



# Europe's oil pipelines: 40 years of results

## CONCAWE reports on the performance of Europe's oil pipelines

The Oil Pipelines Management Group (OPMG) is one of CONCAWE's oldest, having been in existence since the early 1970s. OPMG is open to all European oil pipeline operators and provides a unique forum for exchanging experience on non-competitive aspects of pipeline operations, mainly in the areas of safety, security and environmental protection. OPMG also facilitates sharing of non-confidential information on incidents and near misses, and maintains close contact with operators of other pipelines (gas and chemicals) through their trade associations.

Regulations affecting pipelines may be developed at national, EU or international levels. OPMG tracks these developments and represents the industry in discussions with regulating authorities in order to ensure that the safety and environmental record of the EU pipeline network is well understood. This was done recently in discussions on the possible inclusion of pipelines in the update of the Seveso II Directive. Every four years, OPMG also organises the CONCAWE Oil Pipeline Operators Experience Exchange (COPEX) Seminar to review the state of the EU oil pipeline network. Highlights of the 2010 COPEX Seminar were reported in CONCAWE *Review* Vol. 19, No. 1 and the presentations are available on the CONCAWE website.

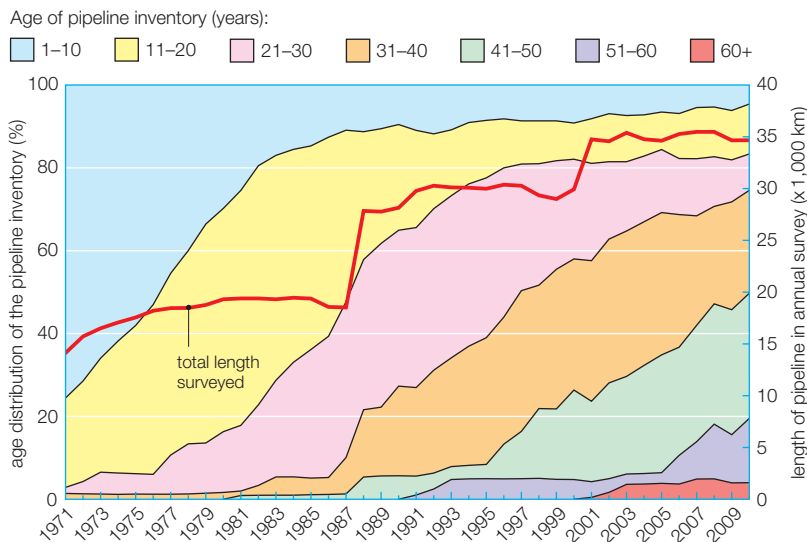
## Surveying the oil pipeline inventory

The most significant OPMG activity, however, is the annual survey of pipeline spillage incidents. CONCAWE's survey database lists 478 spillage incidents covering more than 40 years from 1971 to 2010. OPMG's report on the annual survey (Report 8/11) provides details of the spills that occurred in 2010 and a historical analysis of the EU's pipeline inventory and performance since 1971.

To complete the annual survey, CONCAWE contacts all 78 oil pipeline operators across Europe who are responsible for the safe operation of more than 36,000 km of so-called 'cross-country' pipelines. In this definition, pipelines to off-shore locations are excluded but short underwater sections in rivers and estuaries are included. The survey originally covered pipelines operated by oil companies in Western Europe, but has broadened over the years. Most of the military (or ex-military) pipelines joined the survey in the late 1980s, followed about 10 years ago by a number of Eastern European operators. The current inventory now represents the majority of pipelines in Europe, with the exception of the military or ex-military lines in Italy, Greece, Norway and Portugal and the state-owned lines in Poland and Romania.

For the 2010 survey, 69 operators responded, representing a total inventory of 34,645 km. Taken together, these pipelines transport about 800 million m<sup>3</sup> of material every year, about 2/3 crude oil and 1/3 refined products, which is more than the total annual EU refinery throughput. The majority of these pipelines were installed in the 1960s and 1970s so the average age of the pipeline inventory has been steadily increasing over time (Figure 1).

Figure 1 The average age of the European pipeline inventory, 1971-2010

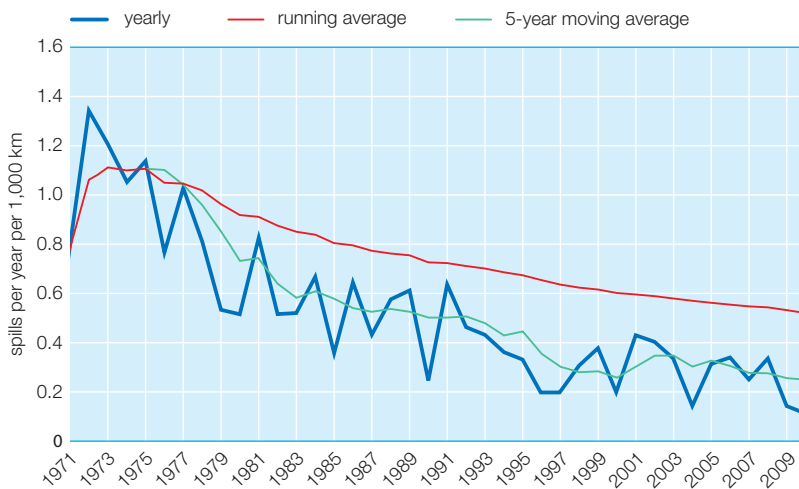


## Pipeline spillage volumes

The total number of pipeline spills per year has slowly decreased with each survey, while the spillage frequency shows an even stronger downward trend (Figure 2). Although there are large variations from year to year, the total volume spilled each year has remained constant at around 2,000 m<sup>3</sup>/annum, even though the total length of pipelines surveyed has increased over the years. On average, about 60% of the spilled oil is recovered. This figure has also improved over the past 10 years, and is now at about 80% recovery in the most recent surveys,



**Figure 2 EU cross-country oil pipelines spillage frequency**



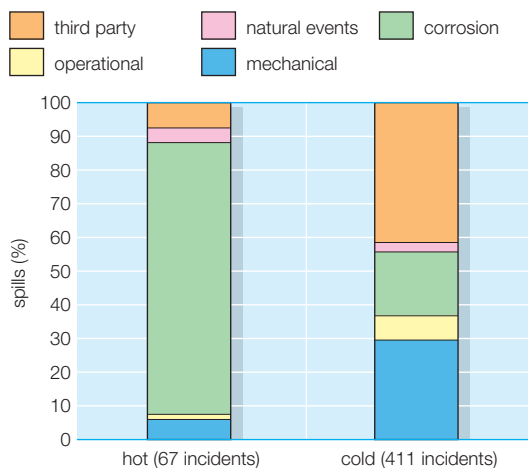
although it is too early to know whether this is a statistically significant trend.

### Causes of pipeline spills

The causes of spills are analysed according to five main categories: mechanical, operational, corrosion, natural events and third-party interference, and their distribution is shown in Figure 3, for both 'hot' and 'cold' pipelines.

'Hot' pipelines represent less than 1% of the total inventory today but account historically for 14% of the total reported spillage incidents. These pipelines, a small and decreasing part of the inventory, consist of insulated

**Figure 3 Causes of pipeline spills**



pipelines transporting heated products, mainly heavy fuel oil. The majority of these have been phased out over the years because of external corrosion problems.

For the larger fraction of 'cold' pipelines, the most common causes of spillage are third-party interference, mechanical failure and corrosion. The long-term trend has improved over time for these three categories, as it has for all spills taken together.

Third-party interference is the main cause of spillage incidents for 'cold' pipelines and is considered by operators as the main threat to the integrity of pipeline operations. A small fraction of these spills are the result of malicious or criminal activities, but the majority are accidental and mostly related to farming and excavation. The pipeline industry is actively working with land owners, contractors, national authorities and regulators to devise new ways of reducing the occurrence of these accidents.

Mechanical failures can result from many causes related to design and materials, as well as from construction defects. An in-depth analysis of the 34 mechanical failures reported in the past 10 years has shown that only about 10% of these could be linked to fatigue-related failures. This suggests that the observed increase is not necessarily linked to the age of the pipeline inventory.

Although corrosion failures also occur in 'cold' pipelines, the long-term trend is downward for this failure mode, suggesting that corrosion problems are under control in spite of the aging of the pipeline inventory.

### How important is the pipeline's age?

As shown in Figure 1, the median age of the EU's oil pipeline is about 40 years with a small percentage more than 60 years old. Although the pipeline's age is a possible cause for spills, CONCAWE's analysis does not suggest that the pipeline's age is an important factor. Pipeline operators have adopted modern management systems covering operational maintenance and inspection, and the now routine use of sophisticated in-line and external inspection techniques provides early detection of structural problems, triggering action before a spill can occur.