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Risk-based dimensioning of industrial fire services in the Netherlands

Industrial firefighting is a highly specialised area of incident response and differs in many ways from 'regular' firefighting. The involvement of hazardous materials and industrial processes demands more specialised skills and knowledge from the firefighters and sets higher demands on the equipment, protective clothing and the available water- and foam capacities. Due to the higher demands on equipment and the more specialised training of staff, the task of industrial firefighting cannot always be carried out by public fire services. So, how can society secure that industrial firefighting as a discipline is covered well?



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To ensure the industrial firefighting tasks are executed well, Dutch legislation provides the possibility of legally forcing a company to set up and maintain their own industrial fire service (Dutch Safety Authorities Act, article 31). On one hand, this legal instrument provides the Dutch safety authorities with the opportunity to prescribe and monitor, under strict conditions, the quantity and quality of industrial fire services. In this way authorities legally secure that the industrial firefighting capabilities are maintained at a certain level. On the other hand, this instrument brings about an extensive mixing-together of the company's and the authorities' responsibilities.

The legal instrument to force companies to set up and maintain their

own industrial fire service seems to be unique in the world. When this instrument is explained to firefighting professionals outside the Netherlands the reactions are mixed. The question that arises quickly is: when authorities are highly involved in the dimensioning and monitoring of private companies' responsibilities, will these authorities not become partly responsible and accountable?

It is important to know that the existence of the legal instrument to force companies to set up and maintain their own industrial fire service is strongly determined by environmental and cultural factors. The Netherlands is a very densely populated country with just under 400 Seveso

▼ **Large fires at a petrochemical plant demand a large fire truck with specific capabilities.**



companies and over 100 transport and storage companies with considerable amounts of chemicals. This means space is limited and industrial sites are likely to be located relatively close to other uses of space, for example urban areas. These characteristics make it so that the potential impact of an industrial incident is relatively high. For this reason, authorities want to have a say in the way these kinds of companies' lines of defence are set up. Besides monitoring through spatial planning and permitting, authorities prescribe the dimensioning of emergency response capabilities.

Culturally the Netherlands has a long tradition of an ongoing intensive dialogue between the governmental authorities and other (private) stakeholders. The first democratically elected institutions were public-private organisations founded to create polder land and keep this new land dry and safe. For this reason, the involvement of governmental authorities in a company's responsibility feels more natural than you would say at first glance. These specific national circumstances show that a law like the one in The Netherlands is probably not suitable for every country, but there is another thing this instrument has to offer. Not the mandatory characteristic, but the method that is used to analyse a company's scenarios and the way resources are connected to this analysis can be valuable for professionals outside the Netherlands.

The way the Dutch system works

In order to legally appoint company-owned fire service, all Dutch Seveso establishments can be asked to make a company fire report. This applies for refineries, tankstorage, chemical process and storage industry, waste, transport, container companies and railyards. In this fire report, the company must identify all the incidents that could possibly take place on site, the so called 'incident scenarios'. Not all the incident scenarios are relevant for an industrial fire service. Incident scenarios that don't involve hazardous materials, scenarios that can be combatted with stationary firefighting equipment or scenarios that fit the profile of the public fire service can be considered as not relevant. Only when an incident scenario poses a 'special threat' to the public environment, can it be the basis for forcing a company to setup their own fire service.



▲ Specific fire scenarios in a large pump pit give specific demands for water and foam.

► Trainyards with large amounts of chemicals need a dedicated fire service, that needs specific training.



Incident scenarios that cause a special threat are called 'credible scenarios'. To determine whether an incident scenario actually causes a special threat, it must be tested against three legally established criteria:

1. The incident scenario has to be 'realistic' and 'representative' for the activities that take place on site, taking into account the preventive measures taken;
2. The scenario must cause damage to persons or buildings in the public environment outside the establishment's borders. The documents provide methods to project heat, spill & explosion contours and a map to provide insight in the potential impact;
3. The actions that a company-owned fire service is putting into effect must have a positive effect on controlling the scenario, or prevent a scenario from escalating. If a scenario develops too fast or too extremely, it is not a credible scenario in this light. These

kinds of scenarios are labelled as disaster scenarios. Company and authorities prepare collectively for this kind of scenario.

To determine whether all three criteria are met, the company must provide a detailed description of the incident scenarios in their company fire report. The description must at least consist of a description of installations and processes, a description of the hazardous materials, and a description of the possible damage and danger for people and buildings outside the establishment.

To determine the base level of staffing and equipment needed to combat the credible scenarios, the so-called 'normative scenarios' must be identified. Normative scenarios are the credible scenarios that demand the highest number of staffing, trucks and equipment and the fastest needed response time. To be able to select the normative scenarios, the company fire report must gain insight in for example the amounts of water and foam needed or pump capacity, as well



◀ Fire at chemical storage in harbour, company and municipality both unprepared for this type of fire.

general and not on the specific risk profile of a site. The amount of staffing and equipment as prescribed by the law or government can be far too much for the presented scenarios. The Dutch system of determining and analysing scenarios and establishing the minimum requirements on a fire service can be helpful in setting the minimum staffing and equipment you actually need. This gives a useful tool to talk to the government and to show you're able to combat all possible scenarios.

But the Dutch system is not limited to company-owned fire services. The same system can be used in a situation where there is no such thing as a (voluntary) company-owned fire service and the local fire service needs to be up for the challenge. The system can be helpful in identifying the nature and size of this challenge the local fire service faces. In another situation there might be a (voluntary) company-owned fire service on site and the local fire service needs to provide back-up in case of the occurrence of a large incident scenario. The system can help you open the black box and gain insight in the performance of this (voluntary) company-owned fire service in order to identify what the local fire service has to bring in.

The system described in this article, where the Dutch authorities have a legal instrument to appoint individual companies to set up and maintain a company-owned fire service is unique. The aim of this article is not to claim that the Dutch system is the best system that can be chosen. As said, local environmental factors and cultures differ from place to place and the system might be a good fit for some locations, but not work for others. The value of this article is to show that the risk based approach that is used, can be helpful in a broader perspective for analysis on topics of industrial fire services and the relation between industrial and public owned fire services. Maybe the strongest point of the instrument: every company gets the fire service it needs, given its credible scenarios.

▶ For more information, go to www.kappetijn.eu

as the number of monitors and fire hoses that need to be rolled out. Based on the equipment that should be deployed, the amount of staffing can be determined by using 'time-task analyses'. During such an analysis each individual task, for example rolling out fire hoses or placing a mobile monitor, will be appointed to one or more staff members, after which it will be determined how much time this task takes. By counting all the staff needed for the individual tasks, it can be determined how much staff is needed to perform the complete intervention on a specific scenario within a fixed period of time.

The regional safety authorities in the Netherlands will receive the company fire report, with the analysis explained above, and will determine if a company should be appointed for a company-owned fire service. The minimum requirements on the company-owned fire service are captured in an appointment document related to the permit. The appointment document has a very prescriptive nature. The scenarios, the number of fire fighters, the fire truck, the type and amount of foaming agents on the truck, necessary PPE, the minimal amount of fire water and specialised equipment are standard quantitatively prescribed. In addition to this, local safety authorities, like in Rotterdam, have set additional clauses too. By doing this, it makes it possible to add qualitative components to the quantitative prescriptions. Related to the number of firefighters is the necessary education to fulfil the tasks to fight the

scenarios. This is prescribed in the appointment document as well as the obligation to fulfil crucial responsibilities related to safety, such as control of safety measures and organisations, and hierarchical operational responsibilities.

What you rarely do, you rarely do well. This is why the appointment document prescribes the quantity and type of education and drills. The education and drills are monitored by the safety authorities and need to be documented. The documentation of the performance that is delivered to meet the criteria laid down in the appointment document is crucial to provide the opportunity to do the crucial compliance monitoring by the safety authorities.

Food for thought

The Dutch system of appointing company-owned fire services is unique and might not fit every country, state or situation. About 150 of the given 500 companies with large amounts of chemicals are actually appointed by the governmental authorities. Not in all cases are the companies unambiguously enthusiastic, because of the inspection load that comes with an appointment. However, the systematic approach contains elements that might be useful. For example, in many countries the law or the government prescribes the amount of staffing, equipment and fire engines a (voluntary) company-owned fire service must consist of. This is mainly based on the type of establishment in