

## Rio Neuquen

## Maritime Chemical Accident

1984, July 27

Port of Houston, Texas, USA

**Aluminium phosphide** (Class 6) contained in aluminium flasks. The substance is a toxic biocide and is used as a fumigant to control insects. It is acutely toxic when ingested and reacts with water or atmospheric moisture to emit **phosphine**, TLV 0.3 ppm (USA), IDLH 200 ppm (USA). The latter is a highly toxic and reactive gas. Phosphine is also extremely flammable and is often contaminated by small amounts of **diphosphine** that is likely to autoignite in air and cause explosion, even at ambient temperature.

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**Summary:** During unloading the Argentine container ship **Rio Neuquen**, a 20 foot shipping container with **aluminium phosphide** exploded. One longshoreman was killed by a flying container door and other men were exposed to **phosphine gas**. A response team found a bulged shipping container in the hold with much of the contents unaffected by the explosion. The aluminium phosphide was packed in cardboard boxes, each containing 14 aluminium flasks. Labels identified the product as **Gastoxin** which is a fumigant (disinfectant) with aluminium phosphide as the active ingredient. **The ship's master and crew, who persisted in refusing to leave the ship, had finally to be removed forcibly by the OSC.** The hazardous atmosphere aboard the ship was continuously monitored by means of **Draeger tubes** and a **HNU photoionization unit**. The flasks were transferred to 230-litre **overpacks**. Powdered lime was added as packing buffer and desiccant material. Lids were left loose on the drums to avoid accumulation of gas and reduce the risk of explosion. After careful reviewing of several different disposal options, **ocean dumping** was decided. 7000 flasks were handled on the deck of a supply vessel by personnel wearing full protective equipment. Each flask was manually punctured several times with the horn of a fire axe before releasing the flask overboard. This was done to make the flasks sink in a positive manner.

**Cause of Accident:** Leaking flasks containing aluminium phosphide (manufacturing malfunction?).

**Comments on Response:** The early information about the identity of the cargo was incorrect and had to be checked carefully. The handling of the monitoring instruments (gas indicators) was unprofessional and improper. The use of lime as packing agent was unwise. It gave tremendous dust problems and did not serve the intended purpose. There were two days delay until a final decision was taken to remove the obstinate master from the ship. After thorough evaluation, ocean dumping was shown to be a safe and satisfactory option that could be recommended for aluminium phosphide and related types of chemicals.

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**Source of Information:** Proceedings of the 1986 Hazardous Material Spills Conference, p. 19-24.  
(Abstracted April 1991 by Björn Looström, Swedish Coast Guard H.Q.).