

HSE - Hazardous Installations Directorate - Land Division

National Field Delivery Unit

Operational Strategy for Pipeline Safety 2001/2004

Introduction

1 HSE is responsible for ensuring that pipeline risks are properly controlled by those who manage them and to improve, or at least maintain, the good safety record for transportation by pipeline in this country. These aims can be met by ensuring that appropriate measures are in place to secure and maintain pipeline integrity and to control and mitigate the consequences of failure.

2 This is the first operational strategy for pipeline safety prepared by the National Field Delivery Unit (NFDU), part of the Hazardous Installations Directorate (HID) Land Division, and which has the operational lead within HSE for pipeline safety. NFDU is the main centre for pipeline expertise, is concerned with pipeline integrity issues and is able to provide inspection effort, technical support, guidance and advice concerning pipelines, both onshore and offshore.

3 This three-year rolling strategy has been developed following consultation within HSE, with industry groups, professional bodies and other interested stakeholders. It will be reviewed in the autumn of each year with the aim of producing an updated and clear statement of the major issues and what plans are in place by NFDU to help develop and maintain pipeline safety.

4 NFDU has a companion strategy - "Operational Strategy for the Natural Gas Supply Industry 2001/2004" - which may be relevant to pipelines conveying gas.

Scope

5 The strategy applies to all pipelines subject to the Pipelines Safety Regulations (PSR) and covers pipelines and associated installations falling into the following categories:

- major accident hazard pipelines (MAHPs):
 - ” almost all offshore pipelines (about 10000 km); and
 - ” approximately 22000 km of pipelines on land including 18500 km of high pressure natural gas pipelines for the gas transmission system, supplies to power stations, etc.
- non-major accident hazard pipelines (non-MAHPs), such as:
 - those conveying mainly oils, "white" oils and industrial gases (about 7500 km); and
 - the medium and low pressure natural gas distribution systems (about 250000 km of mains and services to consumer's premises).

6 Nearly all pipelines on land pass through areas which are accessible to the general public and many pipelines carrying hazardous or dangerous fluids are routed close to, or

even through, residential areas. There is a need for a strong and effective regulatory regime for the protection of the public.

7 Pipelines are a potential source of danger to offshore installations and vessels. The hydrocarbon inventory of some offshore pipelines can be very large and the uncontrolled release of these fluids could lead to the destruction of an offshore installation. A robust regime is required to protect those who live and work offshore.

8 Pipelines can present serious hazards to individual workers involved with construction or when working on, or near, pressurised pipeline systems, including farmers, survey workers, construction workers and sub-sea divers - these risks also need to be properly controlled.

Overview of strategy and the role of NFDU

9 Although pipelines in this country are relatively safe there is still a need to maintain public and work force confidence. There are still accidents resulting in fatalities and injuries associated with the gas distribution system and "near misses" involving other pipelines which could have resulted in a major accident.

10 We must still be mindful of the way pipelines were operated and the implications of pipeline failure during the Piper Alpha Disaster. We will continue to take into account major pipeline accidents that are reported from around the world.

11 The highest priority is given to the prevention of pipeline failure. A precautionary approach will continue to be adopted to ensure that pipelines are properly designed, built and operated so that they are unlikely to fail - in other words, that the risks are reduced to as low as reasonably practicable. This will be achieved, in part, by inspection of operators' arrangements for securing good design, construction, operations and maintenance and overall pipeline risk management.

12 Even well designed, constructed and operated pipelines can fail and there has to be proper provision for emergency arrangements and plans to control and mitigate the effects of incidents and accidents.

13 Pipelines are themselves vulnerable to damage from a variety of causes, particularly from third party interference, whether on land or offshore, and measures should be in place to control these hazards. There is a need to increase awareness of the existence of pipelines by those who could cause damage to them.

14 Enforcement action will be taken in line with the Health and Safety Commission's policy where there are breaches of health and safety law - especially where the safety of the public and those at work has been jeopardised.

15 There is support for pipeline related research and development designed to improve safety and to encourage others to become involved in joint industry projects (JIPs).

16 NFDU intends to remain influential with government bodies and the industry by involvement in the development of pipeline legislation and standards; maintaining contacts with professional bodies and trade associations; producing guidance in conjunction with the industry; and publicising pipeline safety issues.

The pipeline safety environment

17 The onshore pipeline environment is likely to continue to be dominated by the gas supply industry - see "Operational Strategy for the Natural Gas Supply Industry 2001/2004". There are significant safety considerations with the likely uprating of more of the domestic gas transmission system to 85 bar.

18 The offshore sector is likely to remain active with emphasis on enhancement of existing fields and development of floating production and storage facilities (FPSOs) with associated flexible pipeline systems. Offshore is a key sector where the industry operates at the leading edge of technology - continually developing new technical standards many of which have safety implications. Some field developments and associated pipeline systems are also reaching the end of their useful lives and pipeline decommissioning and abandonment could become a major activity.

19 In addition, changes are continuing within the structure of the offshore pipeline industry including large organisations taking back control of certain elements of design, construction and operations following break-up and "downsizing" over recent years.

20 Even with relatively high oil prices the offshore industry is still under great pressure to reduce costs, try innovative techniques, increase the life of existing pipeline assets and reorganise and restructure to become more streamlined and efficient - and all this has to be done without compromising safety.

21 There are other pressures on accepted good practice from a new generation of International and European technical standards.

Strategic themes

- 22 The strategy covers a number of areas, including:
- Pipeline legislation and HSE operational policy
 - Pipeline risk management
 - Enforcement
 - Pipeline standards development
 - Initiatives, projects and R&D
 - Liaison and publicity
 - Development and training (including HSE inspectors)

23 These themes are considered in more detail below and with plans over the three-year period summarised in Annex A.

Pipeline legislation and operational policy

24 NFDU will continue to provide support to HSE's Safety Policy Directorate (SPD) and others on operational and technical issues during the initial and continuing development of pipeline related legislation.

European Union (EU) Pipelines Safety Instrument

25 It is probable that the EU will start moves to introduce a Pipelines Safety Instrument within the period of this paper.

26 A number of options are being considered but it is likely that a Directive will be developed from the Instrument which will include requirements for the protection of the environment and property as well as for safety. It is possible that definitions for dangerous substances may be different to those currently used in this country.

27 NFDU will continue to provide technical and other support to SPD during discussions with industry and DETR and during negotiations with the relevant EU Commission responsible for this work.

Pipelines Safety Regulations 1996

28 NFDU will continue to work closely with SPD, providing support on a range of issues concerning PSR, as described below.

29 A number of issues were “shelved” when PSR was introduced in 1996 to allow PSR to come into force at the same time as the Gas Safety (Management) Regulations. These issues included:

- gasoline to be considered as a dangerous fluid;
- requirements for testing emergency plans by local authorities; and
- introducing additional duties on pipeline designers and constructors, and in particular, to provide information to pipeline operators.

30 Additional guidance on emergency plans may be required to either supersede or to supplement the existing “Further guidance on emergency plans for major accident hazard pipelines” published in 1997.

31 PSR has been in place for five years and is due for review and possible revision. As a result of this experience a number of changes have been identified by NFDU for both the regulations and the associated guidance document (L82).

Pipeline risk management

32 Further development to aid the understanding of pipeline risks and the assessment of risk and reliability based systems used by the industry is proposed.

Models for pipelines

33 Under PSR, the HSE is notified about MAHPs before they are constructed, before they are used and before changes to them are made. Inspectors have to make judgements about what action to take when a notification is made to HSE.

34 However, activities involving the majority of pipelines subject to PSR (ie non-MAHPs) are not notified to pipeline inspectors using any formal procedures. However, the HSE needs to be proactive on a selective basis. The mechanisms of selection are not yet robust and need to be developed.

35 It is proposed that algorithms are developed within NFDU to help manage resources more effectively and to ensure that assessment, verification and inspection effort is targeted while ensuring that the public and those at work are properly protected. Not only will traditional pipeline risk levels be used to rank pipelines for assessment but other factors such as political consequences, public aversion and economic and environmental impact may be included.

Incident and accident data

36 To help understand pipeline risk it is necessary to have good information about the population, the nature of pipeline hazards, the way that pipelines fail and the probability of failure. One area needing special attention is pipeline incident and accident data gathering, especially with pipelines that may be associated with very low probability but high consequence failures.

37 The United Kingdom Onshore Pipeline Operators Association (UKOPA) is developing significantly important databases for both leakage and incidents. This work is continuing and is supported by HSE. The results of this work should give a more realistic picture of pipeline risk in this country and enable more robust predictive measures to be employed.

38 Throughout the 1990s the HSE was involved in supporting the Pipeline and Riser Loss of Containment Study (PARLOC) and published a number of updates. For most of this period funding was provided solely by HSE but this commitment is to be reviewed. It is recognised that PARLOC provides a sound and reliable source of information on risks associated with offshore pipelines in all sectors of the North Sea. The HSE is keen for this database to be maintained but will be looking for renewed involvement by the industry, both here and abroad.

39 The HSE will be reviewing the methods it uses when gathering pipeline accident data through RIDDOR. There is a need for improvements in the quality of information held and how it is used to report on pipeline safety performance.

Public perception of pipeline risk

40 The public has little or no knowledge about pipelines and little information is provided in advance about what they should do in the event of a pipeline problem which may lead to failure or what to do if a failure actually occurs.

41 It will be valuable to understand just how the public perceives pipelines, whether it be the dangers from them or the benefits to society in general from their use. A better understanding is needed about the best ways of communicating with the public without creating unnecessary alarm or concerns due to the nearby presence of pipelines.

42 The increased availability of information needs to be examined carefully to balance security of strategically important pipelines with increased information and awareness with the subsequent implications for third party activities near pipelines.

43 It is proposed to conduct a study, similar to the one for major accident hazard sites, to evaluate how the public views pipelines and to deal with the other issues raised above.

Other models/methods

44 Guidelines are to be developed by HSE/industry on the steps required to ensure that all risks are adequately addressed when increasing the operating pressures of pipelines above that for which they were designed and/or above the normal limits recognised by established standards. For example, there is a need for a standard format to be followed when pipelines that are a part of the National Transmission System are uprated to 85 bar with design factors above 0.72.

45 A number of operators have been, or are, developing regimes using reliability based maintenance programmes for pipeline inspection and maintenance. These schemes need to be examined and evaluated to ensure that they provide a robust procedure for ensuring the continued integrity of pipelines. Guidelines for such examinations and evaluations need to be developed.

46 Additional models and guidance need to be developed to ensure that risk assessments associated with offshore pipelines can be properly evaluated against HSE's own criteria.

Enforcement

Pipelines Safety Regulations 1996

47 A range of assessment and inspection activities are planned over the period including:

- MAHPs on land;
- MAHPs offshore but in conjunction with Offshore Safety Division (OSD) where the safety of persons on offshore installations are affected; and
- enforcement of the general duties in PSR for all relevant pipelines (in conjunction with OSD where appropriate).

48 A proactive approach is currently adopted from the concept design stage, including routing, through to construction, commissioning and the operational phase and on to decommissioning for nearly all MAHPs. However, there is a need to shift emphasis from the larger pipeline projects to the smaller ones where operators may not consider pipelines as part of their core business.

49 Enforcement activities will include:

- responding to statutory notifications under regulations 20, 21 and 22;
- inspecting new and modified pipeline designs, including assessment of routing;
- acting as focal point within HSE for communication with the Department of Trade and Industry for Petroleum Act 1998 and Pipelines Act 1962 pipelines;
- inspecting pipeline fabrication and construction activities, including activities on land and on lay-barges offshore;
- inspecting pipeline operations and safety systems;
- inspecting pipeline schemes of inspection and maintenance;
- inspecting and auditing major accident prevention documents (MAPDs);
- inspecting arrangements by pipeline operators and local authorities for responding to incidents, emergencies and major accidents; and

- investigating pipeline incidents and accidents (in conjunction with others in HSE where appropriate).

50 Non-MAHPs will be addressed since these also may generate significant hazards under the right conditions. A suitable strategy is to be developed to ensure that these pipelines are properly regulated.

51 A significant number of non-MAHPs include those conveying extremely flammable liquids. Gasoline and multi-product pipelines are currently treated differently to other non-MAHPs by NFDU in that contact is maintained with known operators and inspections will be carried out.

52 MP and LP gas distribution and service pipe networks, which comprise the largest proportion of the pipeline infrastructure in this country are another special category of non-MAHPs. These are the only pipelines on land that have, so far, caused death or serious injury to people and incidents involving these systems will continue to be investigated and necessary enforcement action will be taken. More attention is to be given to risk control measures and the safety management of these systems. NFDU will also continue to monitor progress with the replacement of mains and services.

53 NFDU intends to expand the enforcement processes to include inspection of design houses as well as paying more attention to pipeline constructors and fabricators. As part of this, the way that safety is designed into projects will be examined. This will not only include pipeline integrity issues but the way that pipelines can be designed to be safely constructed, installed, examined, inspected, maintained and operated.

Safety case assessment and inspection

54 There is a commitment to the assessment of pipeline aspects of safety cases required under the Offshore Installations (Safety Case) Regulations - including Design, Operational, Combined Operations and Abandonment Safety Cases. Although the safety case regulations tend to concentrate on the installation and its immediate environs, NFDU pipeline inspectors will continue to place heavy emphasis on the interaction between installations where they form part of a pipeline network or system. Follow up inspection of pipeline systems will continue to a programme agreed with OSD.

55 The audit of verification schemes for pipelines within 500m of offshore installations may become a more important activity in the future.

56 There will be continued involvement with the assessment, verification and inspection of pipeline related aspects of Network Emergency Co-ordinator (NEC) and Public Gas Transporter safety cases under the Gas Safety (Management) Regulations.

Treaties and Memoranda of Understanding

57 The implementation of a number of treaty arrangements for pipelines between the UK and other countries, including Norway, Republic of Ireland and the Netherlands is the responsibility of NFDU. Pipeline inspectors also act of behalf of the Isle of Man, under an agency agreement, for that part of the UK/Republic of Ireland Gas Interconnector in Manx waters.

Controlling third party interference

58 Many of the causes of pipeline failure have been or are being addressed but the serious problem of third party interference remains. This is an issue across the whole spectrum of pipelines - from major cross country pipelines to small gas service pipes. If effective measures could be introduced to control this form of damage then the risk of pipeline failure - for all pipelines - could be significantly reduced. However, the issue is a major one involving a large number of government departments, the utilities, the construction industry, local authorities, developers, contractors, etc. and has implications for the environment, commercial operations as well as for safety.

59 NFDU plans to be involved with a number of initiatives over the period, including:

- supporting SPD during its involvement with the Pipelines Industry Guild One-call Initiative;
- maintaining an interest in the progress of the One-call system in Cheshire which is being continued by pipeline operators who participated in the original One-call Trial; and
- working with Transco to provide high profile responses by HSE to third party damage reports involving MP mains, with a clear objective to take enforcement action where necessary.

Performance measures and other initiatives

60 One area that may require effort during the development of the EU Directive is performance measures for pipelines. A great deal of work has been done for the EU on this topic but this should be developed to ensure it is suitable for application in this country and that it can be incorporated into HSE's own inspection plans.

61 NFDU will need to develop new strategies for dealing with operators of an ageing pipeline population - many pipelines are reaching the end of their original design lives. This will include methods of assessing proposals for revalidation, rehabilitation as well as decommissioning and abandonment of pipelines.

Occupational health issues

62 Occupational health and safety issues are normally dealt with by either FOD for onshore pipelines or by OSD for offshore pipelines. Although these arrangements will continue there are aspects of pipeline works which may not readily fall to the other Divisions. NFDU will identify specific health and safety risks to those involved with pipelines and ensure that these areas are addressed in future inspections.

63 Similarly, pipelines inspectors will continue to make contact with pipeline worker representatives during routine inspections to identify any areas that may adversely affect the health and safety of those working with pipelines.

Pipeline standards development

Standards

64 NFDU will continue to support the development of a number of pipeline related standards on behalf of Methodology and Standards Development Unit (MSDU) in HID, including:

- British Standards Institute (BSI):
 - BS8010 Parts 1, 2.8 and 3 and the development of a Published Document where the CEN based standard (BSEN1594) for gas transmission pipelines on land is introduced.
- Institution of Gas Engineers (IGE):
 - ” support for the development of the IGE/TD (Transmission and Distribution) series of Recommendations including IGE/TD/1, IGE/TD/3, IGE/TD/4, IGE/TD/14 and IGE/TD/15; and
 - ” ad hoc support for development of the SR (Safety Recommendations) series.

Approved Codes of Practice (ACoPs) for pipelines

65 NFDU will provide support to SPD during the review and revision of the Approved Code of Practice “Design, construction and installation of gas service pipes” (which supports PSR) and during the possible development of ACoPs in support of regulations for testing pipeline emergency plans.

Revitalising Health & Safety

66 One of the elements in “Revitalising Health and Safety” is to ensure that best practice is followed. NFDU will aim to discover and publicise best practice.

Local initiatives, projects and R&D

67 Local initiatives and projects are likely to be carried out by NFDU on its own or in conjunction with other HSE Directorates or Divisions. For example:

- an assessment of offshore pipeline emergency shut down valve (ESDV) passing rates and the development of guidance to ensure acceptable leakage rates;
- the levels of fire and blast protection used for ESDVs, valve break-out torques, valve opening/closing times, etc.; and
- a study of control corrosion measures for offshore risers.

68 NFDU will continue to support MSDU in identifying, developing and managing pipeline related R&D provided there is a clear benefit in terms of safety.

69 Although most R&D has been for offshore pipeline new technology and in the development of systems for maintaining and monitoring pipeline integrity there is a growing need to ensure onshore pipeline safety is adequately dealt with. The programme is a balance between research undertaken to meet longer term objectives and that to meet short term needs (such as incident investigations, specialised audits, etc).

70 Additional research and development projects include:

- the development of a ready-reckoner for costs of pipeline incidents and accidents - this could develop into a JIP with the insurance industry and pipeline operators;

- the development of a project to establish the suitability of polyethylene pipe for gas distribution at pressures up to 16 bar; and
- the production of guidance for offshore riser caissons.

Liaison and publicity

71 Contact is to be developed and maintained as necessary with the following outside organisations:

- other government departments and regulatory bodies (eg DTI and DETR), local authorities and other agencies;
- international bodies such as Norwegian Petroleum Directorate, Eire Department of Energy, Manx Government, Northern Ireland Department of Economic Development, European Pipeline Regulatory Authorities, USA Office of Pipeline Safety, Canadian National Energy Board, etc.;
- professional bodies (eg Institution of Gas Engineers, Institution of Mechanical Engineers, etc.) and trade associations (eg UKOOA Pipelines Sub-committee, UKOPA, Pipelines Industries Guild, etc.); and
- others, such as consultants, pipeline design houses, pipeline contractors, manufacturers of pipe and other equipment, etc.

Development and training

72 A number of guidance and training packages are needed for HSE's own inspectors including:

- the development of an enforcement model suitable for the quasi-permissioning regime for pipelines but which is in line with HSE's Enforcement Management Model;
- the development of guidance for handling and assessment of PSR notifications; and
- the development of training packages for investigations of pipeline incidents and accidents.

73 NFDU will continue with its links with training organisations such as GINTO (Gas Industry National Training Organisation) to develop suitable training packages for pipeline engineers.