

## PIPELINE DAMAGE PREVENTION

Gasunie campaign reduces number of pipeline incidents by more than 60%

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## BACKGROUND

The number of pipeline incidents in the period 2000 – 2004 caused by external interference was 20 to 25 per annum, and considered unacceptably high for a network with a total length of 12.500 km (approximately 2 damages per 1000 km / yr). A campaign was launched in 2005 to reduce the number of incidents to a maximum of 10 per annum to be realised in 2010. An incident is a situation in which the pipeline is hit by a powered digging device and thus potential able to cause a full pipeline rupture.

A risk based external safety approach for high pressure transmission pipelines was being developed in the Netherlands in the same period. A low incident rate is of national importance not only from the safety point of view but also to maintain a high level of security of supply and to minimize space restrictions due to necessary safety distances.

## METHOD

The major cause for pipeline incidents is external interference due to mechanical excavation or drilling activities. This was the case in 2005 and in fact still is as can be seen from the EGIG reports.

A number of 25 incidents per annum in the Netherlands is not a solid base for statistical analysis. Therefore apart from incidents also near misses regarding external interference were systematically registered. A near miss is a situation where activities with powered tools are carried out, within the right of way, without informing the network operator or were carried out in another way than was agreed upon.

This kind of information, mainly generated by the supervisors in the field, is essential to manage to process of pipeline prevention. It indicates where things go wrong and also enables to judge the effectiveness of measures that have been taken. A regular feed back of performance analysis results to the data providers is important to maintain continuity and uniformity of the information.

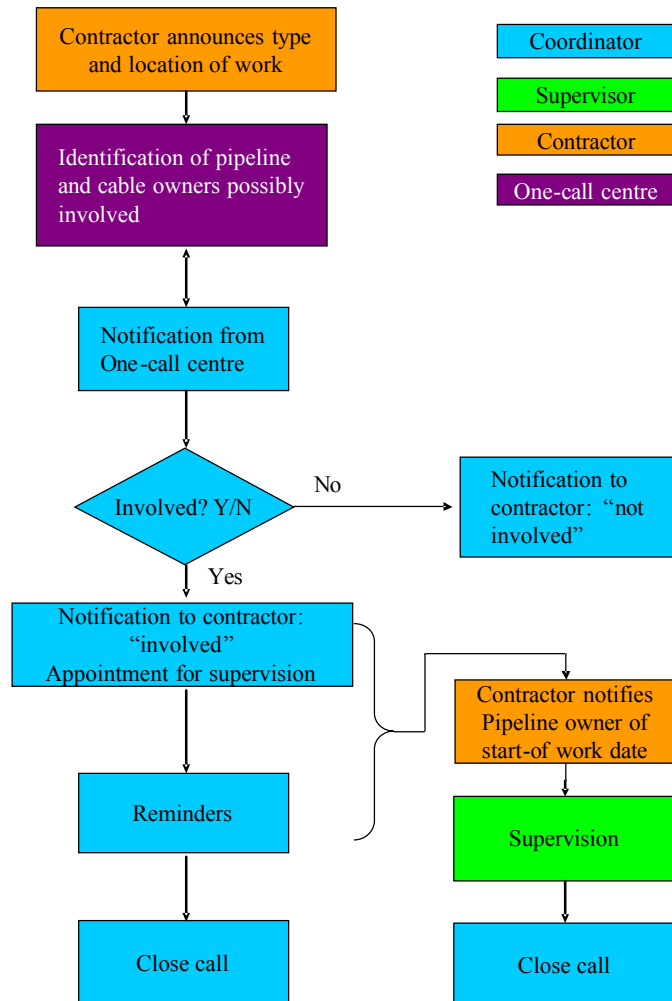
The activities regarding pipeline damage prevention can be divided into:

- information exchange, and
- working conditions / supervision

The location of the high pressure transmission network is marked. These markers indicate the presence of one or more pipelines but do not give the exact location. Therefore a 'one call' system was introduced in 1989 through which a contractor can obtain information about the pipeline location on a voluntary basis; since 2008 this information exchange is mandatory for all networks.

Information requests, within a defined distance from the pipeline, are first screened at the Gasunie office to see whether or not a Gasunie asset is involved. If this is the case than the contractor is requested to contact the supervisor at least three days prior to the works in order to discuss the

conditions of how to carry out the work. The supervisor then marks the exact location of the pipeline using a pipeline locator and supervises the works if necessary.



Pipeline markers

Workflow damage prevention

Despite this process too many incidents happened and a reduction was necessary. Within the Right of Way Management department, responsible for damage prevention, brain storm sessions were organised to come up with ideas on how to reduce the number of incidents considering the weaknesses in every step in the process.

Ideas and suggestions were collected and discussed with all parties involved. This resulted in 2005 in a plan with approximately 30 sub activities to be implemented. In later years some of these ideas have been modified whereas new improvements based on the near misses and incident analysis information were introduced.



Both Gasunie and the Dutch association of transmission network owners (VELIN) have always strived after making the digging request mandatory. In 2008, after a long and thorough process of consultation, a law on information exchange came into force. This law covers reporting digging activities, and providing data regarding the location of pipelines and cables. This enables all the information of the network operators involved to be presented in one overview instead of many separate network drawings in different formats.

There are three types of information requests:

- 1 - orientation request
- 2 - digging request
- 3 - emergency request

The orientation request is used for preparatory work and does not give allowance for digging. A digging request forces the contractor to contact the network operator in case of a network with a potential dangerous content (such as natural gas with a pressure over 16 bars), and the network operator is allowed max. 3 days to make an appointment with the contractor. An emergency request, where supervision is needed, requires prompt response from the network operator. The reason for an emergency call must be explained afterwards. Approximately 85% of all requests refers to a digging request, 5-8% to an emergency request, and 5-8% to an orientation request. The emergency request response requires a 7\*24 hour availability of supervisors.

#### **Cooperation between network operator and contractor**

Previously mentioned law on information exchange covers all elements of prudent digging process, but only details the information exchange. Other responsibilities are covered in a Guideline called *Prudent Digging Process* that was written by representatives from contractors and network operators. The joint network operators of high pressure systems have actively participated in implementing the new law and the guideline. A platform was established where contractors and network operators discussed the problems that came up during the implementation of the law.

A few years before the law was introduced a similar platform launched a campaign.

*Pipeline damage: we prevent together*

This joint approach turned out to be more effective than blaming the other party for making mistakes.



A platform where network operators and contractors meet with a mutual goal does not only support the implementation of the law but also enables to solve apparently minor issues that can be very helpful for the process.

### **Follow up incidents and near misses**

When a contractor is not meeting the requirements, a letter is sent to the contractor and to the principal of the project. In case of deliberately or repeatedly breaking rules also to the law enforcer Agentschap Telecom is informed which in many cases leads to a significant fine. Each incident is fully analysed and reported to the law enforcer.

### **Simple but effective additional measures**

#### Awareness of Gasunie project involvement

Knowing that a lot of information is involved in each project it was suggested to use coloured paper for the letter to the contractor, indicating that Gasunie is involved in his project based upon the indicated position of the works. Also the envelope contains additional text in order to mark this specific information.

#### Informing landowners

A letter was sent to all landowners indicating the fact that a pipeline is located in their property. This will be continued by sending a letter especially when the property changes to a new owner. Often a new owner starts all kind of activities which means that especially new owners should be informed.

#### General conditions issued by high pressure network operators

Requirements regarding the way of working in a project can be accepted more easily when known in advance. Possible financial consequences can be taken into account when contracting prices are calculated. In this way unpleasant discussions at the working site can be avoided. Therefore the high pressure network operators (VELIN members) jointly agreed upon a set of general conditions for excavation and construction activities near the pipe. By applying uniform conditions these are more easily recognized and accepted. The general conditions are available through internet and a link is sent in each digging request response.

#### Gasunie logo clearly visible at inspection helicopter

Making clear that the inspection helicopter flies on behalf of Gasunie shows that inspections are carried out to be helpful, also when the helicopter lands to stop critical activities.

Articles in professional magazines, toolbox meetings and PR.

There are many ways to inform stakeholders about the necessity of damage prevention and mistakes that can be made. It must be made clear that pipelines are not dangerous but must be treated with respect. This kind of message needs to be repeated many times.

### **Continuous improvement**

Each incident (damages and near misses) is analysed within two weeks; in this way all relevant information is available and verified directly and corrective measures if necessary can be taken directly as well.

## RESULTS

### Pipeline damage reduction

The overall effect of the Improvement Plan on damage prevention is shown in figure 1. It is clear that the target for 2011 was met with 6 damages. The 5 years moving average was reduced from 19 to 7 which means a reduction of 60%.

**Pipeline damages target and realisation**

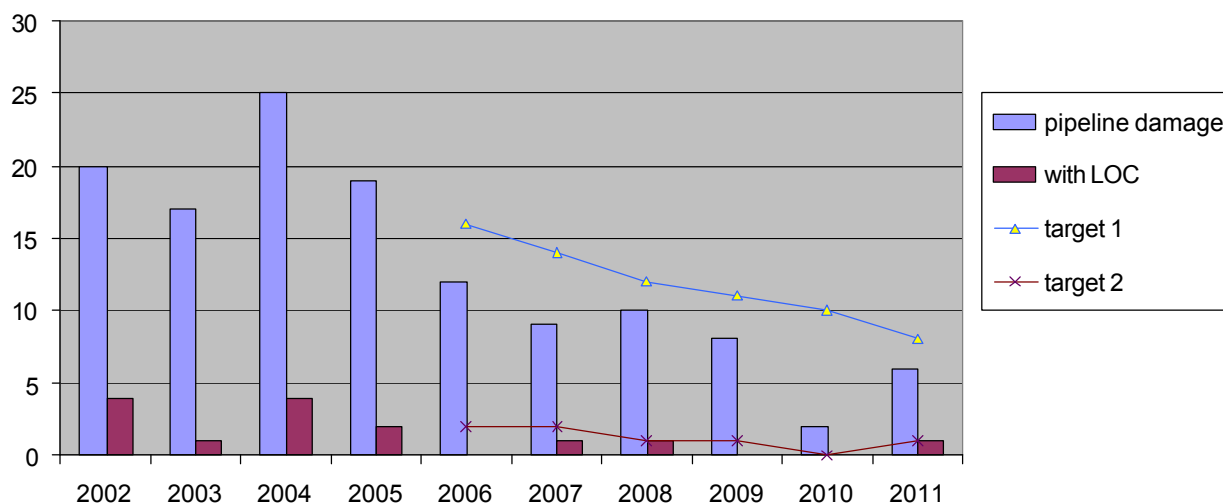


figure 1

Safety is item number 1 on the agenda of each operational meeting within Gasunie; this creates the right atmosphere for a successful prevention campaign.

Recently Gasunie introduced the golden Rules of Safety to improve safety awareness and performance within the company. One of the main elements in the Rules is prudent digging; an extra support to the prevention campaign.

It might be argued that the introduction of the law on information exchange is the major cause for the improvement. This is not so because although this law has a strong potential in preventing damages only recently a significant improvement of the discipline to report activities could be proven. One year before the law came into force Gasunie started yearly random tests. Only after the law enforcer started to fine at a significant level for neglecting procedures, the discipline to make a digging request and to contact Gasunie before starting the works improved. Further improvement therefore is to be expected.



## Extended supervision

Sometimes the contractor forgets to inform the network operator about the actual day the work will be carried out. Therefore Gasunie implemented a recall procedure in which parties are reminded (first time by mail, second time by phone). In some specific cases Gasunie does not wait for the contractor but takes the initiative by contacting the contractor, placing temporarily markers on site, and carrying out daily inspection when no contact was made yet.

In 2010 a new law on risk based external safety requirement regarding potential dangerous transimission pipeline came into force in the Netherlands. In case the new requirements are not met measures must be taken to reduce external safetey risk.

Based on performance data it could be proven that extended supervision, reduces the risk of pipe damage by a factor of 2.5. In the Netherlands extended supervision is accepted as an official risk mitigating measure when the legal safety requirements are not fully met. The risk reduction effect is the same as an increase in pipeline coverage of 30 cm but is much cheaper. To maintain the effect of full attention due to the less common, temporarily markers, extended supervision should be applied over a relatively limited length of the right of way.

It turned out that the majority of situation in which risk reducing measures were needed could be solved by locally implementing extended supervision. A secondary effect of risk mitigating measures is however that, in time, the average safety distance to to pipeline reduces. As an effect of this more and more construction activities will take place near the pipeline. This demonstrates that the importance of supervision during excavations fully remains.



## **SUMMARY / CONCLUSIONS**

Despite all the preventive measures errors will still be made, unintentional or maybe even intentional, causing pipeline incidents. However the network operator can make a difference in preventing damages.

Main key factors in this respect are:

- taking the job of supervising seriously
- continuous improvement based upon reliable performance data; and
- close cooperation with all stakeholders