



DOCKET ITEM

For the

SPECIAL INVESTIGATION REPORT

Safety Risks to Emergency Responders from Lithium-Ion Battery Fires in Electric Vehicles

LETTER TO NTSB from NFRD

Answers to Your Questions Regarding our Training Exercise

September 18, 2018

(3 pages)



NTSB – Denver Regional Office
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Deres ref./deres dato:
/18.09.2018

Vår ref.:
2018/3334/ODEL

Arkivkode:
M80

Dato:
15.11.2018

Answers to your questions regarding our training exercise

Dear Mr Barth

We were happy to learn that our training exercise on electric vehicles could be useful in your work. We will try to provide you with the best answers to your questions as possible.

- The date for the exercise was March 30, 2017.
- The training exercise was carried out by Nedre Romerike brann- og redningsvesen IKS (Fire and Rescue Department region of Nedre Romerike).
- Other participants were:
 - Øvre Romerike brann- og redning (fire department)
 - FFI (research center)
 - Øst politidistrikt (police)
 - Ambulanseavdelingen i Oslo og Akershus (ambulance service)
 - Gjensidige (insurance company)
 - BatteriRetur (handles old batteries).
- All the firefighters that participated were full-time firefighters. These firefighters are all trained to fill the positions of firetruck driver, smoke diver and chemical diver. They are also trained to handle traffic incidents and rescue operations on water. Some of them are also crew-leaders.
- The car used in the exercise was a 2017 BMW i3. The mileage of the car was 4000 kilometers.
- The car was fully charged when the test was conducted. The power was not turned on during the test.

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- We first experimented on cutting in the cars body and framework. We did not touch the battery in this proses. We then tried do damage the battery in order to trigger a shorting and a fire. We tried using a 45-ton wheel dozer, but we were not able do much damage to the battery. We then pierced the battery with a metal rod. Gasses started flowing form the battery immediately after it was pierced. The temperature of the battery raised quickly. After 7 minutes the battery caught fire, and the fire speed form the battery to the rest of the car. More battery cells caught fire in the proses. We extinguished the fire but it re-ignited after a short period.
- During the exercise we extinguished the fire 4 times. 2 times with water, and 2 times with foam. The fire was relatively easy to put out with both water and foam, but it quickly re-ignited every time. We used approximately 2000 liters of water during the test.
- The foam used in the test is called *Firebreaker* and the foam and water mix is 0.3 % The nozzle is specially designed for use with CAFS (compressed air foam system). It has an opening of 25 mm.

We hope you find this information is helpful, and we look forward to reading your research report wen it is done. Do not hesitate to contact us if there is more we can do to help you.

Yours faithfully

Morten Thoresen
section leader

Odd-Runar Elstad
adviser

This document is approved electronically and it is therefore not signed by hand.