U.S. Department
of Transportation

**Pipeline and Hazardous
Materials Safety
Administration**

1200 New Jersey Avenue, SE
Washington, DC 20590

April 16, 2020

Christie Babalis
General Counsel
Goal Zero
675 West 14600 South
Bluffdale, UT 84065

Reference No. 19-0129

Dear Ms. Babalis:

This letter is in response to your November 8, 2019, letter requesting clarification of the Hazardous Materials Regulations (HMR; 49 CFR Parts 171-180) applicable to the classification of an item as "UN3481, Lithium ion batteries contained in equipment, 9." You explain that your company manufactures a portable power station that contains lithium ion batteries, called the Yeti Power Station (Yeti). You explain that although the Yeti is used to provide power for external devices, it has its own operation and internal functions that use power from the batteries. These internal functions include monitoring and adjusting the charging behavior of the Yeti based on the availability of power on the input ports, specifically in relation to solar power inputs that are constantly changing. Additional functions include monitoring available power on the input ports and notifying the end user if the power inputs change within certain parameters.

Additionally, you explain that the product line was designed as two separate product types: the equipment with its own operation, and a separate battery pack to power that equipment. You provided pictures of the two product types showing the standalone battery packs and the Yeti without the battery installed. You state that these two products can be integrated into a single unit, combining the non-hazardous power station without the battery and the compatible standalone battery pack. Specifically, you seek confirmation of your understanding that when integrated, this product may be classified as "UN3481, Lithium ion batteries contained in equipment, 9."

It is the opinion of this Office that the classification of the Yeti as "UN3481, Lithium ion batteries contained in equipment, 9" is incorrect. Section 173.185 defines "equipment" as the device or apparatus for which the lithium cells or batteries will provide electrical power for its operation. While there are functions internal to the Yeti for which the battery provides power, those functions are secondary to and in support of the primary function of this unit, which is to provide power to other external pieces of equipment. Based on your description of the product, and research into this and similar products, the functions that are described for these items include providing power to smartphones, tablets, cameras, laptops, fridges, and televisions. The primary purpose of these units appears to be serving as a backup battery to items that are

typically powered by a lithium battery or providing power to items powered by electricity. All other functions of the Yeti and similar units appear to support the performance of that primary function.

In accordance with § 173.22, it is the shipper's responsibility to properly class and describe a hazardous material. This Office does not perform that function. However, in consideration of the information you have provided, the Yeti's main function appears to be providing power to other pieces of equipment. Therefore, this item should be classified as "UN3480, Lithium ion batteries, 9."

I hope this information is helpful. Please contact us if we can be of further assistance.

Sincerely,

T. Glenn Foster
Chief, Regulatory Review and Reinvention Branch
Standards and Rulemaking Division

Larson
19-0129

November 8, 2019

Mr. Duane A. Pfund
International Standards Coordinator
Pipeline and Hazardous Materials Safety Administration
United States Department of Transportation
1200 New Jersey Ave., SE
East Building, Second Floor
Washington, D.C. 20590

Re: Request for Interpretation - Yeti Power Station with Battery Included

Dear Mr. Pfund:

Goal Zero, LLC manufactures and sells, among other products, portable power stations that contain lithium ion batteries, called "Yeti Power Stations" (hereinafter, "Yeti"). We have understood d the proper UN classification of the Yetis to be UN3481 and not UN3480, and we are seeking an interpretation of the attached information and the Hazardous Materials Regulations (HMR: 49 CFR 171-180) to confirm our understanding that our Yetis are properly classified as UN3481.

After careful analysis of our Yeti Power Station products against interpretation of the relevant HMR, Goal Zero has concluded and has operated under the assumption that the fully-integrated Yeti Power Station with Battery is most properly classified as UN 3481, "lithium ion batteries contained in equipment or packed with equipment". For the following reasons, we believe this to be the most appropriate classification and seek confirmation from you on this issue.

1. Battery contained in equipment. The primary direction that affects whether Goal Zero's Yeti Power Station with Battery products fit under UN 3481 comes from 49 CFR173.185, which, in reference defines "*equipment*" as "the device or apparatus for which the lithium cells or batteries will provide electrical power for its operation."

   While the Yeti product line is used to provide power for external devices, it also has its own operation and function which uses the energy stored in the batteries. The following e operations of the Yeti are some of the primary functions which we believe make it a "power station" rather than a battery or traditional power bank:

   - Monitoring and adjusting the charging behavior of the Yeti based on the availability of power on the input ports, specifically in relation to solar power inputs that are constantly changing. This function resides on a subsystem, referred to as the MPPT or PWM charge controller, that is constantly

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operating, consuming power for its function, and uses the battery for this power even when no output power is being delivered to external equipment.

- Monitoring of available power on the input ports and notifications to the end user if the power inputs change within certain parameters. One example is if the Yeti is used as a home backup power system, in which case it is plugged into and monitoring the utility grid power availability. If this power is suddenly turned off, the Yeti monitors and detects this change and notifies the owner of a power outage, allowing the user to remotely turn ports on the Yeti on or off and potentially adjust their plans for power usage behavior in their home. This function resides on the master control subsystem and includes a WiFi module for connection via WiFi to cloud based services for monitoring of the state of power inputs and outputs connected to the Yeti. Again, in almost the entire and constant function of this subsystem, the batteries provide power for a major function of the Yeti when no output power is being delivered to external equipment.

So, while it is true that the Yeti provides power to other equipment external to the power system, the lithium cells or batteries also provide power for the operation of the Yeti itself. In the above examples, the power from the batteries are actively used within the Yeti and in most applications, the Yeti will spend almost all its time using that battery power for this type of operation, rather than delivering power to external equipment.

2. Design and architecture: The Yeti product line was designed specifically as two separate product types, the equipment with its own operation, and a separate battery pack, each of which could be shipped separately, but also as an integrated singular product as equipment containing lithium batteries. A reference block diagram of these functions can be seen in Figure 1 below.

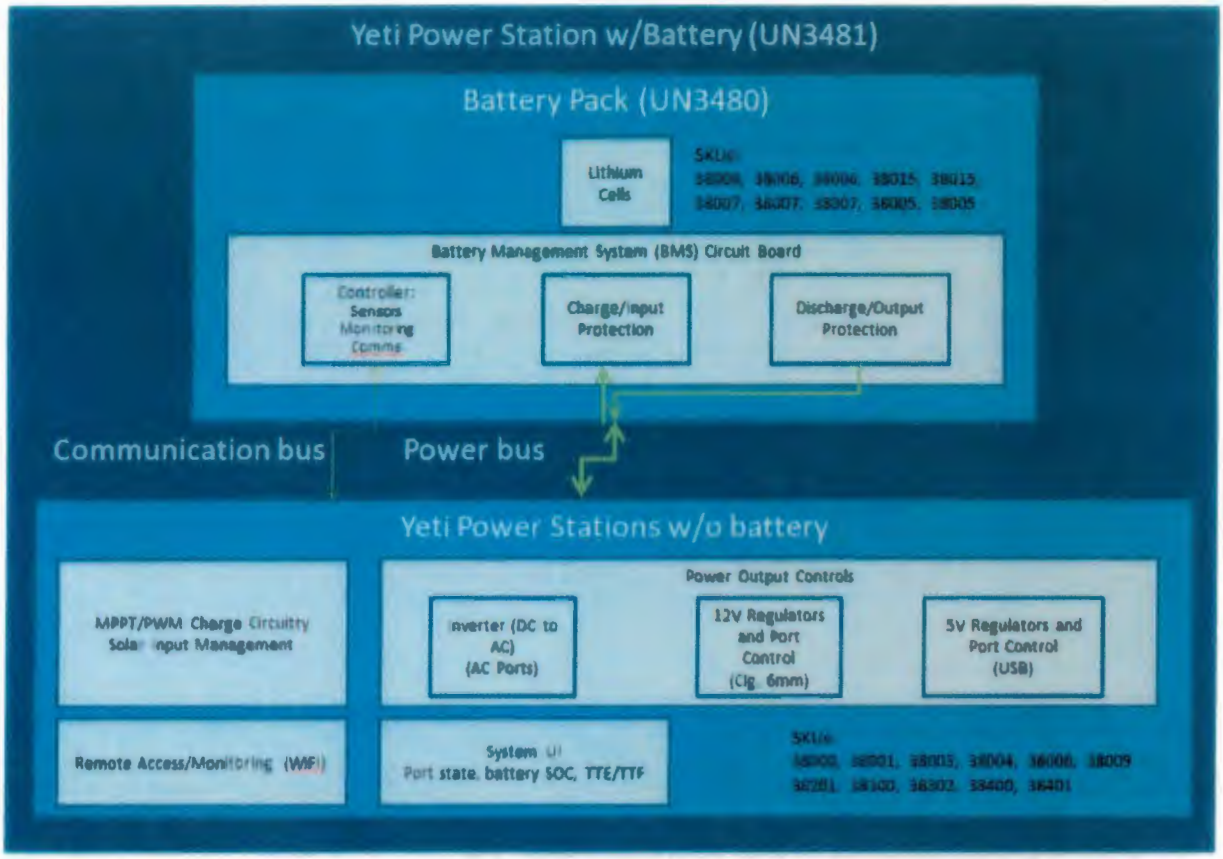

Figure 1: Yeti Power Station architecture and functional block diagram.

The battery packs are a standalone SKUs, with their own mechanical enclosure, power and communication interfaces, and electronics, which reside on the system together with the lithium battery cells (see Figure 2).

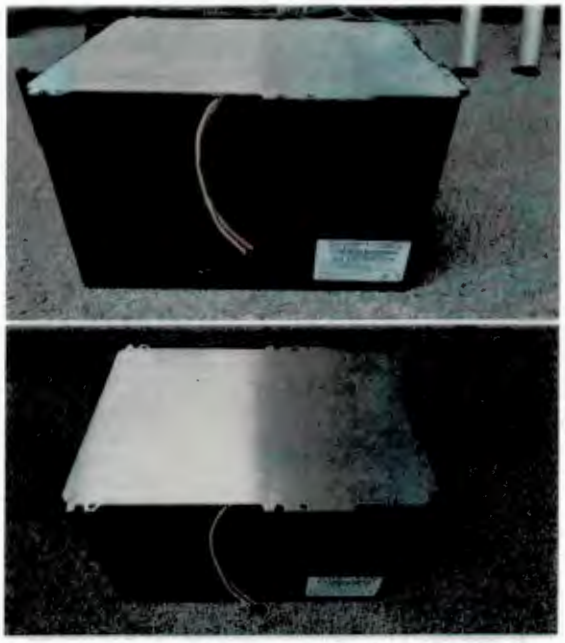

Figure 2: Yeti 3000 Battery Pack, 3074 Wh Battery LG M26 2.6Ah Cells, shipped as UN 3480

This SKU can be and is shipped on its own to various assemblers for assembly into the integrated Yeti Power Station with Battery SKUs described below. In compliance with existing interpretation, as stated in Interpretation Response #16-0022 dated March 7, 2017, under Q2, when this battery is shipped separately from its equipment, it is classified as UN 3480. To meet safety standards for UN 3480 and relevant shipping certification requirements from IATA and other shipping regulatory agencies (i.e., UN38.3 testing), this enclosure and design ensures that no batteries can come into contact with each other or with a conductive or metal surface, as well as contains all electronics to protect from hazardous conditions such as overcurrent inputs and outputs, overvoltage during charging, and limiting or preventing charge/discharge when the batteries are outside of the appropriate temperature parameters. These battery packs are each tested and certified to UN38.3 standards. Examples of this product include:

SKU	Name	Rev	Description	Classification
38006	YETI LI 1400 BATTERY PACK	1.0	1425 Wh Lithium Battery, Sanyo AA 2.2Ah Cells	UN 3480
38006	YETI LI 1400 BATTERY PACK	2.0	1424 Wh Lithium Battery, LG M26 2.6Ah Cells	UN 3480
38006	YETI LI 1400 BATTERY PACK	3.0	1413 Wh Lithium Battery, Sanyo ZL2 2.35Ah Cells	UN 3480
38015	YETI LI 3000 BATTERY PACK	1.0	3074 Wh Lithium Battery, LG M26 2.6Ah Cells	UN 3480

38015	YETI LI 3000 BATTERY PACK	2.0	2981 Wh Lithium Battery, Sanyo ZL2 2.35Ah Cells	UN 3480
38007	YETI LI 400 BATTERY PACK	1.0	428 Wh Lithium Battery, Sanyo AA 2.2Ah Cells	UN 3480
38007	YETI LI 400 BATTERY PACK	2.0	427 Wh Lithium Battery, LG M26 2.6Ah Cells	UN 3480
38007	YETI LI 400 BATTERY PACK	3.0	411 Wh Lithium Battery, Sanyo ZL2 2.35Ah Cells	UN 3480
38005	YETI LI 1000 BATTERY PACK	1.0	1045 Wh Lithium Battery, Sanyo AA 2.2Ah Cells	UN 3480
38005	YETI LI 1000 BATTERY PACK	2.0	1053 Wh Lithium Battery, LG M26 2.6Ah Cells	UN 3480
NEWSKU[1]	YETI LI 500 BATTERY PACK	1.0	500 Wh Lithium Battery, LG M26 2.6Ah Cells	UN 3480
NEWSKU[1]	YETI LI 1500 BATTERY PACK	1.0	1500 Wh Lithium Battery, LG M26 2.6Ah Cells	UN 3480

1. These SKUs have not yet been built or created, but are in the system for new product launch planning in 2020.

Independently manufactured and shipped alone (with no battery included), the Yeti Power Stations Without Battery are independent SKUs, considered as equipment that have a significant amount of added mechanical and electrical functions for the user experience and applications (see Figure 3).

Figure 3: Yeti 3000 Without Battery. Fully assembled (top) and with lid removed (bottom)

These include a master control circuit that handles low power inputs and output regulation, significant on-system user interfaces for managing the state of the system, and WiFi capabilities for communicating and controlling additional monitoring and management features, some of which are completely unrelated to the output power delivery (i.e., state of

power lines, state of input power from solar, state of charge on the battery). Significant to the topic of safety in shipping, this subsystem also handles multiple additional layers of safety for any lithium battery attached to it, including mechanical support and protection and electronic management of both charging and discharging of the battery. This subsystem includes a cavity and interconnects for the installation of the battery packs, which can vary in size, model, and capabilities. The battery pack is then replaceable after installation as well, allowing for upgrades or new batteries to be swapped into the finished product as needed. In terms of function and purpose, this type of product is similar to laptops which have removable batteries when those batteries are *not* installed. When shipped, this SKU is not a hazardous material and contains no lithium batteries. From an engineering and logistics perspective, the Yeti is equipment with its own operation, functional value, and constitutes the majority of the development cost, effort, and feature delivery of the product even when compared to the battery.

The two subsystems can be integrated into a single SKU and product, combining the non-hazardous Power Station Without Battery SKU with a compatible standalone battery pack SKU, constituting the equipment and a corresponding compatible battery. When shipped together or as an integrated SKU, Goal Zero classifies these packages as UN 3481. Fully integrated Yeti Power Station with Battery SKUs include:

SKU	Name	Description	Classification
38000	YETI LI 400 110V	Fully integrated Yeti 400 Li with Battery, Gen 1, for 110V Geographies	UN 3481
38001	YETI LI 400 220V	Fully integrated Yeti 400 Li with Battery, Gen 1, for 220V Geographies	UN 3481
38003	YETI LI 1400 220V	Fully integrated Yeti 1400 Li with Battery, Gen 1, for 220V Geographies	UN 3481
38004	YETI LI 1000 110V	Fully integrated Yeti 1000 Li with Battery, Gen 1, for 110V Geographies	UN 3481
38008	YETI LI 400 100V JAPAN	Fully integrated Yeti 400 Li with Battery, Gen 1, for 100V Geographies (Japan)	UN 3481
38009	YETI LI 1400 100V JAPAN	Fully integrated Yeti 1400 Li with Battery, Gen 1, for 100V Geographies (Japan)	UN 3481
38201	YETI LI 1000 220V	Fully integrated Yeti 1000 Li with Battery, Gen 1, for 220V Geographies	UN 3481
38300	YETI LI 1400 V2 110V	Fully integrated Yeti 1400 Li with Battery, Gen 2, for 110V Geographies	UN 3481
38302	YETI LI 1400 V2 100V JAPAN	Fully integrated Yeti 400 Li with Battery, Gen 2, for 100V Geographies (Japan)	UN 3481
38400	YETI LI 3000 V2 110V	Fully integrated Yeti 400 Li with Battery, Gen 2, for 110V Geographies	UN 3481
38401	YETI LI 3000 V2 230V	Fully integrated Yeti 400 Li with Battery, Gen 2, for 230V Geographies	UN 3481
38402	YETI LI 3000 V2 100V JAPAN	Fully integrated Yeti 400 Li with Battery, Gen 2, for 100V Geographies (Japan)	UN 3481
NEWSKU[1]	Yeti 200X Li 110V	Fully integrated Yeti 200 Li with Battery, Gen 3, for 110V Geographies	UN 3481
NEWSKU[1]	Yeti 200X Li 230V (Type F)	Fully integrated Yeti 200 Li with Battery, Gen 3, for 230V Geographies	UN 3481
NEWSKU[1]	Yeti 400X Li 110V	Fully integrated Yeti 400 Li with Battery, Gen 3, for 110V Geographies	UN 3481
NEWSKU[1]	Yeti 400X Li 230V (Type F)	Fully integrated Yeti 400 Li with Battery, Gen 3, for 230V Geographies	UN 3481
NEWSKU[1]	Yeti 1500X Li 110V	Fully integrated Yeti 1500 Li with Battery, Gen 3, for 110V Geographies	UN 3481
NEWSKU[1]	Yeti 1500X Li 230V (Type F)	Fully integrated Yeti 1500 Li with Battery, Gen 3, for 230V Geographies	UN 3481
NEWSKU[1]	Yeti 3000X Li 110V	Fully integrated Yeti 3000 Li with Battery, Gen 3, for 110V Geographies	UN 3481
NEWSKU[1]	Yeti 3000X Li 230V (Type F)	Fully integrated Yeti 3000 Li with Battery, Gen 3, for 230V Geographies	UN 3481
NEWSKU[1]	Yeti 1000X Li 110V	Fully integrated Yeti 1000 Li with Battery, Gen 3, for 110V Geographies	UN 3481
NEWSKU[1]	Yeti 1000X Li 230V (Type F)	Fully integrated Yeti 1000 Li with Battery, Gen 3, for 230V Geographies	UN 3481

[1]These SKUs have not yet been built or createdt, but are in the system for new product launch planning in 2020.

Historically, Goal Zero has shipped all 3 configurations: the standalone battery classified as UN 3480, and the Yeti Power Station Without Battery and the fully integrated Yeti Power Station with Battery included, classified as UN 3481.

3. Outside feedback and counsel: The Yeti has historically been classified as UN 3481 with major domestic and international shipping organizations, including UPS and FEDEX, granting written authorization to ship these products under that classification. Similarly, when presented on site with the details of the product design and the layers of mechanical and electrical parts that wrap around and operate off the battery power, the DOT inspector agreed that it would make sense for the Yeti to be considered a lithium battery in equipment given the scope and function.

   Although previous interpretation letters address the direction from the US Department of Transportation on how to ship power banks, these product types are significantly different in form, function and levels of safety than our Yeti products. After further investigation into previous interpretation letters, we found that if the Yeti was categorized as a power bank, it should be classified as UN 3480, which was the resulting explanation for probable violations in the Exit Briefing Goal Zero received on October 1, 2019. However, Goal Zero has never classified the Yeti as a power bank and when the details and functions of the product are explained to various experts in the field, they have agreed that the fully integrated Yeti Power Stations with Batteries can and should be classified as UN 3481. The Yeti is not a power bank, either from an engineering or consumer application perspective. It has a significant amount of its own operation that utilizes the battery power, not including the delivery of power output to other equipment. The internal power consumption of the Yeti to operate these functions typically fluctuates between 7 and 15 watts when it is not connected to an external load or equipment on the output ports, which is higher than many power banks can deliver to external equipment.

   We hope that you will analyze the above information about our Yeti products and confirm that we are properly classifying the Yeti Power Stations with Batteries as UN 3481. We look forward to your response.

   If you have any questions about our products or wish to discuss this with us further, please contact me directly at (801) 553-3663. Thank you.

Sincerely,

Christie Babalis
General Counsel