In-Station Training

TM 23-21 Commercial Vehicle Accident

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Purpose

There are many critical factors common to all types of roadway incidents while others are common to specific types of incidents such as vehicle accidents. However, incidents involving commercial vehicles introduce other variables related to the cargo being transported.

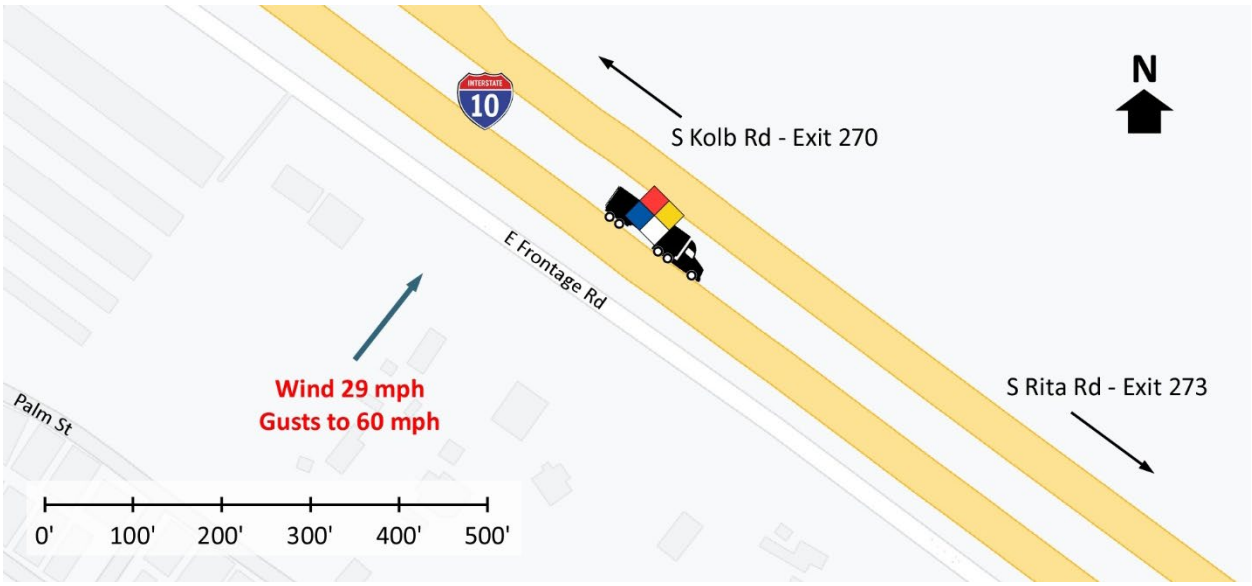
Learning Outcomes

Firefighters and officers perform an effective size-up; select an appropriate strategy, and implement tactics based on the strategic decision-making model.

Conducting the Drill

This incident involved a rollover accident involving a commercial vehicle on Interstate 10 just east of South Kolb Road (Exit 270) in Tucson, Arizona on February 14, 2023, at 15:00 (KGUN9, 2023; Caballero, 2023; & Smith, 2023). Review the map and photos (Figures 1-6) to gain an understanding of area and building involved.

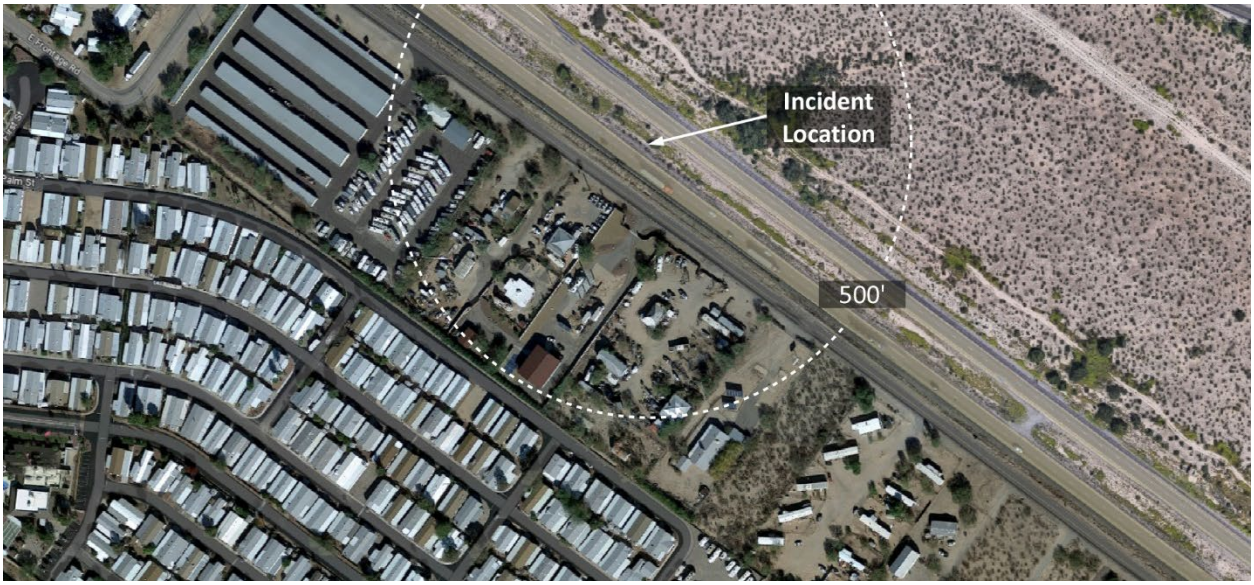
Figure 1. Map of the Incident Area



Note: Adapted from Google. (2023a). [map, Interstate 10 just east of South Kolb Road (Exit 270), Tucson, AZ]. https://bit.ly/3W1VUc9.

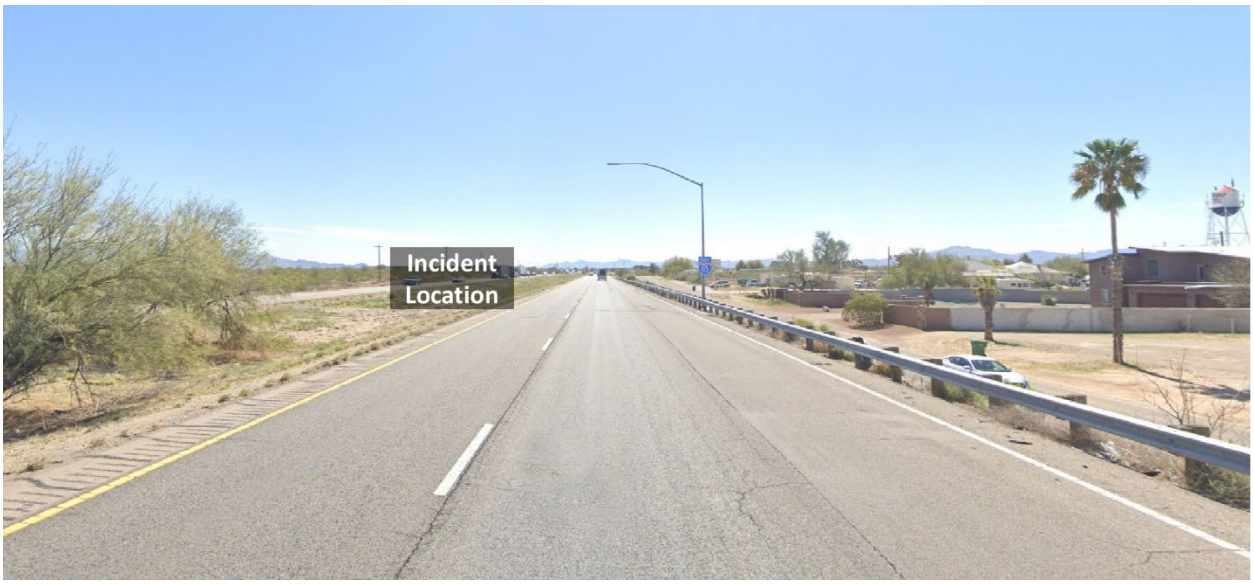
The closest hydrant is on East Frontage Road, just east of South Kolb Road approximately one mile from the incident location.

Figure 2. Aerial View



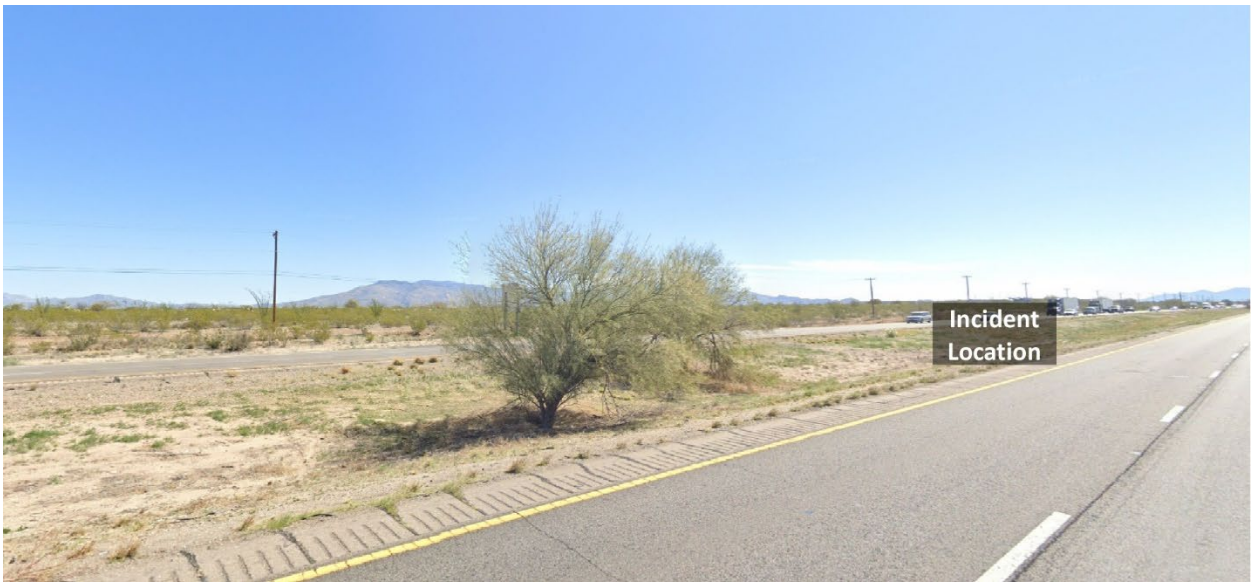
Note: Adapted from Google. (2023b). [aerial view, Interstate 10 just east of South Kolb Road (Exit 270), Tucson, AZ]. https://bit.ly/42Ofk6I.

Figure 3. Incident Location Eastbound on I-10



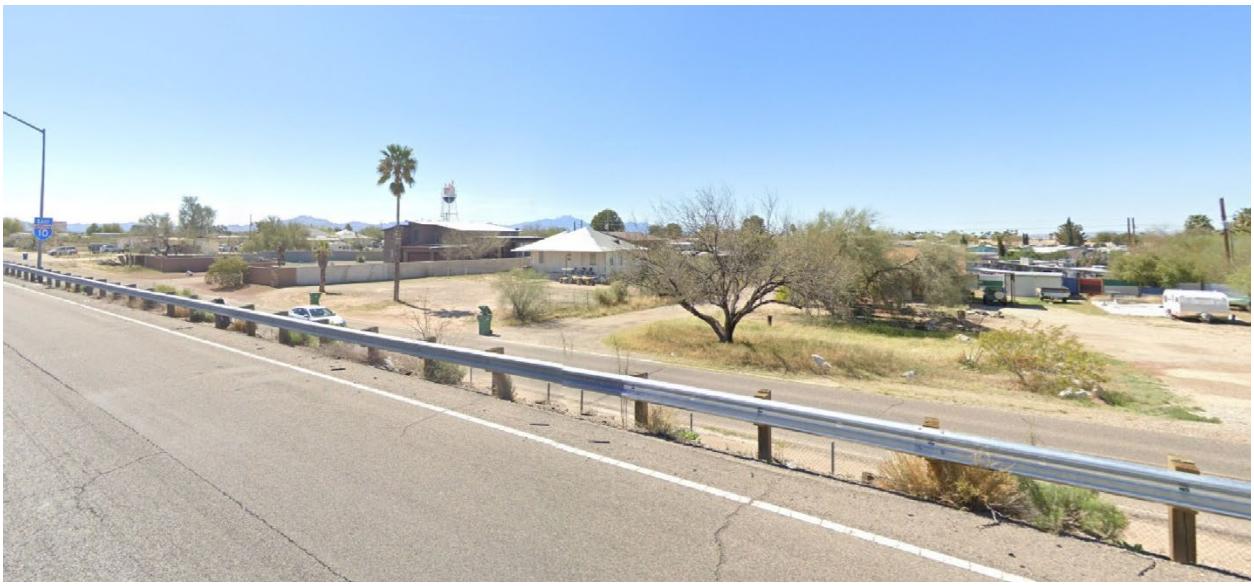
Note: Adapted from Google. (2023c). [street view, Interstate 10 just east of South Kolb Road (Exit 270), Tucson, AZ]. https://bit.ly/42vYfPi.

Figure 4. I-10 Eastbound Looking Northeast of the Incident Location



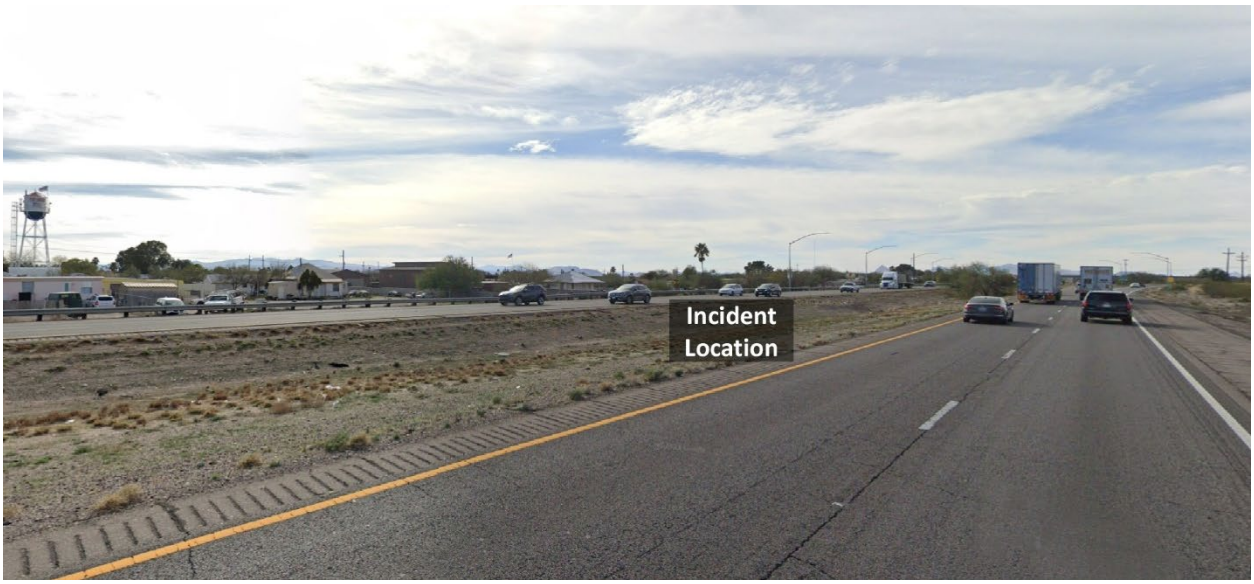
Note: Adapted from Google. (2023d). [street view, Interstate 10 just east of South Kolb Road (Exit 270), Tucson, AZ]. https://bit.ly/3o0pD91.

Figure 5. I-10 Eastbound Looking Southeast of the Incident Location



Note: Adapted from Google. (2023e). [street view, Interstate 10 just east of South Kolb Road (Exit 270), Tucson, AZ]. https://bit.ly/42WiTYF.

Figure 6. Incident Location I-10 Westbound



Note: Adapted from Google. (2023f). [street view, Interstate 10 just east of South Kolb Road (Exit 270), Tucson, AZ]. https://bit.ly/3pCTBAr.

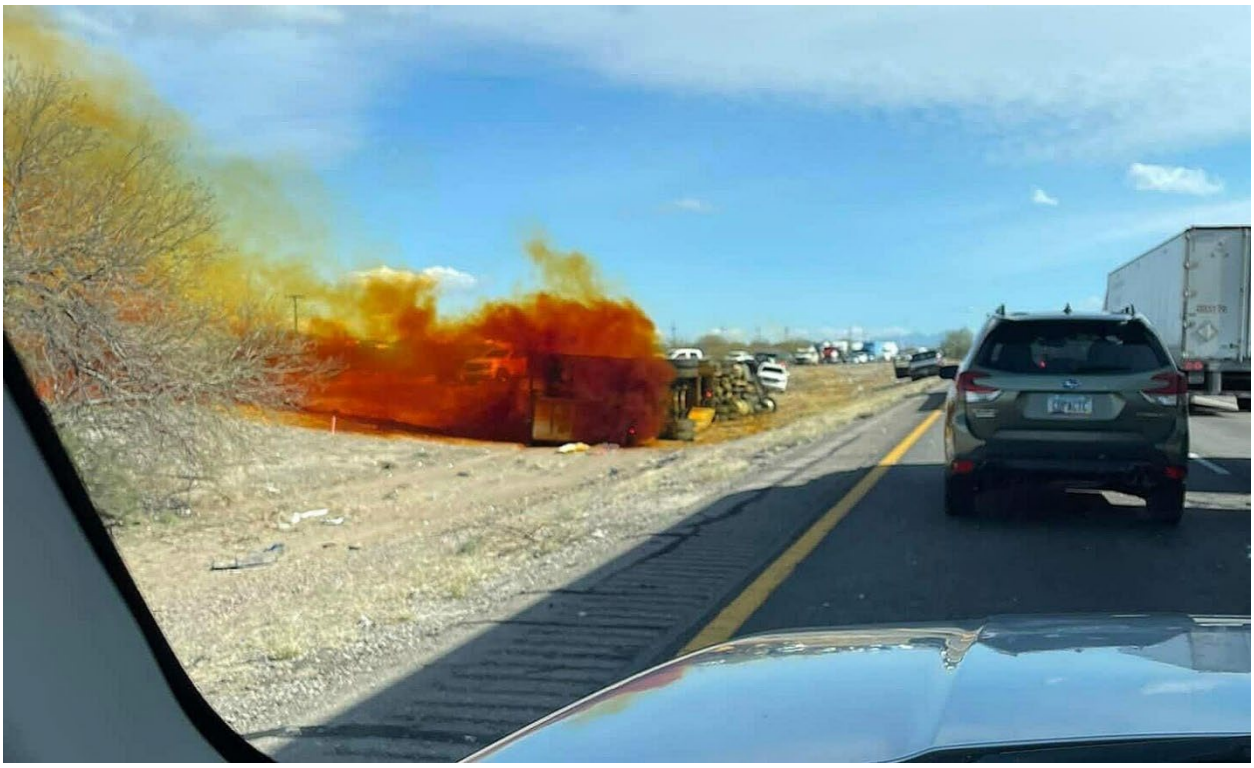
You have been dispatched to eastbound I-10 just east of South Kolb Road (Exit 270) for a rollover accident involving a commercial vehicle. You are the company officer or AIC of the first arriving engine and have your company's typical staffing. Temperature is 60° F with wind at 29 mph from the southwest with gusts to 60 mph (Weather Underground, 2023).

1. What critical factors would you consider when dispatched and during response and what conversations would you have with your crew while responding?

While responding you hear a command officer, another engine and advanced life support ambulance with typical staffing for your agency go enroute. Dispatch provides an update reporting that the accident involves a tractor trailer box truck rolled over in the median. The second engine and ALS ambulance will arrive approximately four minutes after you arrive, followed by the command officer. You are arriving from the west on I-10.

Examine Figure 7 illustrating conditions on arrival (likely from closer than your initial apparatus position).

Figure 7. Conditions on Arrival



Note: Adapted from Ludden, N. (2023). Report: driver in Tucson Semi-truck crash, chemical spill impaired. Retrieved May 13, 2023, from https://bit.ly/3o5ynup.

2. State your initial radio report (IRR) exactly as you would transmit it to dispatch.

3. What specific actions would you take (as the company officer) immediately upon arrival and exiting the apparatus and what task orders you would give your crew?

Using binoculars, you observe conditions illustrated in Figure 8. Shortly after your arrival, dispatch advises that multiple reporting parties indicate that the driver is still in the cab of the truck.

Figure 8. Closeup of Conditions on Arrival

Note: Caballero, L. (2023). *Breaking down hazardous spill of nitric acid near Tucson.* https://bit.ly/44XU3ct

Use the *Emergency Response Guidebook* (DOT, 2020) and *Pocket Guide to Chemical Hazards* (NIOSH, 2020) to inform your strategic and tactical decision-making.

4. Would you change the action you are taking or modify the assignments given to your crew? If so, what task orders would you provide?

5. State your update report exactly as you would transmit it to dispatch.

6. State the tactical assignment you would give the next arriving engine exactly as you would transmit it.

7. Based on the anticipated effectiveness of your tactical operations, state your conditions, actions, and needs (CAN) report that you would provide to the first arriving command officer as part of command transfer to IC #2?

8. What *Emergency Response Guidebook* (US DOT, 2020) guide did you use? How did the information contained in this guide and in the *Pocket Guide to Chemical Hazards* (NIOSH, 2020) inform your decision-making?

9. Is your apparatus equipped with any detection and monitoring equipment or supplies that are appropriate for determining the presence of nitric acid vapors? If so, what? If not, what type of detection and monitoring equipment or supplies could be used to determine the presence of this type of vapor (or other acidic or basic gases or vapors)?

10. The driver was trapped in the vehicle on your arrival. Did you attempt to affect a rescue? Why or why not?

11. How did wind speed and direction influence your tactical decision-making?

Additional Learning: Recognizing the hazards presented by hazardous materials is improved by understanding key terms and a bit of chemistry. Review the following definitions related to corrosives and those specifically related to acids.

Corrosive: A corrosive material is a highly reactive substance that causes obvious damage to living tissue. Corrosives act either directly, by chemically destroying the part (oxidation), or indirectly by causing inflammation. Corrosive materials pose serious immediate risk to skin, tissues, eyes, and other parts of the body.

Corrosivity has several different regulatory definitions.

- ***OSHA Corrosive:*** Corrosive: A chemical that causes visible destruction of, or irreversible alterations in, living tissue by chemical action at the site of contact.
- **EPA Corrosivity:** The Environmental Protection Agency (EPA) defines a corrosive as a substance having a pH of 2 or 12.

- ***DOT Corrosive:*** The Department of Transportation (DOT) defines a corrosive as a liquid or solid that causes visible destruction or irreversible alterations in human skin tissue at the site of contact, or a liquid that has a corrosion rate on steel or aluminum more than .246" (6.25 mm) per year.

Acid: There are several definitions for the term acid. One common definition of an acid is a substance which contains hydrogen, and which ionizes in water so that some or most of the hydrogen ions (positively charged) form H3O+ (hydronium) ions.

For example, hydrogen chloride is comprised of hydrogen and chlorine. In water, the bond between the hydrogen and chlorine atoms is broken resulting in positively charged hydrogen ions and negatively charged chlorine ions,

This definition requires that the substance be in an aqueous (water) solution. The other two common definitions are based on an acid's ability to give a proton (H+) or to accept a pair of electrons. Neither of these definitions require the acid to be an aqueous solution. (This explains how solids can be classified as acid).

Inorganic Acids: Mineral acids do not contain carbon. Inorganic acids are non-flammable. However, some of these acids such as Nitric Acid (HNO_3) are powerful oxidizers (the "O_3" in the formula is a strong hint). Inorganic acids react with many metals to produce hydrogen (a flammable gas) and salt (a compound consisting of a metal and a non-metal).

Organic Acid: Organic compounds are composed of carbon and hydrogen and may also contain atoms of other elements. Many organic acids contain the carboxyl group (COOH). One example of this type of organic acid is Acetic Acid. These compounds are acids as they produce at least one hydrogen ion when put into solution with water (forming a hydronium ion in a similar manner to inorganic acids). Despite the significant number of hydrogen atoms in the molecule, only those within the carboxyl group can be ionized. The other type of organic acid contains the phenol group. The simplest example of this type of acid is carbolic acid (phenol). Organic acids are generally flammable but typically have high ignition temperatures.

pH: To gain an improved understanding of the concept of pH and the pH scale watch *Introduction to pH* (Kahn Academy, 2023). pH is often measured using a colorimetric indicator paper (pH paper). Watch *How to Use Hydrion pH Paper* for an illustration of how pH paper is used. pH paper can only be used to measure the pH of a liquid, but if wet with distilled water, pH paper can be used to detect the presence of acidic or basic gases or vapors.

References

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