



U.S. Department
of Transportation

**Research and
Special Programs
Administration**

400 Seventh Street, S.W.
Washington, D.C. 20590

SEP 21 1998

Mr. Edward Yarmak, Jr., P.E.
Chief Engineer
Arctic Foundations, Inc.
5621 Arctic Boulevard
Anchorage, Alaska 99518-1667

98-0273

Dear Mr. Yarmak:

This is in response to your letter dated September 8, 1998 requesting clarification of the requirements in § 173.306 (e), under the Hazardous Materials Regulations (HMR; 49 CFR parts 171-180). Specifically, you ask whether your devices, which you refer to as Thermopiles and Thermoprobes, meet the defining criteria for refrigeration machines.

The HMR govern the transportation of hazardous materials in commerce. Under § 173.22, it is the shipper's responsibility to properly classify a hazardous material or determine that it does not meet a hazard class definition in Part 173. If your devices conforms to the defining criteria identified in § 173.306 (e), it is the opinion of this office that they would be considered to be Refrigerating machines.

If we can be of further assistance, please feel free to contact us.

Sincerely,

Hattie L. Mitchell, Chief
Regulatory Review and Reinvention
Office of Hazardous Materials Standards

ARCTIC FOUNDATIONS, INC.

Belts

§ 173.306

September 8, 1998

Ryan Posten
Transportation Regulation Specialist
Regulatory Review and Reinvention
U. S. Department of Transportation
Research and Special Programs Administration
Office of Hazardous Materials Standards - DHM10
400 Seventh Street, S. W.
Washington, DC 20590

Re: Interpretation of 173.306 (e) with regard to Thermopiles and Thermoprobes

Dear Mr. Posten:

On August 31, 1998, Mr. Ron Abis and Mr. David Robertson of the USDOT met with us concerning the shipping of the products that we manufacture. We believe that they fall under a standard exception, and that is 173.306(e) for refrigeration machines. We will detail our products to you so that you can make an interpretation as to whether our belief is correct.

Arctic Foundations, Inc. manufactures passive refrigeration devices that are used to freeze soil. These devices are generally known as thermosyphons and use natural temperature differentials between the cold winter air and the soil to operate. There are no external energy inputs required for the devices to properly operate. A detailed description follows:

Thermosyphons are typically constructed using pipe tubing with closed ends. The sealed vessel is charged with a fixed quantity of working fluid so that there are predetermined volumes of vapor and liquid fractions contained in the vessel. The portion of the thermosyphon exposed to the air is the condenser and the buried portion is the evaporator. In normal applications, the evaporator is not completely full of liquid. Whenever the condenser end of the thermosyphon is cooler than the evaporator end, the vapor condenses and returns by gravity to the evaporator. Most of the condensate evaporates from the side of the vessel before reaching the bottom. The latent heat absorbed on evaporation of the liquid and subsequently released upon condensation of the vapor is responsible for the high heat transfer conductances typical of thermosyphons.

Arctic Foundations, Inc.

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More specifically, Arctic Foundations, Inc. builds thermosyphons in accordance with Section VIII, Division 1 of the ASME Boiler and Pressure Vessel Code. Fill ratios are generally less than 10% and usually approach 3% for most units. Welded construction is used with standard pipe and semi-elliptic ends. Carbon Dioxide, R-744, is our refrigerant of choice; however, various other refrigerants have been used including R-11, R-12, R-22, R-290, and R-600. Thermosyphons charged with carbon dioxide are typically designed for a maximum allowable working pressure of 750psi. Materials of construction are generally mild steel. Fabrication is by welding. These units are shipped from our plant to the project site where they are installed. Shipping may be by truck, rail, barge or air. Once installed, the units are anchored to the earth, providing subgrade refrigeration for the facility to prevent permafrost degradation.

Should you require additional information, please contact us at your convenience.

Very truly yours,



Edward Yarmak, Jr., P. E.
Chief Engineer

EY/rlp

ARCTIC FOUNDATIONS, INC.

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