However, when a room-heater's fuel charging chamber is intended to contain fuel above the lower level of the feed door (for example, in the case of a heater whose door serves both to feed the unit and to remove the ashes), the charging chamber is to be loaded to a depth that complies with the intent of this test procedure.

14.1.2 After ignition, coal is to be added to the heater at the rate required to maintain the fuel level at the one-half-full depth until maximum temperatures are attained.

14.1.3 The first fuel loading after ignition is to occur at 30 minutes and subsequent loadings are to be increased or decreased (as required) so that the volume of the fuel consumed between loadings is an equivalent volume to one-half the intended fuel depth. During this test, the heater is to be loaded at intervals of not less than 15 minutes nor more than 60 minutes, according to the following:

- a) When one-half of the intended fuel depth is consumed in 30 minutes, fuel is to be added at 30-minute intervals.
- b) When less than one-half of the intended fuel depth is consumed in 30 minutes, the loading interval is to be increased to 45 minutes. When less than one-half the intended fuel depth is consumed in 45 minutes, the interval is to be increased to 60 minutes.
- c) When more than one-half of the intended fuel depth is consumed in 30 minutes, the loading interval is to be reduced to 15 minutes.
- d) The subsequent fuel loading intervals are to be maintained at 15, 30, 45, or 60 minutes, according to the determinations in (a), (b), or (c).

14.1.4 Ashes in the ash pan or on the hearth underneath the grate are to be removed after each fuel loading operation.

14.1.5 The coals are to be shaken at each fuel loading interval by use of an integral mechanism or by manually slicing with a flat bar of steel through the coals.

14.1.6 After maximum temperatures are obtained with the fuel depth specified in 14.1.2, the fuel depth is to be increased to the full fuel charging chamber volume and the test sequence repeated until the maximum temperatures are obtained for the full fuel depth.

14.1.7 When the room heater is operated as described in 14.1.1 – 14.1.6, the maximum temperature rise above ambient temperature shall not exceed:

- a) 117°F (65°C) on exposed surfaces of the test structure; and

b) 90°F (50°C) on unexposed surfaces of the test structure, such as beneath the room heater, beneath the floor protector or behind the wall-mounted shield.

14.1.8 The temperature rise on any part of the room heater, and on a chimney connector when provided as part of the room heater, shall not exceed the maximum values specified in Column 1 of Table 10.1 for the material employed.

14.1.9 The temperature of the flue gases entering the chimney shall not exceed 1000°F (538°C). Exception: The temperature of the flue gases are permitted to exceed 1000°F (538°C) when the temperature does not exceed 1400°F (760°C) for a cumulative period not exceeding 12-1/2 percent of the test duration.

14.1.10 After completion of the coal fire test specified in 14.1.1 – 14.1.9, the test is to be repeated using a size or type of coal different from that specified by the manufacturer.

14.2 Abnormal radiant fire test

14.2.1 A room heater not incorporating an integral coal storage hopper and intended to burn coal is to be loaded to a depth of 6 inches (150 mm) or to one-half the volume of the coal loading chamber, whichever is the greater depth, with charcoal briquettes formed in the shape of a 2.0- by 1.9-inch (50- by 48-mm) square pillow having rounded edges and a maximum thickness of 1.2 inches (30 mm). The briquettes are to have a count weight of 17 per pound (38 kg), a heat content (dry basis) of 11,500 Btu per pound (26,750 J/kg), and a moisture content of 5 percent.

14.2.2 When the room heater is operated as described in 11.6 and 11.7, the maximum temperature rises shall be not more than 140°F (77.8°C) above ambient temperature on the following surfaces:

- a) Test structure;
- b) Room heater or chimney connector parts at points of zero clearance to the test structure; and
- c) Beneath a floor protector applied to the area prescribed for such a protector.

14.2.3 The temperature rise on any part of the room heater, and on a chimney connector when provided as part of the room heater, shall not exceed the maximum values specified in Column 2 of Table 10.1 for the material employed.

14.2.4 The temperature of the flue gases entering the chimney shall not exceed 1400°F (760°C). Exception: The temperature of the flue gases are permitted to exceed 1400°F (760°C) when the temperature does not exceed 1700°F (927°C) for a cumulative period not exceeding 10 minutes of the test duration.

14.3 Abnormal brand fire test

14.3.1 When a room heater not incorporating an integral coal storage hopper and intended to burn coal is operated as described in 12.3 – 12.8, the maximum temperatures shall be not more than 140°F (77.8°C) above ambient temperature on the following surfaces:

- a) Test structure;
- b) Room heater or chimney connector parts at points of zero clearance to the test structure; and
- c) Beneath a floor protector applied to the area prescribed for such a protector.

14.3.2 Each fire brand for the coal burning heater is to have an area equal to one-third the grate area or one-third the largest wall area of the fire chamber, whichever area is greater.

14.3.3 The temperature rise on any part of the coal burning room heater, and on a chimney connector provided as part of the room heater, shall not exceed the maximum values specified in Column 2 of Table 10.1 for the material employed.

14.3.4 The temperature of the flue gases entering the chimney shall not exceed 1400°F (760°C). Exception: The temperature of the flue gases are permitted to exceed 1400°F (760°C) when the temperature does not exceed 1700°F (927°C) for a cumulative period not exceeding 10 minutes of the test duration.

54.4 Coal burning heaters

54.4.1 The instructions for a room heater intended to burn coal shall also include particular details concerning:

- a) Reference to the formation and removal of soot buildup in the chimney connector and chimney as follows (the inspection frequency ²once every two months ² stated below may be a shorter time period at the manufacturer's or private labeler's option):

²Soot – Formation and Need for Removal

When coal is burned, the products of combustion combine with moisture to form a soot residue which accumulates on the flue lining. When ignited, this soot makes an extremely hot fire.

The chimney connector and chimney should be inspected at least once every two months during the heating season to determine if a soot buildup has occurred. If soot has accumulated, it should be removed to reduce the risk of a chimney fire.² This information may be combined with the statement contained in 54.3.2 (d) if the unit is a combination wood/coal burning heater.

- b) Maximum flue collar draft [inches of water (Pa)] for operation of a heater intended to burn only coal. Information on measurement and control of chimney draft including the installation and operation of barometric draft regulators.
- c) Type and size of coal fuel to be used in the heater.
- d) Recommendations on the proper storage of coal.
- e) Caution statement regarding the use of fuels other than those specified on the heater.