U.S. Department
of Transportation
**Pipeline and Hazardous
Materials Safety
Administration**

1200 New Jersey Avenue, SE
Washington, DC 20590

November 17, 2023

Denielle Gower
Director of Logistics
Eos Energy Enterprises Inc
3920 Park Ave
Edison, NJ 08820

Reference No. 23-0100

Dear Ms. Gower:

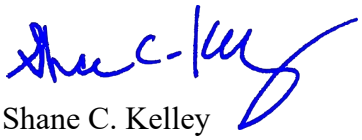
This letter is in response to your October 31, 2023 email and subsequent phone conversations requesting clarification of the Hazardous Materials Regulations (HMR; 49 CFR Parts 171-180) applicable to the classification of batteries and battery storage systems containing zinc bromide. Specifically, you are seeking confirmation that these batteries, when shipped at a zero state of charge and containing no other materials meeting the definition of a hazardous material other than zinc bromide, may be classed as "UN3548, Articles containing miscellaneous dangerous goods, n.o.s., (zinc bromide), 9."

Based on the information you have provided in your email and subsequent phone conversations; it is the opinion of this Office that "UN3548, Articles containing miscellaneous dangerous goods, n.o.s., (zinc bromide), 9" is an appropriate shipping description for the batteries and/or battery assembly you describe. While your email references the IATA DGR, please note that the HMR do not officially recognize the IATA DGR for purposes of transporting hazardous materials. However, § 171.22 of the HMR authorizes use of the International Civil Aviation Organization's (ICAO) Technical Instructions for the Safe Transport of Dangerous Goods by Air (Technical Instructions) provided shipments offered under the ICAO Technical Instructions conform to the applicable requirements of §§ 171.23 and 171.24. The ICAO Technical Instructions list special provision A224 with this entry along with A2. Special Provision A224 states that articles containing miscellaneous dangerous goods, n.o.s. may be transported on passenger and cargo aircraft irrespective of the indication of "forbidden" in columns 10 to 13 of Table 3-1, provided that the only dangerous goods contained in the article is an environmentally hazardous substance, the articles are packed in accordance with Packing Instruction 975, and reference to Special Provision A224 is made on the dangerous goods transport document. Zinc bromide meets the criteria for an environmentally hazardous substance but does not meet the criteria for inclusion in any other hazard class. Therefore, Special Provision A224 would apply,

and these articles would not be forbidden. Please note, in accordance with § 171.23(b)(5), these articles may be subject to additional requirements for hazardous substances as defined in § 171.8.

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

Sincerely,



Shane C. Kelley
Director
Standards and Rulemaking Division
Office of Hazardous Materials Safety

Larson, R.
23-0100

From: Andrews, Steven (PHMSA)
To: Larson, Ryan (PHMSA)
Subject: FW: Request an Opinion for Eos Energy Storage System
Date: Tuesday, October 31, 2023 3:27:59 PM
Attachments: image001.png
image003.png
image001.png

Hey Ryan,

Think you have time tomorrow/Thursday to look into this for us?

Thanks
Steven

From: Kelley, Shane (PHMSA) <shane.kelley@dot.gov>
Sent: Tuesday, October 31, 2023 1:04 PM
To: DerKinderen, Dirk (PHMSA) <Dirk.DerKinderen@dot.gov>; Andrews, Steven (PHMSA) <steven.andrews@dot.gov>
Cc: Nickels, Matthew (PHMSA) <Matthew.Nickels@dot.gov>; Webb, Steven (PHMSA) <steven.webb@dot.gov>
Subject: Fwd: Request an Opinion for Eos Energy Storage System

Dirk/Steven

Could someone on the team take a look and offer thoughts on classification under the HMR and ICAO?

From: Denielle Gower <dgower@eose.com>
Sent: Tuesday, October 31, 2023 12:15:07 PM
To: Vierling, Ryan (PHMSA) <ryan.vierling@dot.gov>; Falat, Lad (PHMSA) <lad.falat@dot.gov>; Burger, Donald (PHMSA) <donald.burger@dot.gov>; Kelley, Shane (PHMSA) <shane.kelley@dot.gov>; Klem, Michael (PHMSA) <michael.klem@dot.gov>
Cc: Nicks, Michael (PHMSA) <michael.nicks@dot.gov>; Rene Sotolongo <rsotolongo@eose.com>
Subject: Request an Opinion for Eos Energy Storage System

CAUTION: This email originated from outside of the Department of Transportation (DOT). Do not click on links or open attachments unless you recognize the sender and know the content is safe.

To whom it may concern,

As per our last conversation we are formally requesting guidance on the proper designation, packaging, and transport of our Battery Energy Storage System.

The Battery Energy Storage System, also known as the Eos CUBE®, is a containerized energy storage system consisting of 672 individual batteries. Each individual battery contains ~2.2 gallons of our proprietary electrolyte resulting in aprox. 1,478 gallons of electrolyte per CUBE. The electrolyte is a Zinc Bromide formula where the Zinc Bromide content is in excess of 10% weight of the electrolyte. The electrolyte is over 40% distilled water (approx..) with the remaining contents consisting of our proprietary mixture.

As we mentioned in our conference call, we had our electrolyte tested and we confirmed that our electrolyte is NOT corrosive based on the following administered testing:

- UN DOT Coupon Corrosion Testing per ASTM G31, in accordance with UN C.1
- Skin Corrosivity (in vitro) a.k.a. Corrositex® as per the *Recommendations on the Transportation of Dangerous Goods, Manual of Tests and Criteria, 7th edition revised*; and/or *UN Globally Harmonized System of Classification and Labelling of Chemicals (GHS Rev. 9, 2021).*

We also confirmed that our electrolyte is NON-FLAMMABLE based on the following administered test:

- Flash Point Temperature–Pensky-Martens Closed Cup (ASTM D93)

Using the ATE (Alternative Toxicity Estimator) methodology, we determined that our electrolyte does not fall within the categories specified to be considered / labeled as a toxic and using the same methodology determined that it did nor fall into the criteria for being either an acute or chronic marine hazard.

Based on these determinations we followed UN and DOT transport rules and along with a third-party consultant we came to the conclusion that the proper UN transport number for our product for international shipping should be UN 3548, Articles containing miscellaneous dangerous goods, n.o.s., (Zinc Bromide), 9 and that our product did not fall under DOT regulations when shipping domestic. It is confusing to try to understand how our battery is exempt from DOT shipping requirements/regulations (article exemption) but UN3548 increases the requirements when shipping international.

Is there a better designation than UN 3548, or is there a way do get a unique designation for our type of battery like was done with Lithium-Ion batteries that has multiple designations dependent on the type of battery you are trying to ship? Because when we offered this to our broker, we were told we would need a special permit. Did we make a mistake in our UN transport number? Or, is the permit needed due to special provision A2 under IATA (which is incorporated by reg. at 49 CFR part 175) due to the “packaging requirements” for placement of dangerous goods on aircraft… or is it due the total amount of electrolyte being

transported?

Any guidance and/or ruling you could provide would be greatly appreciated!

Thank you in advance for your time and attention.

Denielle Gower
Director of Logistics

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