

PIPELINES SAFETY REGULATIONS

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Synopsis

Currently in the UK there are two quite separate legislative regimes for the control of health and safety aspects of onshore and offshore pipelines. A number of issues have come together over recent years to cause the reassessment of this existing legislation. This paper describes the proposed new regulatory framework for a single risk based, goal setting regime covering both onshore and offshore pipelines. The regime is based on a two tier approach: general duties applicable to all pipelines covering design, construction and installation, operation, maintenance and abandonment; and additional duties for pipelines with a major accident hazard potential covering notification, the preparation of a Major Accident Prevention Policy and preparation of emergency plans.

Key Words: legislation, onshore and offshore, pipelines

BACKGROUND

The health and safety aspects of onshore and offshore pipelines are covered by different sets of legislation. Offshore pipelines safety has been regulated primarily by the Petroleum and Submarine Pipelines Act 1975. Onshore pipelines legislation is more fragmented and applied in a piecemeal fashion.

These existing safety regimes, which comprise legislation of varying origin, scope and regulatory approach require updating, reflecting the general philosophy of the Health and Safety at Work etc. Act 1974.

MOTIVATION FOR CHANGE

A number of issues have come together in the UK over recent years to cause a reassessment of pipeline safety legislation.

In 1988, the disastrous explosion and fire on Piper Alpha, a production platform in the North Sea killed 167 people. Lord Cullen chaired a formal inquiry into the incident and he recommended in his report⁽¹⁾ the need to rationalise the prescriptive and bureaucratic arrangements with a goal setting regime in line with the UK's general health and safety philosophy set out in the Health and Safety at Work Act etc. 1974 (HSW Act).

There is a general drive to simplify and clarify health and safety law and, where appropriate and practicable, to apply common regulatory principles, onshore and offshore. Both the onshore and offshore pipelines controls are prescriptive, outmoded and administratively burdensome.

In May 1994, the UK Government published proposals for opening up the domestic gas market to competition from April 1996 and create a more open framework for pipeline construction and operation. The Health and Safety Commission (HSC) which oversees all health and safety issues was asked to consider the safety implications and submitted a report to Minister entitled "British Gas Supply: a Safety Framework"⁽²⁾. This report was subsequently accepted by Ministers and published. The report recognised that pipeline integrity is a key feature for the safety of the public gas supply network.

APPROACH TO THE NEW REGULATIONS

HSE has now reviewed the existing legislation and has developed proposals for a single, risk based, goal setting approach to regulations encompassing both onshore and offshore pipelines. The Health and Safety Commission (HSC) has recently published a Consultative Document⁽³⁾ setting out these proposals to replace current pipeline safety legislation, couched mainly in prescriptive terms, with new regulations expressed mainly in goals to be achieved reflecting the general philosophy of the HSW Act.

The proposals are based on a two tier approach: general duties, applicable to all pipelines, covering design, construction and installation, operation, maintenance and abandonment; and additional duties for pipelines with a major hazard potential. The proposals apply to both onshore and offshore pipelines, whether new or existing.

This approach recognises that while all pipelines conveying hazardous substances should be covered by general duties which elaborate on those set out in the HSW Act, some will be capable of generating significant residual risks even when these duties have been complied with. Such pipelines should be subject to additional duties.

THE PROPOSED NEW REGULATIONS

Scope

Two important aspects of the proposed regulations are the definition of a pipeline and the scope of the regulations. The approach taken has been to have a wide definition of a pipeline and then to exclude those pipelines which we do not wish to bring within the scope of the regulations.

The proposed definition of a pipeline includes the apparatus and works associated with the pipeline and it is not related to, nor limited by, the substances conveyed. However, the definition of a pipeline does not include drains and sewers.

The regulations do not cover pipework within premises or on offshore installations. However, the regulations do exclude some pipelines which cross public roads from the application of the regulations. This exclusion is limited to pipelines crossing roads from one part of a factory to another and to premises within the same ownership. We recognise that pipeline crossing roads etc. could be susceptible to damage and that there could be immediate offsite consequences involving members of the public in the event of an incident. However, pipelines running between premises separated by a road, but within the same ownership and therefore under unitary control, should have sound arrangements for isolating the pipeline and dealing with an emergency. This exclusion does not apply to pipelines crossing between premises in different ownership, as it may be less clear who is responsible for the pipeline.

The duty holder under these regulations is the owner of the pipeline. A number of those consulted prior to the development of the regulations have queried the extent to which certain duties such as the regulation that the pipeline should be designed to be safe, so far as is reasonably practicable should rest solely with the duty holder, arguing that the owner may engage specialist designers to carry out the work. We have looked again at the duties but continue to feel that the duty holder, as the person ultimately responsible for the pipeline, has a responsibility to make sure that such work is carried out properly.

General Duties

The overall goal of the regulations is to ensure the initial and continuing integrity of all pipelines throughout their lifecycle. This goal will, in the main, be achieved by **general duties** to design, construct and install, operate, maintain and abandon pipelines without risk, so far as is reasonably practicable. The main duties are as follows:

a) to ensure the pipeline is designed so that it is safe, so far as reasonably practicable, within the range of all the operating conditions to which it could be reasonably subject;

b) to ensure that the pipeline is constructed and installed as designed;

c) to ensure the pipeline is operated within safe operating limits;

d) to ensure that the pipeline is maintained to secure its safe operation and to prevent loss of containment;

e) to ensure that the pipeline, once it has come to the end of its life, is abandoned in such a way as not to become a source of danger to people.

Preventing damage to pipelines

Third party interference by others can affect the integrity of a pipeline; it is the main cause of incidents leading to loss of containment.

We recognise that pipeline owners have a duty to prevent damage to their pipeline by their own actions. There is also an onus on them to take steps to prevent action by others which could damage their pipelines. The owner should ensure that third parties, so far as is reasonably practicable, are made aware of the presence of the pipeline and appropriate information is supplied regarding its location.

A further aim of this regulation is to enable HSE to take action against a third party whose actions compromise the safety of a pipeline.

Additional Duties for Major Accident Hazard Pipelines

It is recognised that even when the general duties in these regulations are fully complied with there will remain a residual risk associated with certain pipelines conveying substances with the potential to cause a major accident. At its simplest a major accident hazard pipeline could be described as a pipeline that carries a dangerous substance which possesses the property to give rise to a major accident.

For major accident hazard pipelines, we propose additional duties designed to ensure the major accident hazard is properly addressed. These duties will consist of a requirement for notification, for the preparation of a Major Accident Prevention Policy, and for emergency plans to be prepared and tested.

Land Use Planning

While not part of the pipeline safety legislative package, **land use planning** is also an essential element in the strategy for controlling major accident hazards. The fundamental objective of land use planning for major accident hazard pipelines is to minimise risks to people from accident through the identification of **suitable routes** for new pipelines and the **control of developments** in the vicinity of existing pipelines.

Major Accident Hazard Pipelines

To help us in identifying which fluids conveyed in pipelines should attract the additional duties, HSE commissioned Arthur D Little Ltd. Consultants (ADL) to carry out a research project to consider both the societal and individual risks for a number of different pipelines. The results of the study are published separately⁽⁴⁾.

The study compared the individual and societal risks for a number of high pressure methane (natural gas) pipelines, gas pipelines operating at lower pressures and pipelines conveying ammonia, gasoline, natural gas liquids, spiked crude (crude oil containing a significant proportion of dissolved flammable gases), ethylene and oxygen. Appendix 1 contains the individual risk transects for the pipelines studied.

For all the classes of substances listed in regulations we propose that the trigger should be the material conveyed and, where appropriate, the pressure under which it is conveyed. We feel that the concept of a qualifying quantity is inappropriate for pipelines where the risk from loss of containment is associated with the fluid conveyed, the condition and pressure under which it is conveyed rather than the quantity of material in the pipeline.

The ADL study considered a number of different diameter high pressure (70 bar gauge) gas pipelines and also two representative lower pressure gas pipelines (7 barg and 16 barg). The results show that for the 24 inch diameter gas pipeline, there are significant risks even at 7 barg; the distance to an individual risk of dangerous dose of 1×10^{-6} per annum extends 55 metres from the pipeline centre line. Although the risks are lower for the smaller diameter (6 inch) pipeline at 7 barg, the risks are still in excess of 3×10^{-7} per annum, the existing limit used to set consultation distances around major hazard installations.

We concluded therefore that even small diameter gas pipelines operating above 7 barg are capable of generating significant risks and that flammable gas above 7 barg be included in the list of dangerous fluids attracting the additional duties.

The research also considered the risks from extremely flammable liquids (liquids with a flashpoint below 0°C and a boiling point at or below 35°C) of which gasoline (petrol) is the most common example. This initial research carried out by ADL suggests, somewhat unexpectedly, some residual risk associated with gasoline pipelines, and this is reflected in the risk transect. However, the assessment was only based on one gasoline pipeline operating at 80 bar gauge, and can only be taken as an indication of potential significant risk. Currently planning controls are not applied to extremely flammable liquids pipelines. Before coming to a conclusion on the risks associated with extremely flammable liquid pipelines, we have commissioned a more detailed study to look at a wider range of such pipelines which, if we conclude that such pipelines should fall into the major accident hazard category, would need to be the subject of separate consultation.

Notifications

Notifications at various stages in the lifecycle of the pipeline will be required viz. notification at end of concept design stage, of bringing into use and of other changes to the pipeline. Other changes concern changes to a major accident hazard pipeline, its operation or environment which may have an effect on the pipeline integrity or level of risk from that pipeline.

In developing these regulations, we have tried to reduce the bureaucracy and to streamline the process of notification by limiting the amount of information to be sent to the HSE.

Major Accident Prevention Policy (MAPP)

There is a specific regulation which requires the preparation of a Major Accident Prevention Policy (MAPP) and documented safety management systems with a major accident potential. The MAPP and associated safety management systems will be prepared by the company; there will be no requirement for submission to HSE nor will there be any requirement on HSE formally to assess these documents. However, HSE Inspectors will want to consult the MAPP when discussing the safety of the pipeline with the duty holder and use it to inform their inspection.

The MAPP will be a short statement setting out the policy covering the health and safety arrangements with respect to the control of major accident hazards and referring to more detailed documents which set down how that policy will be put into action.

The main duties associated with the Major Accident Prevention Policy are:

- a) to identify all hazards associated with the pipeline system with the potential to cause a major accident;
- b) to identify the associated risks and to take measures to reduce the risks to persons affected by these hazards to as low as is reasonably practicable
- c) to prepare a written statement setting out the Major Accident Prevention Policy, and to have in place a safety management system which is adequate for the control of major accidents hazards associated with the pipeline;
- d) to have in place adequate arrangements for systematic audits which address the adequacy of the management system in achieving the safety of the pipeline, so far as is reasonably practicable.

Emergency Planning

The approach HSE has adopted to regulating major hazards is based on controls designed to identify installations (including pipelines) with a major accident hazard potential, to control the hazard, and to mitigate the consequences of accidents should they occur, through emergency planning and land-use planning.

The regulations require the duty holder to prepare and keep up to date emergency procedures for the pipeline. They also require local authorities to prepare and keep up to date emergency plans for major accident hazard onshore pipelines. This requirement on the local authorities to prepare an emergency plans is similar to the requirement for offsite emergency plans in the Control of Industrial Major Accident Hazards Regulations 1984 (CIMAH). However, because pipelines cross local authority boundaries, there will need to be close liaison between local authorities in drawing up these plans.

Under CIMAH, there is a requirement for the duty holder to supply information to the public (within a specified information zone) concerning means of warning and safety action to be taken by the public in the event of a major accident. This requirement is less appropriate for a pipeline: the chances of an incident occurring at any particular point along the pipeline are small. Also it is not generally practicable to provide a means of warning the public along the whole length of a pipeline. Furthermore, unless the pipeline has been damaged by a third party it may be that no-one will be present to raise the alarm.

Approved Code of Practice for Gas Service Pipes

A draft Approved Code of Practice (ACoP) primarily aimed at the design, construction and installation of gas service pipes has been prepared to support the regulations. The ACoP is intended to give practical guidance on ways in which the safety goals can be met for service pipes. The Government's intention is that service pipes need not be necessarily laid by the public gas transporter (PGT). We consider an ACoP, with supporting guidance in this area is required.

TIMING

The public consultation period which started in August finishes at the end of October. The draft regulations will be revised in light of the comments received with a intention that the regulations will come into force on 1 April 1996.

CONCLUSIONS

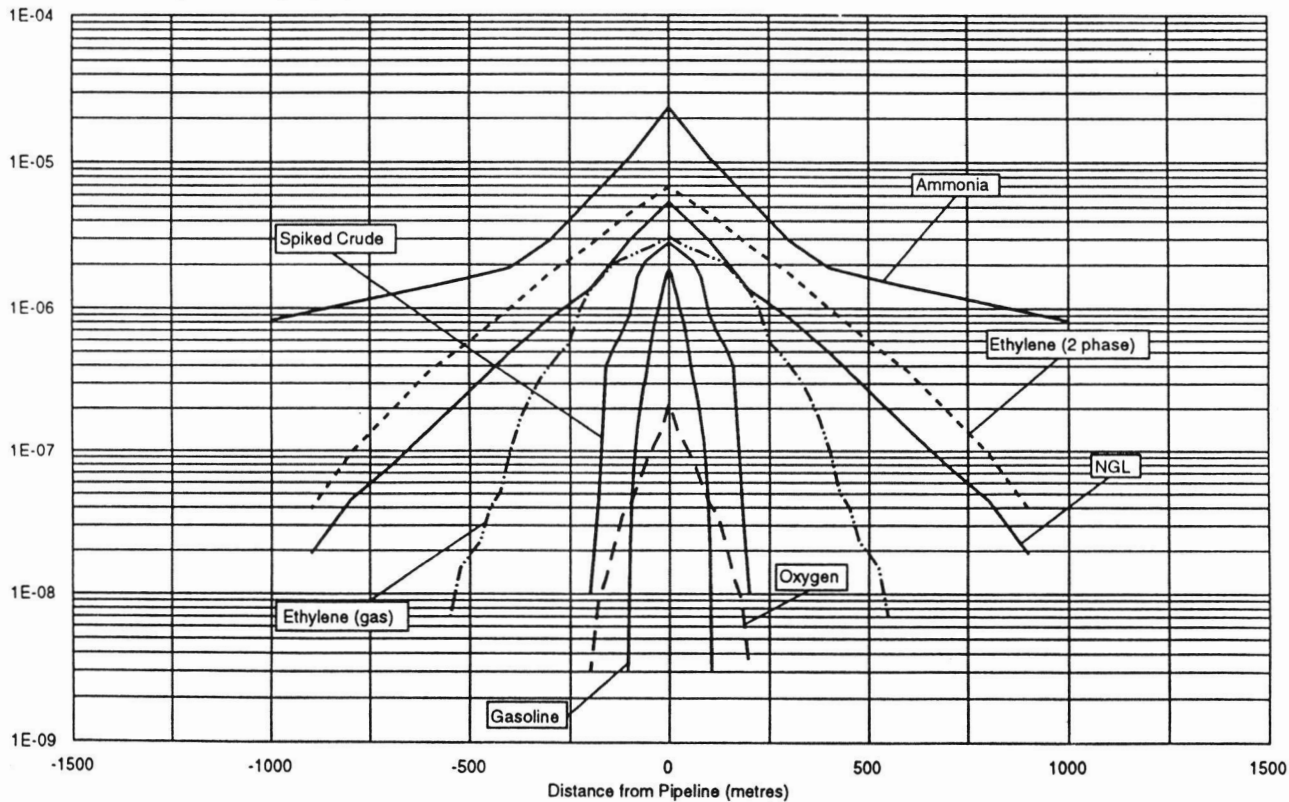
This paper has looked at the pressures which have led to proposals for pipelines safety legislation in the UK. The new pipelines regulations will be based on a two tier approach with general duties applicable to all pipelines and an upper tier applicable to major accident hazard pipelines.

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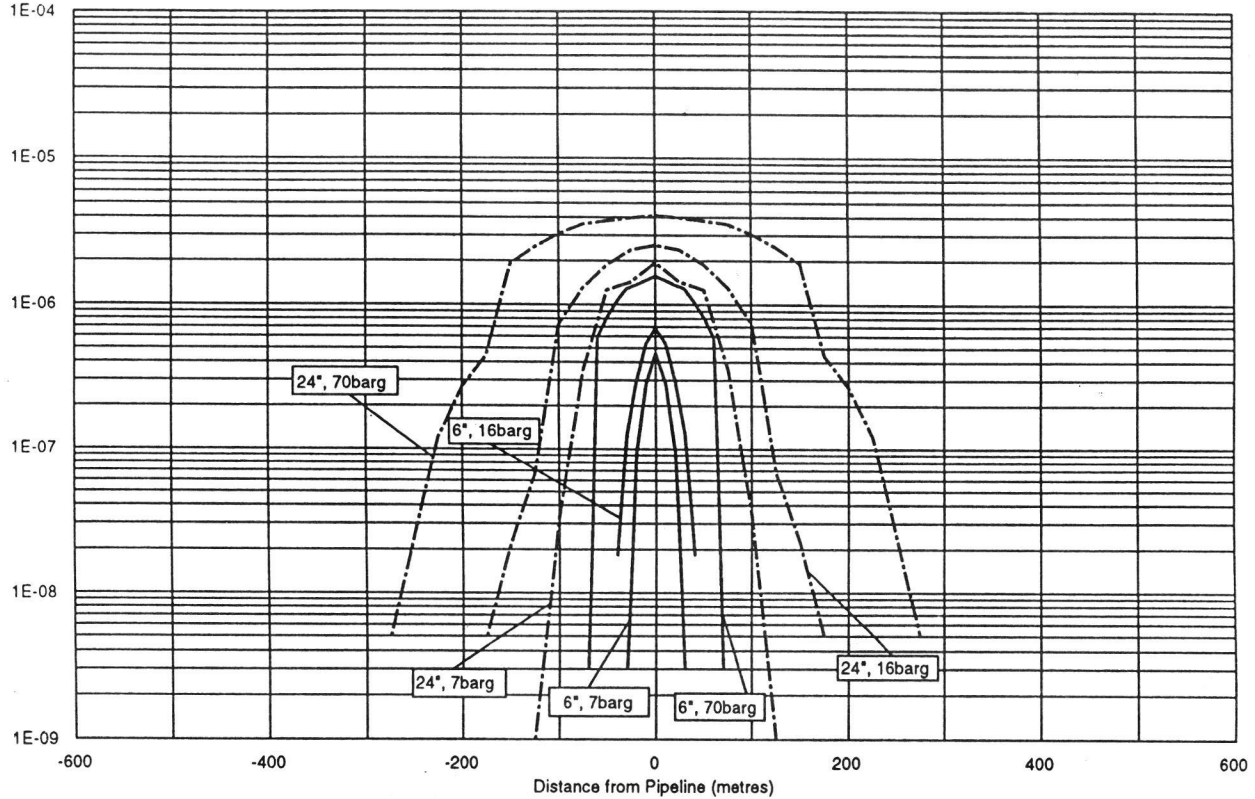
Individual risk of dangerous dose transects for non-methane pipelines

Individual Risk of Dangerous Dose (per year)



Risk transects for 24 inch and 6 inch methane pipelines at 70 bar, 16 bar and 7 bar

Individual Risk of Fatality/D.Dose (per year)



Risk transects for 70 bar methane pipelines

Individual Risk of Fatality/D.Dose (per year)

