

BY BERNARD VAN LAMMEREN



Fire at the Arkema factory in Crosby, Texas.

CSB defies Trump at approaching new hurricane season

The American Chemical Safety Board will soon launch a campaign to warn the industry about the new hurricane season. The reason for this has been shown in the investigation of the fires at a Texas branch of Arkema of August last year. It was not the first event that showed that safety plans are not always calculated, taking into account what nature can do.



Late Friday night, August 25, 2017, Hurricane Harvey landed at Corpus Christi. The amount of rain it brought was of historical proportions. Arkema's chemical plant in Crosby, forty kilometers northeast of Houston, was sparsely occupied at the time. The employees who were

present saw that the site started to overflow, and on Saturday, as a precaution, operations were stopped at the factory. In places where the water entered, they also shut off the electricity. The problem was that emergency generators also stopped working, because they were pushed up by the

rising water level. Spread all over the site were storage sites with large amounts of finished product, organic peroxides. To be precise: 158,757 kilos in total, in fifteen thousand individual packages. If they were not kept below 6 degrees Celsius, the content would become unstable and ignite spontaneously. That is why the employees started to move stocks

to places where cooling still did take place, and to nine stationary cooling trucks on elevated parts of the site. Between Sunday night and Monday morning, the entire site started to overflow and the last stocks had to be transferred to the last four refrigerated trucks. The forklift trucks that the employees had at their disposal stopped functioning one by one so they had to move the rest with their bare hands, still in the pouring rain.

On Tuesday, everything was in refrigerated trucks and they left the site. They had to leave behind three loaded trucks, because the engines would not start. The management warned the local authorities, who decided to evacuate local residents in a radius of one and a half miles. On Thursday, one of the three failed trucks caught fire, on Friday

the other two did. On Sunday, September 3rd, a full week after the beginning of the flood, the other six

Other companies in that part of the US faced similar problems

Trucks were set on fire by emergency responders, after which the evacuation could be lifted. Several people were injured. But everyone survived.



Assumptions from the past

The Chemical Safety Board (CSB) is to the American chemical industry what the Dutch Onderzoeksraad voor Veiligheid (English: Dutch Safety Board) is to all Dutch sectors. The board initiated an investigation and issued a preliminary report in November. It contained, not only a reconstruction of the facts (there is a computer animation on the CSB website), but also a conclusion of general scope. The researchers found that other chemical plants in that part of the U.S. had suffered similar problems because of Harvey. "Now that tropical storms in the Gulf of Mexico are increasing in frequency and intensity," said CSB Chairperson Vanessa Allen Sutherland, "it is imperative that installations have effective emergency procedures." She called companies, but also governments and other regulators, to quickly check whether they are prepared, in all respects, for hurricanes and floods of this magnitude. "Companies must re-test assumptions from the past." She announced that the CSB would look more closely at these assumptions



ORGANIC PEROXIDES

compounds in which the peroxide fragment is -O-O- between parts of the skeleton.

They are relatively unstable and can easily split between the two oxygen atoms. They then form two free radicals. The splitting can be accelerated by increased temperature or irradiation with light. In some cases, it can come to a self-accelerating decomposition in packaged condition; in the case of very unstable peroxides this can lead to an explosion.

The lowest temperature at which a peroxide decomposes by itself in its packaging is called the SADT (Self-Accelerating Decom Temperature). For example, the SADT of diisopropyl peroxydicarbonate is 5° C. This substance must be stored at -15° C. In other cases, there is less instability and storage at a maximum of 40° C is possible.

and also see how other countries in the world deal with these types of risks. Because it was not that Arkema had not assessed risks and had no emergency procedures. That was all there. But it has not been enough this time. The conclusion is that the CSB, in the very near future, will work on a more detailed report, in order to better prepare companies and emergency services for the new hurricane season.

Risk estimation

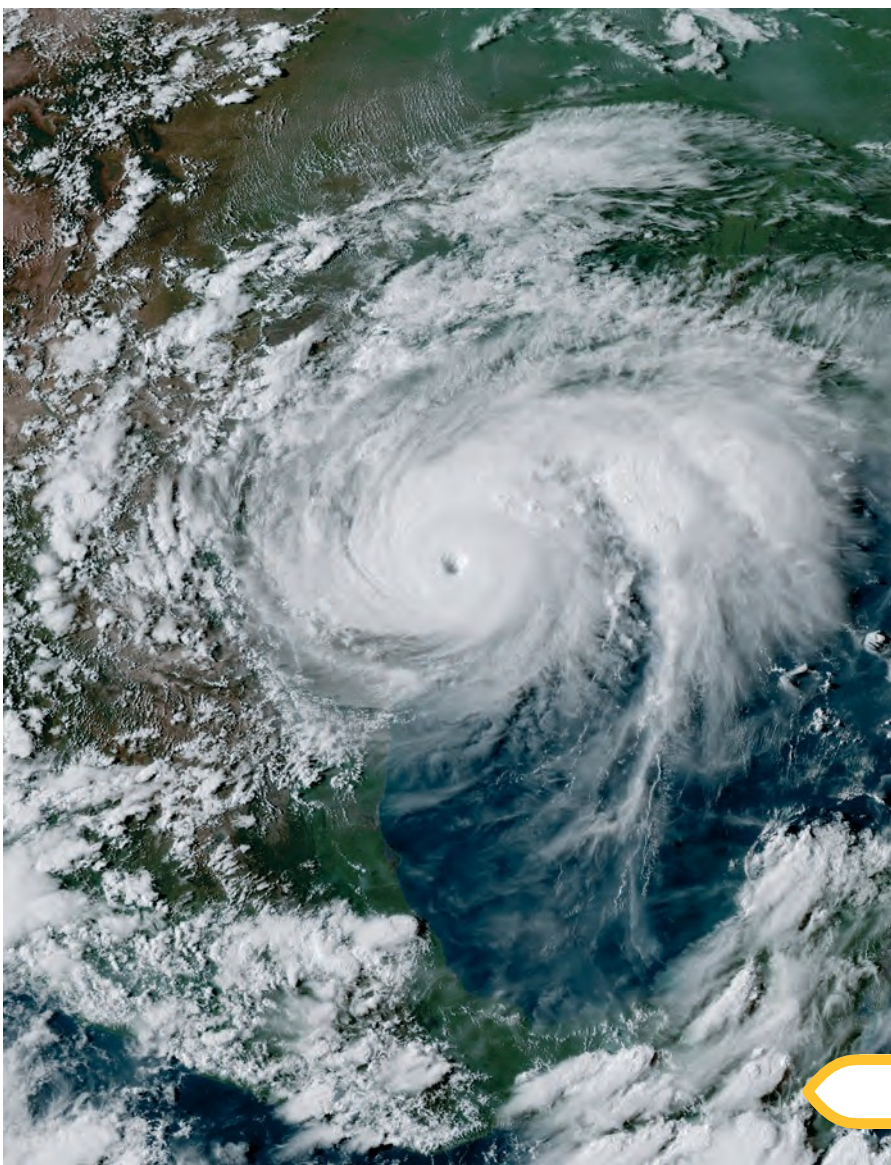
The Arkema investigation reminded us of another disaster where the

failure of refrigeration generators had major consequences, the meltdown of three of the four reactors of the Fukushima nuclear power plant after the 2011 earthquake and tsunami. We even remember a lecture, not long after that event, in which an expert explained that the disaster could ultimately be reduced to one broken screw. That screw helped keep a cooling generator in place in the concrete tub in which it was installed. Inflowing seawater pushed the device up in its tub, causing a pipe to become dislodged and starting a chain reaction, which jammed the

entire cooling system of the first reactor, and so on. It was an event one remembers, because a broken screw would be a very small cause for such immense consequences. Despite investigations, we could not find confirmation of that analysis. We did find a news article, however, in which nuclear physicist Kenneth Bergeron explains that the failure of cooling systems is "considered extremely unlikely, but that it has been one of the risks of nuclear power for decades." But in the end, the relevance of Arkema and Fukushima does not lie with the question of how often cooler generators fail, even though that is apparently not a bad question at all. This relevance lies in the fact that natural forces are sometimes underestimated, and the consequences can at times be overlooked. Fukushima is an example of this. The tidal wave which flooded the whole installation, reached heights of more than ten meters, three times higher than what the construction was calculated for. And whether it was a screw or not, the fact is that afterwards the motor-driven cooling systems of a reactor failed, causing the splitting rods (65 tons in total) to 'dry', melt out of their protective casing, and destroy the concrete floor (the latter could only be determined recently). The fact that people used seawater for cooling after the cooling system failed only aggravated the problem because the power plant was leaking, which caused radioactive seawater to enter the environment.

The lesson is that the risk that nature can pose should never be

Underestimating the power of nature causes great risks.



The region where hurricane Harvey 'landed'.



underestimated. It even happens to the builders of nuclear installations.

Politically sensitive

Climate change is not an issue in the Fukushima case, but in Arkema it is. In the Netherlands, this is no longer a question where ideological differences are being disputed. It is an administrative issue for us: it is assumed that we will have to deal with more extreme precipitation, wet periods that will last longer, and more flooding danger. That is why our standards for dykes, dams and dunes have been revised as of 1 January 2017 (they are in the 'Delta Decision on Flood Safety of the

Delta Program 2017). Water boards and Rijkswaterstaat, the Government water authority, have until 2050 to reach those new standards. Also, areas where there may be many victims or where the economic damage would be great (such as hospitals or power plants) receive extra protection. Places with increased flood risks can be found on the website Risk chart. A special 'Delta Commissioner' (Wim Kuijken) supervises the implementation of the program. Such consensus and such administrative preparedness is hard to find in the US.

There is a president in power who sees every reference to climate change as a personal stepping-off that only fits one response: suppress. The federal environmental service EPA, he placed under the guidance of a kindred spirit for that reason. And he even wants to completely eliminate the Chemical Safety Board (in his new budget he has only included the amount required for this). Fortunately, there are opposing forces, also within the

American establishment. The new EPA Administrator Scott Pruitt, has made himself impossible to work with. Not only for his reluctant staff and the general public (there are already stories about airline passengers who prefer not to sit next to him), but also in Capitol Hill.

Will Sutherland continue on this course? we will know around June

At the beginning of April, 64 Democrats in the House of Representatives asked Trump to fire him, because of wasting taxpayers' money. The details were such that Trump did not immediately dismiss the request

and promised to have a look at it. In the meantime, Pruitt has canceled a number of measures taken by Trump's predecessor Obama and fired at least five EPA senior officials. Whether the CSB will really be discontinued is still far from certain.

Experts from Washington have tried to be reassuring, but it should not be ruled out that Trump will want to fire Vanessa Allen Sutherland, something he can arrange without political support. She may not have felt that pressure last fall, but the fate that has struck the EPA afterwards cannot have escaped her notice. Will Sutherland continue on this course? We will know around June.

What is going to be a very interesting question, for Dutch people who are dealing with American chemical companies, is whether she has the support of the industry, the safety of which she helps oversee. Because that industry is one of the few forces to which Trump still listens.