



Proposals for amendments to the Pipelines Safety Regulations 1996

This consultative document is issued by the Health and Safety Commission in compliance with its duty to consult, under Sections 16(2) and 50(3) of the Health and Safety at Work etc Act 1974 (HSWA), bodies which appear to it to be appropriate before submitting proposals for the making of Regulations and the issue of an Approved Code of Practice.

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to reach him no later than 14 November 2002

The Commission tries to make its consultation procedure as thorough and open as possible. Responses to this consultation document will be lodged in the Health and Safety Executive's Information Centres after the close of the consultation period where they can be inspected by members of the public or be copied to them on payment of the appropriate fee to cover costs.

Responses to this consultation document are invited on the basis that anyone submitting them agrees to their being dealt with in this way. Responses, or part of them, will be withheld from the Information Centres only at the express request of the person making them (Under the Code of Practice on Access to Government Information; Environmental Information Regulations 1992 and the Data Protection Act 1998). In such cases a note will be put in the index to the responses identifying those who have commented and have asked that their views, or part of them, be treated as confidential.

Many business e-mail systems now automatically append a paragraph stating the message is confidential. If you are responding to this CD by e-mail and you are content for your responses to be made publicly available, please make clear in the body of your response that you do not wish any standard confidentiality statement to apply.

CONSULTATIVE
DOCUMENT

CONSULTATIVE DOCUMENT
PROPOSALS FOR AMENDMENTS TO THE PIPELINES
SAFETY REGULATIONS 1996

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Summary

1. This consultative document seeks your views on a new regulation (regulation 13(A)), proposed by the Health and Safety Commission (the Commission), to give legal effect to the Transco iron mains replacement programme, which would amend the Pipelines Safety Regulations 1996 (PSR). The proposed amendment regulations, which would be called, The Pipelines Safety (Amendment) Regulations 2002, are contained in Appendix 1.
2. The proposals and issues set out in this document have been discussed primarily with those most likely to be affected by their implementation. These have included the main Gas Transporter - Transco; those regulating the industry - at the Office of Gas and Electricity Markets - OFGEM; those representing consumers - at Energywatch (formerly the Gas Consumers Council). Others in the industry, the Trades Unions, consumer groups and the enforcing authority have been advised through subcommittees and working groups of the Advisory Committee on Dangerous Substances - ACDS.
3. A cost benefit assessment relating to the Transco Mains Replacement Programme is at Appendix 5. [Http://www.hse.gov.uk/gas/gasmain.pdf](http://www.hse.gov.uk/gas/gasmain.pdf)

Although this does not form an actual part of the proposals to amend the regulations it is placed as an illustration of the overall costs of replacing all “at risk” iron pipes currently being used to convey gas, balanced against the societal benefits.

Consultation

4. The Health and Safety Commission has a statutory duty to consult to elicit stakeholder’s views on proposals. The Commission believes that this enables an open and transparent approach being brought to decision-making that is essential if policies and decisions are to have widespread ownership and reflect the needs and aspirations of the people they will affect. The Commission then decides on the best way forward based on an interpretation and analysis of the results of the exercise.
5. This consultative document is being sent to a wide range of organisations and individuals who are likely to be affected by or interested in what is being proposed. A list of those we have formally consulted with is at Appendix 6. If you think that we have omitted someone or an organisation, will you please let us know with contact details? This document can be freely photocopied, and is available on the HSE web site at www.open.gov.uk/hse/condocs/index.htm. Alternatively, further copies can be obtained from HSE Books at the address on the back cover. However, if you do want more than one copy, a charge will be made to cover the cost of packaging and handling. It would be helpful if you were able to suggest any other organisation that you believe may like to receive a copy of this document.
6. We are happy to receive your comments in whichever form of reply you find the most convenient. We would like replies to arrive no later than the date on the front cover. This also explains where you should send your comments, that all responses will be made publicly available unless you expressly request otherwise, and provides a contact for queries.

7. If you are replying on behalf of an organisation, it would be helpful if you tell us what that organisation does, and what its aims are. We will acknowledge all responses and give full consideration to the substance of arguments in the development of proposals; we may also contact you again if, for example, we have a query.

8. If you reply to this consultation document in a personal capacity, rather than as a post holder in an organisation, you should be aware that information you may provide may constitute “personal data” in the terms of the Data Protection Act 1998. For the purposes of this Act, HSE is the “data controller” and will process the data for health, safety and environmental purposes. HSE may disclose this data to any person or organisation for the purposes for which it was collected, or where the Act allows disclosure. You have the right to ask for a copy of the data and to ask for inaccurate data to be corrected.

9. If you are not satisfied with the way in which this consultation exercise has been conducted you can complain by contacting Nick Starling, Director, HSE Safety Policy Directorate, Rose Court, 2 Southwark Bridge, London, SE1 9HS. We aim to reply to all complaints within 10 working days. If you are not satisfied with the outcome of your complaint, you can raise the matter with the HSE Director General - Timothy Walker - at the same address. You can also write to your MP and ask that he/she take the case up with us. Your MP may refer the matter to the Parliamentary Commissioner for Administration (the Ombudsman) who will investigate your complaint.

10. Subject to your comments on the proposals, the Commission intends to submit this draft amendment to the Pipelines Safety Regulations 1996 (PSR) to Ministers early in 2003.

Introduction

11. Natural gas is supplied to more than 20 million domestic consumers across Great Britain through a network of buried pipes and pipelines. The network comprises mainly of pipes that are made from steel, polyethylene and iron. It extends for about 275,000 kilometres. The network is a mature one with numerous sections of it being in existence for over 100 years. Whilst much of the gas is conveyed at high pressure across country and away from people, by the time it reaches, or comes close to the consumer, these pressures are much lower. However, even at low pressure, gas remains a highly hazardous substance, which, if accidentally released in substantial quantities and then ignited, can cause serious injury or death to people.

12. Many releases have occurred as a failure of the mains, but there have been others that have occurred as the result of accidental or third party damage. The latter is the main cause of the failure of plastic - polyethylene (PE) - pipes.

13. In the case of cast iron, pipes fail through fracture. Ductile iron pipes tend not to fail through fracture but rather from corrosion. Corrosion occurs over time and can lead to the formation of plugs of corroded iron; these plugs can then blow out unexpectedly with the result being a release of gas.

14. Cast-, Spun-, or Ductile iron pipe is no longer used for the construction of gas mains. The majority of new construction and replacement work of low and medium pressure gas pipelines are now carried out using polyethylene (PE) pipes.

15. The work of replacing the iron mains with plastic pipes is the responsibility of Transco - the UK's largest Gas Transporter. The work has been going on since 1977, during which time 61,000 kilometres of iron mains have already been replaced. A further 91,000 kilometres of "at risk" iron mains (in addition to 1,000 kilometres of medium pressure ductile iron pipes) still remain to be replaced. "At risk" is defined as those iron mains laid within 30 metres of public habitation. The first five years of a finite programme for this remaining work has now been agreed between Transco and HSE. OFGEM and Energywatch have each been part of the discussions leading to the agreement.

16. Transco is presently committed to completing this work in no more than 30 years. The iron sections end of their reliable physical life, with the consequent risk of failure increasing along with of the network are old and it is conceivable that within the 30 year period, parts will reach the a rise in the number of incidents/leaks. As indicated in HSE's published enforcement policy for the replacement of iron gas mains, the Pipelines Safety Regulations 1996 places a number of absolute duties on pipeline operators, including one to maintain all its pipelines in good repair. Although the regulations do not specify how this should be achieved, the agreed programme of mains replacement does however provide a managed response to this. In this, it is recognised that there may be circumstances where Transco could not reasonably have known that a particular length of pipe would fail and the regulations, therefore, need to be amended. One of the objectives of the proposed amendments is to give Transco a defence against criminal proceedings provided it was following the agreed programme of mains replacement programme, and had used all the intelligence available to it to determine when a pipe should be replaced.

Background

17. There have been a small number of incidents where fatalities have occurred as result of failure of iron mains. Public reaction to those incidents and concern for something to be done has been predictable, with questions being asked both of the industry and those regulating it. The response has been quick. Not only has the HSE carried out investigations into the actual incidents, but it has also looked with the industry and others at ways in which the risks of similar incidents occurring in the future might be reduced. A fundamental part of that has been an objective look, with Transco, at the effectiveness of its iron mains replacement programme.

18. There are two principal risks associated with the integrity of the gas mains supply. The first is the risk of damage to people and their property. Leaking gas may collect in an enclosed space, then ignite, with the resulting explosion seriously injuring and killing people, and at the least, creating damage to their homes and bringing disruption into their lives. The second is the risk of a widespread failure in the overall integrity of the network through mechanical failure. A combination of the two would affect public confidence to the extent that a re-evaluation of the risks would likely deem them to be unacceptable.

19. Each time there is a mains failure, Transco has an opportunity to gather a limited amount of physical information as a result of it. This information is used to inform the risk models that it has already developed, which in turn are used to determine and establish priority areas for mains replacement. To gain any clearer picture of the physical condition of the mains Transco would have no alternative but to excavate the whole of the “at risk” sections of the network i.e. those iron mains occurring within 30 metres of the public habitation. Not only would this be costly, it would be impracticable and would be likely to pose additional health and safety risks by way of increased excavation activities, and disruption to local transport.

20. The UK public gas distribution and supply network is 275,000 kilometres long. Whilst it now mainly consists of pipes made from steel and polyethylene, about 45% of the network is still comprised of iron pipes.

21. The network is primarily the responsibility of Transco. Transco is the largest of a number of Gas Transporter's. The other Gas Transporter's are:

British Gas Connections Ltd, East Midlands Pipelines Ltd, Energi Link Ltd, ES Pipelines Ltd, GTC Pipelines Ltd, Independent Pipelines Ltd, Mowlem Energy Ltd, Scottish Power Gas Ltd, SSE Pipelines Ltd, The Gas Transportation Co Ltd, United Utilities Gas Pipelines Ltd, and Utility Grid Installations Ltd. These GT's are relative newcomers to the market and have only used plastic - polyethylene.

Two local authorities, in the London Boroughs of Sutton and Camden, and one housing association - the Metropolitan Housing Trust, also operate small gas supply networks that are comprised of iron. All have been asked by HSE to report on the condition of their respective networks.

22. Of the 91,000 kilometres of iron mains (not including the medium pressure ductile iron mains) conveying gas within 30 metres of buildings, the majority - some 78,000 kilometres - are cast iron, with the remaining 13,000 kilometres made of ductile iron. The ductile iron mains convey gas at low pressures. Each year these mains suffer about 23,000 fracture and corrosion failures leading to 600 “gas in building events”, causing an average of between 3 and 4 major incidents, which result in, on average, the deaths of 1 to 2 people. In this context, HSE describes a “gas in building event” as one where volumes of gas quickly collect in enclosed spaces - cellars, voids, rooms etc. The term, “major incident” is used to signify one that involves fire and/or explosion resulting in property damage and/or personal injury. Over the past 15 years there have been 60 such major incidents resulting in 27 fatalities. It is important to note that at some there were multiple fatalities, namely those incidents, at Putney (1985 - 8 people killed), Rutherglen (1985 - 5 people killed) and Larkhall (1999 - 4 people killed).

23. Since 1977, British Gas and its successors, including Transco have operated a points-prioritised programme to replace all its “at risk” iron mains. So far, a total of 61,000 kilometres have been replaced, with the highest annual rate of replacement being 3,300 kilometres. However, this level has not been consistently maintained. Over the past 5 years the average annual rate of replacement has fallen to 1,840 kilometres. At the recent average rate, it would take a further 51 years for Transco to replace all the “at risk” mains.

24. This targeted approach, supported by better gas release reporting and improved emergency response, has had the effect of reducing the number of incidents from an average of 25 per year in the 1970’s to the current rate of between 3 and 4 per year. However, over the same period, mains fractures have increased and the fracture rate has shown a slightly rising trend. Cast iron mains fractures had increased from about 13 fractures per 100 kilometres of pipe in the mid 1970’s to 14.5 fractures per 100 kilometres of pipeline. Nevertheless, the number of incidents has not risen correspondingly, providing endorsement to the effect of current levels of replacement activity.

25. The historic rate of replacement since 1977 averages out at about 2,650 kilometres per annum. This represents a substantially higher rate than that actually achieved by Transco over the last 5 years (1,840), and considered by HSE to be reasonably practicable. At this rate, Transco would be able to replace all its “at risk” mains in 35 years.

26. The Transco mains replacement programme has always been a targeted programme, with systems in place to help it prioritise its actions. However, the programme has not been subject to any formal agreement or review, and no specific timescale has ever been set. The Monopolies and Mergers Commission (MMC), reporting in 1997 on Transco price controls, did, however, note the Transco proposal to replace 2,650 kilometres per year over the 5-year period, starting from 1997, commenting that it would expect to see this gradually improved. This included an expectation that Transco should have adequate funding to achieve this, year on year.

27. In 2000, HSE began a full review of the mains replacement programme with Transco. The review not only looked at performance and how future work might be set out in order to reach an agreed and finite completion date, but also at the operational aspects applying to the programme, including the methods developed to help establish priorities for the replacement of iron pipes.

28. Two accelerated completion options were considered - a 25 year programme, and a 30 year programme.

29. Each option shared the same three stages.

Stage 1: a steady increase in the early years to an annual maximum point;

Stage 2: the maximum being maintained over a sustained period;

Stage 3: a progressive reduction to the final point of completion.

30. This staged approach was considered essential because of the logistics of recruitment, training and employment, not only at the start of the process but as the work would begin to approach completion.

A 25 year programme

31. This would require a gradual increase in the replacement rate in the first 5 years to a plateau of 4,300 kilometres per year, then sustained for 15 years with a gradual decrease for the remaining 5 years. Compared to a 35 year programme this would cost an extra £1.5 billion (net present cost). For the first 5 years the actual cost, including service replacement would be £3.5 billion. 4,300 kilometres per year is, however, a rate of replacement far greater than has ever been achieved by Transco. However, this would represent a rate of improvement far greater than that achieved before. There are clear constraints in moving to this. The work would have to be resourced and managed, raising the question of adequate levels of trained operatives being available. There would also be likely public reaction to any widespread disruption to travel and transport, along with a general inconvenience, arising from more excavations in the highways.

A 30 year programme

32. This would require a similar gradual increase in the rate in the first 5 years, up to a plateau of 3,580 kilometres per year, sustained for 20 years and then a gradual decrease for the remaining 5 years. Compared to a 35 year programme this would cost an extra £650 million (net present cost) over the whole period. The actual total cost for the first 5 years would be £2.27 billion. Transco has previously achieved replacement rates in the order of 3,300 kilometres, and the public and commerce have apparently tolerated the associated disruption.

The decision

33. The longer Transco takes to replace its “at risk” iron pipes, the longer the risk remains that more lives may be lost due to events arising from mains failures. Also the likelihood of a rapid deterioration of the network, and its attendant potential consequences, may increase. Of concern would be the availability of skilled operatives to undertake the work, and where there was a shortfall, the time taken to train others.

34. Although these key factors were taken into account, the 30-year replacement option has been chosen. HSE considers it realistic and practicable for Transco to speed up its rate of replacement over the next 5 years so as to be in a position to complete the replacement of all the remaining “at risk” mains within a total of 30 years at most.

35. The first 5 years of the formal mains replacement programme will be crucial. It will allow time and opportunity for Transco to look at some of the uncertainties surrounding its knowledge both of the state of the network, and how the risks may be more accurately assessed. Developments will be regularly monitored by HSE, leading to a full review at the end of that 5 year period. Decisions on the remaining programme will be considered further at that time.

36. A report describing Transco’s methodology for assessing risk and establishing priorities for replacement was published in November 2000 as the outcome of a tri-partite review by Transco, OFGEM and HSE. Copies of this joint report can be requested via the Transco website (www.transco.uk.com - see section entitled “Our Publications”). Although this methodology is considered to be robust, the nature of what it is designed to achieve and the environment it has been developed for make it essential for it to be regularly reviewed and updated as appropriate.

37. The Transco mains replacement programme agreed by HSE represents the outcome of the normal dialogue and response between those with duties under the Health and Safety at Work etc Act, 1974 (HSWA), and regulations made under it, and those who enforce the legislation. It informs HSE that the company has identified the risks to people from its operation and that it is doing something to remove or reduce them.

38. Under HSWA, HM Inspectors already have powers to enforce such a programme through the issuing of Improvement Notices. The proposed regulatory changes would take this further, by making provision for HSE to bind pipeline operators, including Transco, by agreeing, and formally approving a finite programme of iron mains replacement under which the pipeline operator would have a legal duty of compliance. Provision is also made for the pipeline operator to have a defence, in the event of those criminal proceedings brought against it, where contravention of the regulations is alleged, in those situations where HSE has agreed and formally approved a programme of mains replacement, and where the company did not know nor could not reasonably be expected to know that a relevant part of the pipeline needed to be replaced.

39. Decisions to introduce the actual iron mains replacement programme were taken by HSE on 1 August 2001, following full consultation with OFGEM and Energywatch. Because of the significance of what was agreed, and its likely effect on the public, Ministers and the Health and Safety Commission were also advised of the outcome. HSE also published a Press Notice on 18 September 2001, including details of its enforcement policy. Although both have been reproduced for ease of reference at Appendix 2 (<http://www.hse.gov.uk/press/e01161.htm>) and Appendix 3 (<http://www.hse.gov.uk/gas/gasmains.pdf>), they can still be accessed from the website.

Transition

40. An Improvement Notice (IN) against Transco is already in operation for the replacement of “at risk” medium pressure ductile iron mains. This work of replacement is continuing towards the decommissioning of all such pipes by 31 December 2002. All activities relating to this IN are being monitored by HSE. The work of replacing all other iron pipes is also being monitored by HSE. This will need to be accounted for in any formal agreement in the event of amendment regulations coming into force.

The proposal and issues

Proposal

Current legal position

41. The Pipelines Safety Regulations 1996 (PSR) require that:

the operator shall ensure that no fluid is conveyed in a pipeline unless it is composed of materials that are suitable (regulation 8);

the operator shall ensure that no fluid is conveyed in a pipeline (save for the purpose of testing it) unless it has been so constructed and installed that, so far as is reasonably practicable, it is sound and fit for the purpose for which it has been designed (regulation 9);

the operator shall ensure that a pipeline is maintained in an efficient state, in efficient working order and in good repair (regulation 13);

42. These regulations all place an absolute duty on the operator, with only a limited defence (regulation 28) in the event of third party breach. Regulation 28 states:

(1) in any proceedings for an offence for a contravention of any of the provisions of the regulations it shall, subject to paragraphs (2) and (3), be a defence for the person charged to prove -

(a) that the commission of the offence was due to act or default of another person not being one of his employees....; and

- (b) that he took all reasonable precautions and exercised all due diligence to avoid the commission of the offence.
- (2) the person charged shall not, without leave of the court, be entitled to rely in the defence in paragraph (1) unless, within a period ending seven clear days -
- (a) before the hearing to determine mode of trial, where the proceedings are in England or Wales; or
 - (b) before the trial, where the proceedings are in Scotland, he has served on the prosecutor a notice in writing giving such information identifying or assisting in the identification of the other person as was then in his possession.
- (3) for the purpose of enabling the other person to be charged with and convicted of the offence by virtue of section 36 of the 1974 Act, a person who establishes a defence under this regulation shall nevertheless be treated for the purposes of that section as having committed the offence.

43. The mains replacement programme sets out what Transco has agreed it needs to do to fulfill the requirements of the regulations. It sets out what can be reasonably achieved over a measured timescale and represents a positive step forward. The fact that the regulations do not recognise such a programme and therefore do not provide any legal underpinning to it, and that there is no defence for the pipeline operator against criminal proceedings, presents a clear cause for concern.

44. HASWA section 3(1), requires an operator to conduct its undertaking to ensure, in such a way and so far as is reasonably practicable, that persons not in its employ are not exposed to risks to their health and safety. Judgment on what is reasonably practicable is informed by what has been achieved in the past. Regarding the iron mains replacement programme, HSE would consider it reasonably practicable for Transco to increase its replacement rates to at least the historical average.

Changes to PSR

45. This proposal to amend PSR is intended to improve this situation, not only from the perspective of HSE as the enforcing authority, and the pipeline operator, but also that of the public. HSE is seeking changes by making provision for pipeline operators with iron pipes, including Transco, to be bound to a finite programme of iron mains replacement, in relation to which, the pipeline operator would be under a legal duty of compliance. Provision is also made for the pipeline operator to have a defence in the event of criminal proceedings brought against it for alleged contravention of the regulations, where the mains replacement was being adhered to, and where it did not know, nor could not reasonably be expected to know that a relevant part of the pipeline needed to be replaced. **However, it is not intended that such a defence would adversely affect, or take away, the right of a person injured by reason of a breach of the regulations to bring a claim for damages in civil proceedings.**

Issues

46. The actual Transco mains replacement programme represents a substantial series of documents containing details of the network, its regional/area structures, technical requirements, operational aspects etc. Although this will be available to HSE, in furtherance of its role in monitoring progress and enforcement, it is not intended for this documentation to be approved as far as the proposed regulatory changes are concerned. What is actually envisaged is a high-level policy document in which a formal commitment will be made by Transco to replace all iron pipes within a finite period. The policy document will also detail any other relevant timescales, particularly those that will consist of any formal reviews. For Transco it will need to be signed off at an appropriate level in the company.

Question: Is it sufficiently clear that this is what is expected?

47. The costs of the mains replacement programme form part of the price control mechanism applied to Transco by the economic regulator, OFGEM. It is to OFGEM that Transco will have to account for this expenditure. Whilst this information would provide HSE with some indication of activity, it would be less important than details of the amount of pipe laid or decommissioned. It is therefore not proposed that HSE should receive this information from Transco, but rather details of iron pipes replaced or decommissioned, and measured against previously agreed schedules of work for each region or operational area.

Question: Do you agree with this approach?

48. Transco has a legacy problem with its ageing iron mains, many of which have been inherited from the Victorian and pre-war eras. It is clear that they need to be replaced, and there is the clear financial commitment to do it. However, there is no real argument, at least one based on current knowledge, to bring about that change any sooner than over the next 30 years. Transco operates pipelines for the safe and secure conveyance of gas to millions of domestic and commercial gas consumers through a network of pipes. The immediate replacement of the unsuitable pipes is neither reasonable nor impracticable. Making the mains replacement programme subject to legal duties of compliance, however, provides a way of managing this replacement programme, as well as providing HSE with a clearer enforcement position. To provide the operator with a level of defence is seen as crucial in clarifying the legal position.

Question: Is this considered a reasonable approach to take?

Regulatory Impact Assessment

49. Although any acceleration of the mains replacement programme will involve substantial costs to Transco (see cost benefit assessment at Appendix 5), this does not come as a result of the coming into force of the proposed changes, but rather from duties under the existing regulations. Since the key issues in this consultation are concerned with a notification process, and the provision of a legal defence, it has not been considered appropriate to conduct a Regulatory Impact Assessment. In practice any additional notification costs are likely to be trivial, since the level of documentation required would be done as a matter of course and summaries of operational performance are currently provided to HSE on request. The scope of future enforcement is not predictable since we cannot anticipate the likelihood of future action against individual companies.

APPENDIX 1

**EXTRACT FROM THE PIPELINES SAFETY
REGULATIONS 1996**

**SHOWING PROPOSED CHANGES TO PIPELINES
SAFETY REGULATIONS**

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STATUTORY INSTRUMENTS

2002 No. Type number

HEALTH AND SAFETY

The Pipelines Safety (Amendment) Regulations 2002

<i>Made- - - -</i>	<i>2002</i>
<i>Laid before Parliament</i>	<i>2002</i>
<i>Coming into force</i>	<i>2002</i>

The Secretary of State, in the exercise of the powers conferred on him by sections 15(1), (4)(a), (6)(a) (8) and 82(3)(a) of the Health and Safety at Work etc. Act 1974(a) ("the 1974 Act") and of all other powers enabling him in that behalf and for the purpose of giving effect without modifications to proposals submitted to him by the Health and Safety Commission under section 11(2)(d) of the 1974 Act, after the carrying out by the said Commission of consultations in accordance with section 50(3) of that Act, hereby makes the following Regulations.—

Citation and commencement

These Regulations may be cited as the Pipelines Safety (Amendment) Regulations 2002 and shall come into force on
2002.

Amendment of the Pipelines Safety Regulations

After regulation 13 of the Pipelines Safety Regulations 1996(b) there shall be inserted the following regulation—

"Iron pipelines

13A.—*(1) Subject to paragraph (2), the Executive may from time to time approve -*

(a) (a)1974 c.37; the general purposes of Part I of the 1974 Act were extended by sections 1(1) and 2(1) of the Offshore Safety Act 1992 (c.15).
(b) (b)S.I.1996/825.

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- a. with or without modification by it, a programme prepared by the operator of a pipeline;
- b. a programme which it has itself prepared; or
- c. a programme which after approval has been modified by the operator or by itself.

(2) The Executive shall consult the operator before it approves a programme which it has itself modified or prepared.

(3) An approval under paragraph (1) -

- (a) shall be in writing;
- (b) shall be notified to the operator and published in such manner as the Executive may approve; and
- (c) may be withdrawn by the Executive by reasonable notice in writing at any time.

(4) The operator shall so far as is practicable comply with a programme approved under paragraph (1).

(5) In any proceedings for an offence for a contravention of regulation 13 it shall be a defence for the person charged to prove that at the relevant time -

- (a) any pipe to which the contravention related was of a description, apart from its geographical location, to which a programme -
 - i. approved by the Executive; and
 - ii. not then due for completion,

applied; and

- (b) where the proceedings arise from an event involving a failure of a pipe, the operator did not know and could not reasonably be expected to have known that there was a risk to safety concerning the pipe which required immediate attention.

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(6) Any reference in this regulation to a programme is a reference to a programme for the decommissioning of any description of iron pipe used in a pipeline.'

Signed by authority of the Secretary of State

*Parliamentary Under Secretary of State,
Department for Transport, Local
Government and the Regions*

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EXPLANATORY NOTE

(This note is not part of the Regulations)

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APPENDIX 2
HSE PRESS RELEASE 18 SEPTEMBER 2001
HSE ANNOUNCES ACCELERATED GAS MAINS
SAFETY REGULATIONS

HSE announces accelerated gas mains replacement programme

The Health & Safety Executive (HSE) today announced an accelerated programme to replace all iron gas mains in Britain located within 30 metres of buildings.

The announcement means that some 91,000 km of iron mains will be replaced within 30 years, five years earlier than if the mains were replaced at the historical average replacement achieved since 1977, and substantially earlier than at the present replacement rate.

There is a total of 275,000 km of pipeline in the network, made mostly of polyethylene or steel, with about 115,000 km of cast-iron and ductile iron pipework remaining from a historic legacy. Most iron mains - about 60% - are at least 40 years old, and some are over 100 years old. Virtually all of this iron pipework carries gas at low-pressure.

In September 2000, following the investigation of the Larkhall gas explosion in Scotland, HSE agreed with Transco, the largest public gas transporter, that all medium-pressure gas mains made of ductile iron within 30 metres of buildings would be replaced by December 2002. This represents 2,300 km of mains.

Today's announcement follows a review by HSE of Transco's replacement policy. The 91,000 km of mains to be replaced is the total remaining iron pipework within 30 metres of buildings. It comprises 78,000 km of cast-iron and 13,000 km of low-pressure ductile iron mains. To give an idea of the scale of the work involved, the circumference of the earth is about 40,000 km.

The purpose of the review was to examine the possibility of an increase in failures of iron mains. At present, fracture and corrosion failures cause on average three to four major incidents a year, resulting in one to two deaths.

Each gas release incident has the potential - depending on location - to cause multiple injuries or deaths, e.g. at Putney (1985 - eight deaths), Rutherglen (1985 - five) and Larkhall (1999 - four). Such incidents naturally give rise to considerable public concern.

Announcing the new programme, Dan Mitchell, Head of Land Division, HSE Hazardous Installations Directorate, said:

"Though the rate of serious incidents is stable, the fracture rate for cast iron mains since the 1970s has shown a slightly rising trend. Within 20 or 30 years, parts of the network could, conceivably, reach the end of their reliable mechanical life. If this point were reached, it would be reasonable to anticipate an increase in the failure rate and, therefore, in the number of major incidents.

"Given the technical difficulties in assessing the condition of iron mains and the potential consequences of mains failures in populated areas, HSE has decided, following detailed discussions with Transco, that the rate of replacement should be increased."

The average rate of mains replacement over the past five years has been 1,840 km/year. This is well below the highest annual rate of 3,300 km/year achieved in the 1980s and the 'historic' average rate of 2,650 km/year attained over the period since 1977. At this historic rate, it would take 35 years to replace all 'at risk' metal mains.

"HSE considers it realistic and practicable for Transco to implement a faster replacement programme",

said Mr Mitchell.

"Accordingly, Transco has agreed to increase the replacement rate to reach 3,580 km/year over the next five years, with a view to completing the programme within 30 years at most."

HSE had considered whether an even faster programme - for completion within 25 years - could be implemented, but concluded that, in the current state of knowledge, this was not practically achievable.

HSE proposes to review the new programme within five years. Within this time frame, Transco is being asked to undertake research with a view to reducing present uncertainties and enabling risks to be assessed more accurately.

HSE has produced an enforcement policy statement which sets out its position more fully on the gas mains replacement programme. The text of this will be available later this week on HSE's website at: www.hse.gov.uk/gas/gasmain.pdf

Copies of the statement may be obtained from: kelly.gibbs@hse.gsi.gov.uk. Tel: 020 7717 6816.

Notes to Editors

1. Transco has a legacy problem with its aging iron mains, many inherited from the Victorian and pre-war eras. For several decades, Great Britain has had a programme to replace these mains with more modern materials. In the 1960s ductile iron was introduced because it was more flexible than cast-iron, which can fracture with excess loading from, for example, traffic or ground movement. Ductile iron can corrode, however, so there has been a further programme to replace both metals with polyethylene pipework.
2. Difficulties in assessing the current state of the iron mains network give rise to safety concerns. The fracture rate per kilometre of cast-iron mains increased from about 13 per 100 km in 1977, when a targeted programme for replacing 'at risk' mains was introduced, to about 14.5 per 100 km in 1999. In the same period, Transco replaced some 61,000 km of iron mains.
3. In reaching its decision, HSE consulted Transco, Office of Gas and Electricity Markets (Ofgem) and Energywatch. The economic regulator, Ofgem, has agreed to take account of this programme in determining the price control to be applied to Transco from April 2002, with a view to ensuring that Transco is able to finance the replacement work. Based on figures provided by Transco, the extra cost of the proposed programme, compared with achieving the historic average rate, is estimated at £110 million for the first five years and around £650 million (net present cost) over the 30-year period. However, the cost increase in relation to the current replacement rate will be higher. Total replacement expenditure is projected to rise from about £1.2 billion (1997/8-2001/2) to about £2.25 billion over the next

five-year period. This should be viewed in the context of a total estimated mains replacement cost of £15.1 billion over a 35-year period. The effect on consumer prices will depend on the decisions of Ofgem, who are currently examining Transco's cost projections as part of their price control review. Ofgem are expected to announce their decisions on the future price control towards the end of this month.

APPENDIX 3
HSE ENFORCEMENT POLICY

THE HEALTH AND SAFETY EXECUTIVE'S ENFORCEMENT POLICY FOR THE REPLACEMENT OF IRON GAS MAINS

Background

1. There is a high level of societal concern about the potential consequences of gas mains failure. The Health and Safety Executive (HSE) is therefore requiring Transco to take further prudent and practicable steps to reduce this risk. The Office of Gas and Electricity Markets (Ofgem) has agreed that if HSE requires Transco to accelerate its current mains replacement programme it will adjust Transco's price control to allow for this.
2. The principal risk associated with the integrity of the gas mains supply is the risk of injuries, fatalities, and damage to property caused by gas releases and subsequent explosions. An accelerating rate of pipe fracture could lead to widespread failure in the integrity of the network. The combination of widespread failure and a catastrophic incident could affect public confidence to the extent that risks are re-evaluated and deemed unacceptable.
3. Transco obtains limited information each time there is a failure and this informs the risk models used to determine priority programmes for mains replacement. However, the only way they could obtain comprehensive information on the mechanical condition of the mains would be to excavate the whole of the 'at risk' network. This would create major problems of practicability and new health and safety risks.
4. There are about 91,000km of remaining iron mains within 30m of buildings ('at risk' mains) that may give rise to a risk to people. The majority of these - some 78,000km - are cast iron mains, the remaining 13,000km being low pressure ductile iron mains (see Appendix 1). Each year these mains suffer about 23,000 fractures and corrosion failures leading to 600 'gas-in-building' events causing on average 3 to 4 major incidents (fires and explosions) resulting in the deaths of 1 to 2 people annually. However, each gas release incident has the potential - depending on location - to cause multiple fatalities: for example Putney (in 1985 - 8 fatalities), Rutherglen (in 1985 - 5 fatalities) and Larkhall (in 1999 - 4 fatalities).

The risks and their containment

The need for a precautionary approach

5. Iron pipes make up slightly less than 50% of the Transco network, the remainder being made of polyethylene or steel. Most of the iron pipes are over 40 years old; some are more than 100 years old. Transco prioritises the replacement of these pipes using a system developed in conjunction with the HSE but there is considerable uncertainty about their exact condition and future integrity. It is, however, conceivable that within the next 20 to 30 years parts of the network may reach the end of their reliable mechanical life. If this point is reached, a rapid increase may occur in both the rate of failure and the number of incidents, some of which could well involve multiple fatalities, even though the risk cannot be quantified accurately at this stage. In such circumstances, which would be likely to arise in the winter months, the only option might be to shut down the particular network and cut off the gas supply to both commercial and domestic consumers.

6. There would be considerable pressure to replace the failing network as quickly as possible. But this in itself entails risk. Such work is often carried out in the middle of busy roads. Where construction activity in such locations is carried out on an emergency basis without the opportunity for careful and detailed planning, experience shows that those involved in the replacement activity are exposed to a significantly increased risk of fatalities and serious injuries.

7. A significant safety risk also arises in reconnection, as unless all appliances are properly purged gas/air mixtures can arise resulting in more explosions. To give an idea of the scale of the challenge, to reconnect 3,000 consumers safely can take at least two weeks provided there are sufficient trained staff available. Reconnection delays in the event of a major programme of work following an emergency could induce unqualified consumers to attempt to relight their own appliances, thereby increasing risks to health and safety still further.

8. Given the history of the development of the system and the extent of the buried network, Transco cannot realistically be expected to know the exact condition of all its iron mains. A precautionary approach to the issue of accelerating the replacement programme is therefore needed. The approach is based on the principles of risk aversion under conditions of uncertainty and substantial societal concern, and the need to avoid a foreseeable, unacceptable harm (in this case the potential consequences of a catastrophic failure of a gas main in a populated area) unless the costs of such avoidance can be shown to be grossly disproportionate.

The historical position

9. Since 1977 there has been a targeted programme of replacing these 'at risk' mains. Over this period 61,000 km have been replaced with a highest annual rate of replacement of 3,300 km/yea. Over the past 5 years the average rate of replacement necessary to achieve the agreed safety outputs was 1,840 km/year and at this rate it would take a further 51 years to replace all of the 'at risk' metal mains.

10. This targeted programme together with gas release reporting and emergency response has reduced the number of incidents (involving death or serious injury to people or major damage to property) from an average of 25 per year in the 1970s to the current figure of 3.5 per year. However the fracture rate has shown a slightly rising trend, having increased from about 13 per 100 km in 1977 to about 14.5 per 100 km in 1999. This could be a signal that the network is deteriorating, although the number of incidents is not rising correspondingly due to the current level of replacement activity.

11. The historic rate of replacement since 1977 averages out at 2,650 km/year. To return to this rate which is higher than that achieved in the last 5 years (1,840 km/year) would mean replacement of the 'at risk' mains in 35 years. If the rate of deterioration of the network does not increase, about 52 major incidents can be predicted to occur during this period.

12. The Monopolies and Mergers Commission (MMC) agreed in its 1997 report on Transco's price control that there should be no deterioration in Transco's safety standards, defined by HSE at the time as the minimum legal requirement. It also noted, though it did not fully support, Transco's proposal to replace mains at a rate of 2,650 km/yr over the 5-year period

from 1997, compared with 2,250 km/yr achieved over the previous 5 years, commenting that some further gradual improvement in standards would seem appropriate until HSE, Transco and the economic regulator (now Ofgem) decided on a new programme.

The legal position

13. The Health and Safety at Work etc Act 1974 (HSWA), section 3(1), requires Transco to conduct its undertaking to ensure, so far as is reasonably practicable, that persons not in its employment are not exposed to risks to their health and safety. In making a judgement on what is 'reasonably practicable' the courts will take into account standards that have been achieved in the past. HSE's view is that it is reasonably practicable for Transco to increase its replacement activity to at least the historical average.

14. However, in addition, the Pipelines Safety Regulations 1996 (PSR) require (regulation 8) that pipelines be composed of material that is suitable; (regulation 9) that it has been constructed so as to be sound and fit for purpose; and (regulation 13) for the operator (Transco) to ensure that a pipeline is maintained in an efficient state, in efficient working order and in good repair. All of these duties are absolute, with a limited defence if a breach is caused by a third party.

15. HSE is currently developing proposals for amending the PSR regulations so as to provide an explicit legal underpinning for any programme approved and agreed with Transco. In accordance with the normal practice of the Health and Safety Commission, any proposals for legislative change in this area will be the subject of full public consultation.

Transco's Replacement Policy from 2000

16. Transco currently applies a risk-based methodology agreed with HSE and Ofgem to inform its main replacement programme. The effect of the current approach to maintaining existing safety standards could require only a few hundred kilometres of cast iron mains to be replaced each year gradually decreasing to a very low level. Following review, HSE no longer considers the programme to be an acceptable course of action because it:

- a. does not constitute adequate action to comply with the requirements of health and safety legislation;
- b. does not address the likelihood and severity of the health and safety (and social and economic) consequences should be rapid deterioration of the network occur.

Options

17. The aims of a replacement policy are:

- a. first, to pre-empt as far as possible a sudden deterioration in the integrity of the network, such as would entail unplanned emergency action and the associated risks described above;
- b. to enable Transco to react more effectively than would otherwise be the case in the event of a sudden deterioration taking place before the completion of the targeted programme.

18. The quicker the 'at risk' mains can be replaced the smaller the chance of the onset of rapid deterioration. As the replacement proceeded, the scope for disruption and danger in any situation that did develop would progressively diminish. Thus, the extra cost incurred in replacing mains faster than the historic replacement rate is essentially an insurance premium to avoid the adverse consequences of rapid deterioration, and also to prevent the incidents that would occur even without this deterioration because the public would be exposed to risk for a shorter time.

19. All options for Transco to reduce the period within which the mains are replaced involve 3 stages: a steady increase in the replacement rate over a period of years to a maximum; maintenance of that maximum rate for a number of years; and then progressive reduction of this rate to zero over the final few years of the replacement programme. This profile is needed to deal with the logistics of recruiting and training staff to do the work and then reducing the workforce towards the end of the programme. HSE considered a number of options to see what might be practically achievable.

A 35 year Programme

20. This is the programme that Transco would achieve if the replacement rate were increased to match the historic average replacement rate of 2,650 km/year described above. According to cost projections made by Transco, the gross cost of the programme would be £15.1 billion over 35 years (see Appendix 2). However, much of this expenditure is well into the future. Forecast gross costs over the next five years would be £2.16 billion (including service pipe replacement). The present value of total costs, taking into account cost savings, is £5.8 billion over thirty-five years. In HSE's judgement, this would be the minimum programme needed to enable Transco to comply with HSWA.

A 25 year Programme

21. This would require an increase in the replacement rate over 5 years to a plateau of 4,300 km/year for 15 years and then a gradual decrease in the rate over the next 5 years. Transco has estimated that, compared to a 35 year programme, a 25 year programme would cost over the period an extra £1.5 billion (net present cost). Over the next 5 years the forecast total could be £3.8 billion (including service pipe replacement).

22. However, a rate of 4,300 km/year is far greater than has ever been achieved. Major constraints include the difficulty of ensuring the availability of sufficient numbers of trained personnel and logistical problems associated with organising largescale pipe-laying operations in urban areas. Moreover, the reaction of the public and commerce to the inconvenience and widespread disruption of supply is unknown but could be very strong. On these grounds **a 25 year programme does not appear, in our present state of knowledge, to be practically achievable.**

A 30 year Programme

23. This would require an increase in the rate over 5 years to a plateau of 3,580 km/year for 20 years and then a gradual decrease over the next 5 years. On the basis of figures provided by Transco, compared to a 35 year programme a 30 year programme would cost approximately an extra £650 million (net present cost) over the period. With some rephasing of the more expensive large diameter mains replacement, the total forecast cost for the next

five years would be contained to £2.27 billion, which is an additional £110 million on the cost that would be incurred in the first five years of the 35 year programme. Transco has achieved rates of the order of 3,300 km/year previously and the public and commerce tolerated the associated disruption. **Therefore this option is practicable.**

24. Ofgem and Transco are now considering how best to manage the funding of necessary expenditure in the period 2002/3 - 2006/7. HSE's decision has taken into account Transco's cost estimates. However, the HSE notes that Ofgem is currently scrutinising these costs and may make its own assessment of the efficient costs of the work programme in setting the allowed revenues for Transco's price control from April 2002. The outcome of these considerations will determine the effect on consumer prices. Ofgem is expected to announce its decisions on 26 September 2001.

25. Against the cost, there will be the benefit of significantly reducing the likelihood of incidents due to rapid deterioration of the network and the consequences of any emergency repair programme undertaken as a result of deteriorating safety levels. In addition, there will be the benefit of avoiding the four incidents that could be expected if the incident rate continued at the current level.

HSE's Decisions

26. HSE considers it realistic and practicable for Transco to speed up its rate of mains replacement over the next 5 years so as to be in a position to complete the replacement of all the remaining 'at risk' iron mains within a total of 30 years at most. This precautionary approach is in line with the principles of risk aversion under conditions of uncertainty and the duty to avoid unacceptable harm unless the costs of doing so can be shown to be grossly disproportionate.

27. However, given the uncertainty surrounding this issue, HSE recognises that it will need to keep the policy under review as implementation proceeds. HSE accordingly intends to review the position before the end of the first 5 years, so that an agreed programme can be confirmed for the following period. HSE will also require Transco to undertake further work within the initial 5-year period to reduce the uncertainty by carrying out research to enable the risks to be assessed more accurately.

28. HSE is also developing proposals for amending the law with a view to facilitating the implementation of the new programme (see paragraph 15). The intention is that legislative proposals will be put to the Health and Safety Commission (HSC) who will issue a consultative document for public comment. Following consideration of the responses to this consultation, the HSE will then, in accordance with normal practice advise Ministers on any appropriate legislative changes.

APPENDIX 4

**TABLE SHOWING 'AT RISK' AND 'TOTAL IRON MAINS'
POPULATION**

'AT RISK' POPULATION

Material	Length of Low Pressure (Km's 000s)	Length of Medium Pressure (Km's 000s)	Total Length (KM's 000s)
Cast Iron	73.0	4.7	77.8
Ductile Iron	13.0	-	13.0
Totals	86.0	4.7	90.8

TOTAL IRON MAINS POPULATION BY DIAMETER & MATERIAL

Pipe Size	Pit Cast Iron (Km's 000s)	Spun Cast Iron (Km's 000s)	Ductile Iron (KM's 000s)
Diameter<=3"	3.1	2.2	0.1
Diameter 4-5"	21.8	23.1	8.8
Diameter 6-7"	16.9	13.2	7.7
Diameter 8-11"	6.3	3.9	1.7
Diameter >=12"	4.1	2.2	1.6
Totals	52.2	44.7	19.9

APPENDIX 5
IRON GAS MAINS REPLACEMENT
COSTS AND BENEFITS

IRON GAS MAINS REPLACEMENT

COSTS AND BENEFITS

Risks

1. The principal risk associated with the integrity of the gas mains supply is the risk of injuries, fatalities, and damage to property caused by gas releases and subsequent explosions. An accelerating rate of pipe fracture could lead to widespread failure in the integrity of the network. The combination of widespread failure and a catastrophic incident could affect public confidence to the extent that risks are re-evaluated and deemed unacceptable.

2. If as a result risks are suddenly considered unacceptable, then the only re-course may be to temporarily shut down part of the network using the remaining cast-iron pipelines, and implement an emergency replacement programme. (The most dense populations would be targeted first, and supply to critical sites, such as hospitals and large process plants would either be maintained, or disruption greatly minimised. Many of these sites would also have emergency back-up facilities, or be able to switch between gas and heavy fuel oil). The need to adopt emergency measures is reduced as the mains replacement programme is accelerated.

Costs of accelerating the replacement programme

3. Transco have estimated that the costs of the replacement programme would be £16 billion over twenty five years, £15.8 billion over thirty years and £15.1 billion over thirty five years. These are undiscounted total costs, in current (year 2001) prices.

4. However, more rapid replacement brings benefits in terms of a more reliable system. Discounted at 6% in line with HM Treasury guidelines, the net costs of the programme are £7.3 billion over twenty five years, £6.5 billion over thirty years and £5.8 billion over thirty five years. The difference in costs between the thirty and thirty five year programme is around £650 million in present value terms - if both programmes were completed as scheduled.

Balance of costs and benefits

5. Accelerating the replacement programme to thirty years should reduce the number of incidents from faulty gas mains, even if there is no increase over current failure rates. However, the number of incidents prevented (around four) has to be set against the additional cost of £650 million in present values. This results in a cost for each incident avoided of around £160 million (with the potential for a greater number of incidents associated with a deteriorating network).

6. However, accelerating the programme would have two other possible outcomes:

- (a) the need for emergency remedial programmes would be avoided if a part of the network had been replaced, before widespread failures of that part would have occurred under the 35 year programme.
- (b) even if such emergency programmes were to prove necessary before 30 years, a higher rate of replacement would mean less of the network would comprise iron mains. Hence an emergency programme of repair would be less extensive and less costly.

7. As examples of the costs that could be avoided under these two different scenarios, the effects of an emergency replacement programme which would involve around 11% of the low and medium pressure network (some 27,000 kms) over two years have been estimated. (These costs are based on discussion with Transco about the scope and implications of such a programme, but should be regarded as indicative only). Costs arise through the pipeline works, but also through the inevitable disruption to supply affecting domestic and commercial/industrial users. The present value of such costs depends on their timing: undiscounted they are estimated at some £12.1 billion, at 20 years hence the present cost is £3.8 billion, at 25 years hence, £2.8 billion. These costs would be entirely avoided if outcome (a) was a consequence of accelerated replacement.

8. If (b) were the outcome, there could still be a benefit of faster replacement. The 30 year programme replaces the 'at-risk' cast-iron mains at a rate around 17% higher than a 35 year programme. At year 25 of the 30 year programme, there would be only 6% of the network left to replace. Under a 35 year programme there would still be around 11% left to replace. The difference between the extent of emergency programmes under these circumstances (the present value benefit of the higher rate of replacement) would be some £1.3 billion.

APPENDIX 6

CONSULTATION ARRANGEMENTS

Extract of Consultees

NATIONAL GOVERNMENT

All relevant government departments and agencies

LOCAL GOVERNMENT

All local government associations and representatives from the emergency services

REPRESENTATIVES OF WORKERS

Trades Union Congress contacts plus a wide range of trade unions representing all sectors

EMPLOYERS ORGANISATIONS (INCLUDING SMALL FIRMS)

Consumers Association
Federation of Small Businesses
Institute of Directors
Institute of Gas Engineers
Small Business Service
Union of Independent Companies

OTHER ORGANISATIONS

British Safety Council
British Safety Industry Federation
British Standards Institute
Country Landowners Association
Countryside Commission
Countryside Commission for Wales
Emergency Planning Association
Energywatch
Institute of Directors
Institute of Gas Engineers
Occupational Health Advisory Committee
OFGEM
Royal Society for the Prevention of Accidents (RoSPA)
The Crown Estate Commissioners

Industry

British Gas Connections Ltd
East Midlands Pipelines Ltd
Energi Link Ltd
ES Pipelines Ltd
GTC Pipelines Ltd
Independent Pipelines Ltd
Mowlem Energy Ltd
Pipeline Industry Guild (PIG)
Scottish Power Gas Ltd
SGE Pipelines Ltd
The Gas Transportation Co Ltd
Transco
UK Onshore Pipeline Association (UKOPA)
United Utilities Gas Pipelines Ltd
Utility Grid installations Ltd

CONSULTATIVE DOCUMENT



The full text of this and other Consultative Documents can be viewed
and downloaded from the Health and Safety Executive web site on the internet:

www.hse.gov.uk/condocs/

Consultative Documents are available from:

HSE Books, PO Box 1999
Sudbury, Suffolk CO10 2WA
Tel: 01787 881165
Fax: 01787 313995