

# A guide to the Borehole Sites and Operations Regulations 1995

## Guidance on Regulations



**This is a free-to-download, web-friendly version of L72 (second edition, published 2008). This version has been adapted for online use from HSE's current printed version.**

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This book contains the full text of the Boreholes Sites and Operations Regulations 1995 together with accompanying guidance concerning the minimum requirements for improving the safety and health protection of workers in the mineral extraction industries through drilling. It has been prepared after widespread consultation with industry and provides guidance for management and specialists in the oil/gas, mining and quarrying industries.

In addition to the oil, gas and other mineral extraction industries, it applies to the drilling, for example, of boreholes inside a mining area, for proving quarry and opencast reserves, for the extraction or disposal of water, extraction of landfill gas, civil engineering, geophysical exploration and geotechnical investigation. The Regulations do not apply to offshore installations or activities carried out from an offshore installation.

This second edition expands the scope of the guidance (to cover boreholes used for the storage of gas in natural strata reservoirs where oil, gas etc have previously been extracted) and updates references to other regulations and publications.

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This guidance is issued by the Health and Safety Executive (HSE). Following the guidance is not compulsory and you are free to take other action. But if you do follow the guidance you will normally be doing enough to comply with the law. Health and safety inspectors seek to secure compliance with the law and may refer to this guidance as illustrating good practice.

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# Preface

The Borehole Sites and Operations Regulations 1995 came into force on 1 October 1995. The Regulations were made under the Health and Safety at Work etc Act 1974.

They implement requirements, not covered by other legislation, of the European Directive on Boreholes (92/91/EEC) concerning the minimum requirements for improving the safety and health protection of workers in the mineral extracting industries through drilling.

In addition, there are two other requirements unrelated to the Directive. These are:

- (a) a notification requirement on operators for notice of drilling operations and in some cases subsequent abandonment of the borehole. This is necessary due to the privatisation of British Coal and changes to the Department of Trade and Industry's petroleum licensing regime;
- (b) the inclusion in the Borehole Sites and Operations Regulations 1995 of prospect drilling operations to meet a requirement of a separate Directive (Mines and Quarries Directive 92/104/EEC) which was considered better placed in these Regulations rather than in the Quarries Miscellaneous Health and Safety Provisions Regulations 1995 and the Mines Miscellaneous Health and Safety Provisions Regulations 1995.

This publication contains the full text of the Borehole Sites and Operations Regulations 1995 (SI 1995/2038) together with accompanying guidance which has been prepared after widespread consultation with industry.

Regulation

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## Regulation 1 Citation and commencement

*These Regulations may be cited as the Borehole Sites and Operations Regulations 1995 and shall come into force on 1st October 1995.*

Regulation

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## Regulation 2 Interpretation

(1) *In these Regulations, unless the context otherwise requires –*

*“borehole site” means a place at which a borehole operation –*

- (a) is being or is to be undertaken; or*
- (b) has been undertaken, save where all borehole operations have ceased and all boreholes have been abandoned;*

*“competent” in relation to a person means competent by way of sufficient training and experience or knowledge and other qualities properly to perform or assist in performing the work which that person is required to do;*

*“the Executive” means the Health and Safety Executive;*

*“health and safety document” has the meaning assigned to it by regulation 7;*

*“mining” does not include opencast mining;*

*“mining area” means land –*

- (a) within one kilometre, in a horizontal or other direction, of the workings in a mine (whether disused or not); or*
- (b) in relation to which a licence to mine for minerals has been granted;*

*“operator” in relation to a borehole site means –*

- (a) a person appointed by the owner in writing to exercise for the time being the function of organising or supervising borehole operations at the site, where that function involves the exercise of overall control of the borehole site; or*
- (b) where for the time being there is no such person, the owner;*

*“owner”, in relation to a borehole site, means the person who has the right to undertake the borehole operations which are being or are to be undertaken at the site; and*

*“well” includes any borehole associated with that well.*

(2) *Any reference in these Regulations to a borehole operation is a reference to an activity or operation in the course or furtherance of, or in connection with the cessation of –*

- (a) the extraction of minerals by a borehole;*
- (b) prospecting with a view to such extraction; or*
- (c) prospecting by a borehole, other than a borehole drilled from within the underground workings of a mine which is in use, with a view to the extraction of minerals by means other than a borehole,*

*or to the preparation for sale, but not the processing, of extracted minerals at the place of any such activity or operation.*

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- (3) *In these Regulations, unless the context otherwise requires –*
- (a) *a reference to a numbered regulation or Schedule is a reference to the regulation or Schedule in these Regulations so numbered; and*
- (b) *a reference to a numbered paragraph is a reference to the paragraph so numbered in the regulation or Schedule in which that reference occurs.*

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**Borehole operation**

1 A borehole operation is any operation or activity at a borehole site, associated with the following:

***Extraction of minerals by boreholes***

2 This includes all extraction operations at a borehole site, for oil, natural gas, coal bed methane and other minerals existing in their natural strata. It includes boreholes used for the storage of gas in natural strata reservoirs from which oil, natural gas or coal bed methane has previously been extracted. It does not include extraction of landfill gas.

3 It also includes ancillary operations associated with extraction such as injection of water or gas from the surface to an underground reservoir, maintenance work and on-site operations associated with the preparation of the extracted minerals for sale. It also includes boreholes used to construct underground storage facilities where minerals are to be extracted through the borehole, for example in the construction of caverns in salt formations by solution mining. Preparation of minerals includes simple operations to separate water and gas from well fluids and to stabilise well fluids prior to transport from a borehole site. It does not include processing of minerals.

***Prospecting for minerals which are to be extracted by boreholes***

4 This includes all exploratory drilling operations for minerals existing in their natural strata, which are to be extracted by boreholes, eg oil, natural gas, coal bed methane etc.

5 It also includes all work ancillary to a drilling operation at a borehole site, such as assembly and installation of drilling equipment on the site, drilling, borehole logging, mud pumping, well surveying, fracturing, perforating and well testing etc. It also includes any prospecting work carried out at an existing borehole site even though no drilling operations are being carried out in association with that prospecting.

***Prospecting by means of boreholes, excluding those drilled from within the underground workings of a mine, with a view to extracting discovered minerals by means other than boreholes***

6 This includes prospecting by boreholes for coal, tin, salt, gypsum, limestone or any other minerals which are to be extracted by deep mining, opencasting or quarrying. It includes drilling operations, coring, seismic work using boreholes and all work associated with these operations at a borehole site.

7 'Mineral' means mineral existing in its natural strata and includes oil, natural gas (but not landfill gas), coal bed methane, coal, fluorspar, gypsum, lead, potash, anhydrite, salt, tin, rocks, clays and other minerals. It does not include water with the exception of water extracted from or returned to natural strata in connection with the exploration or extraction of minerals.

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### Exclusions

- 8 Borehole operations do not include:
- (a) the drilling of shotfiring holes in connection with production blasting at opencast sites or quarries or blasting at construction sites;
  - (b) geophysical exploration or investigation for the construction of underground storage facilities, civil engineering tunnels, shafts or other civil engineering works which may involve extraction of minerals;
  - (c) prospecting for water or extraction or disposal of water, except in connection with petroleum extraction or mineral exploration;
  - (d) extraction of landfill gas;
  - (e) preparation at a site where no extraction or prospecting is being carried out, of minerals which were extracted by boreholes at another site. An example of this would be separation of gas and water from crude oil at a central oil collection site which is not used for prospecting or production of minerals by boreholes.

### Borehole site

- 9 A borehole site means any site at which borehole operations:
- (a) are going to be undertaken;
  - (b) are being undertaken; or
  - (c) have been undertaken and at which there is a borehole, whether partly drilled or completed, which has not been abandoned.
- 10 In the case of a site at which the first borehole is to be drilled, the site will become a borehole site as soon as the owner, as defined in these Regulations, decides that borehole operations are to be undertaken there. It will remain a borehole site until all boreholes on that site have been abandoned.
- 11 A borehole site may contain several boreholes and plant and equipment associated with the boreholes and borehole operations. The extent of the site should be defined as appropriate, either on a plan or physically on site or both and should be consistent with the area and activities for which the operator has overall control.

### Mining area

- 12 A mining area means land which lies within 1 km of the workings of any mine whether currently being worked or disused, or land in relation to which a licence to mine minerals has been granted.
- 13 This is land where mining operations may have been carried out, may be ongoing or may be carried out in the future. It is an area where mining operations and borehole operations may affect one another.
- 14 It includes the volume of land which lies within the locus of all points lying 1000 metres, measured in any direction, from any mine working. The extent of mine workings and the location and proximity of a borehole must be considered in three dimensions.
- 15 Mine workings include all areas where mineral has been extracted including shafts, staple pits, underground roadways, stopes, longwall workings, board and pillar workings, headings, water lodges and any boreholes associated with the mine, for example for ventilation, cable routes, pumping, methane drainage, proving of reserves and probing in connection with prevention of inrushes.

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16 Mine owners and where necessary mining records should be consulted to determine the extent of mine workings in an area where a borehole is to be drilled.

17 Land in relation to which a licence to mine for minerals has been granted includes the volume of land above, below and within the mineral deposits to which the licence applies.

18 The Coal Authority and mineral planning departments of local authorities should be consulted to determine the extent of land relating to licences for mining of minerals.

19 Useful information relating to mines and mine plans is given in the Approved Codes of Practice (ACOPs)<sup>1,2</sup> supporting the Management and Administration of Safety and Health at Mines Regulations 1993 and the Mines (Precautions Against Inrushes) Regulations 1979.

Regulation

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### Regulation 3 Application

*(1) These Regulations shall not apply to offshore installations or activities carried out from such installations.*

*(2) These Regulations shall apply to a self-employed person as they apply to an employer and as if that self-employed person were both an employer and an employee.*

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20 The Regulations do not apply to offshore installations or activities carried out from an offshore installation. The meaning of 'offshore installation' is described in articles 4(2) and (3) of the Health and Safety at Work etc Act 1974 (Application outside Great Britain) Order 2001 (due to be replaced).

21 A structure which is connected with dry land by a permanent structure providing access at all times and for all purposes is not an offshore installation. These Regulations therefore apply to such a structure and activities carried out from such a structure.

22 With the exception of parts of regulation 6, which deals with notifications, all of the Regulations apply to borehole operations and borehole sites as defined in regulation 2(2).

23 Regulation 6(1) deals with the notification of drilling, abandonment and other well operations at petroleum borehole sites.

24 Regulation 6(2) deals with the notification of exploratory drilling operations in connection with mining of minerals.

25 Regulation 6(3) deals with the notification of any drilling operations 30 metres deep or more, other than those in connection with petroleum or deep mining, which are to take place within a mining area.

26 This regulation therefore applies to the drilling, for example, of all boreholes which are 30 metres deep or more and inside a mining area, for proving quarry or opencast reserves, extraction or disposal of water, extraction of landfill gas, civil engineering, geophysical exploration and geotechnical investigation.

27 The Regulations therefore apply to a large range of sites at which boreholes are to be drilled, are being drilled or have been drilled and have not yet been abandoned. These include for example:



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- (a) large gas and oil production sites where drilling or workovers may be ongoing at the same time as production;
- (b) small production sites where there may be a single unmanned well producing small quantities of oil or gas;
- (c) sites where water is extracted or is injected back into the strata via boreholes in connection with the extraction or exploration of minerals;
- (d) exploratory drilling sites where boreholes are being drilled to prove mineral deposits for extraction by deep mining, quarrying or opencast quarrying;
- (e) sites where boreholes are being drilled, for whatever purposes, to a depth of 30 metres or more within a mining area.

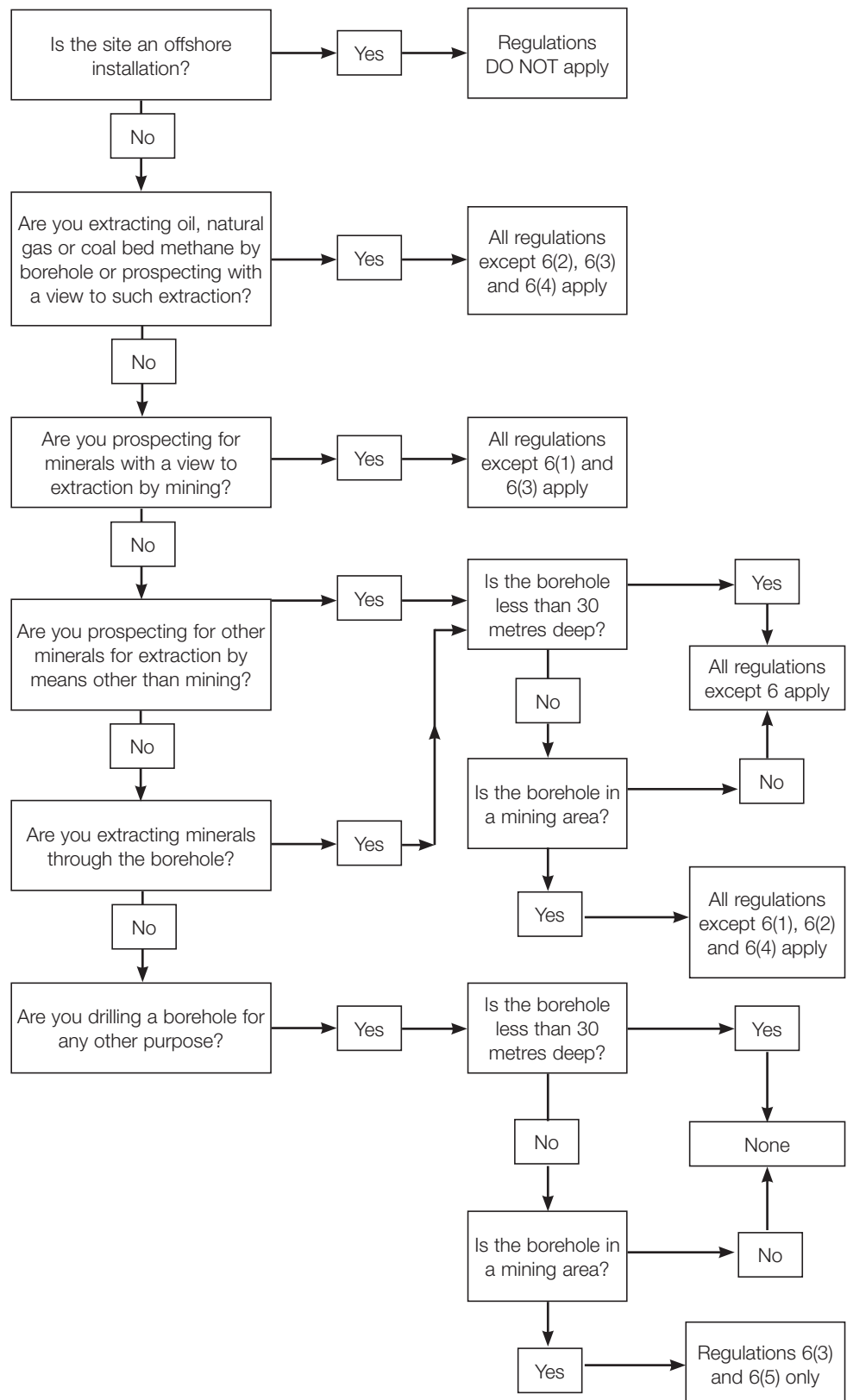
28 Table 1 and Figure 1 summarise the application of the Regulations.

**Table 1** Application of Regulations

<b>Proposed work activity</b>	<b>Location</b>	<b>Borehole depth</b>	<b>Is this a borehole operation?</b>	<b>Which regulations apply</b>
Prospecting for or extraction of oil, gas or coal bed methane by borehole	Anywhere	Any	Yes	All except 6(2), (3) and (4)
Prospecting for other minerals with a view to extraction by mining	Anywhere	Any	Yes	All except 6(1) and (3)
Prospecting for other minerals with a view to extraction by means other than mining (eg by quarrying, opencast mining or solution mining through the borehole)	Inside a mining area	30 metres or more	Yes	All except 6(1), (2) and (4)
		Less than 30 metres	Yes	All except 6
	Outside a mining area	Any	Yes	All except 6
Extraction of other minerals by borehole	Inside a mining area	30 metres or more	Yes	All except 6(1), (2) and (4)
		Less than 30 metres	Yes	All except 6
	Outside a mining area	Any	Yes	All except 6
Drilling of a borehole for any other purpose	Inside a mining area	30 metres or more	No	6(3) and (5) only
		Less than 30 metres	No	None
	Outside a mining area	Any	No	None

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**Figure 1** Flow chart showing application of Regulations



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## Regulation 4 Information to and general duties of the operator

(1) *Where the owner is not himself the operator of a borehole site, he shall furnish the operator with all information in his possession needed to enable the operator to perform his duties under these Regulations.*

(2) *In addition to any other duties imposed on the operator by these Regulations, it shall be the duty of the operator –*

- (a) *to exercise overall control of the borehole site; and*
- (b) *to co-ordinate the measures taken by himself and every employer and self-employed person at the site to comply with the requirements and prohibitions imposed upon them by or under the relevant statutory provisions.*

(3) *In relation to a borehole site, any duty imposed on an employer by these Regulations shall also be imposed on the operator in so far as it relates to matters under his control.*

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### Appointment of operators

29 Owners have the option either to be the operator themselves or to appoint in writing another person to be the operator of a borehole site.

30 The person appointed may be an individual person or a body of persons.

31 These Regulations place a number of important health and safety related duties on the operator, whether he be the owner or an appointed person.

32 Owners, who are employers, have duties under the Health and Safety at Work etc Act 1974 (HSW Act)<sup>9</sup> to ensure, so far as reasonably practicable, the health, safety and welfare of their employees. They also have a duty to conduct their undertakings in such a way as to ensure, so far as reasonably practicable, that persons not in their employment who may be affected by their undertakings are not exposed to risks to their health or safety.

33 In addition, regulation 13 of the Management of Health and Safety at Work Regulations 1999 (SI 1999/3242) places a duty on employers, in entrusting tasks to their employees, to take into account their capabilities as regards health and safety.

34 When appointing an operator, the owner is therefore required to ensure that the demands of the appointment do not exceed the operator's ability to carry them out. Owners should take into account the competence of the operator and the capacity to discharge duties and exercise authority on the site. Individual persons or the staff of a body of persons appointed as the operator should have adequate practical and theoretical knowledge and relevant experience of the type of borehole site and borehole operations which are to be carried out there.

35 An operator's competence may need to be reviewed if and when circumstances change or events require it.

36 Operators may be appointed for several borehole sites providing the combined duties are reasonably within their capacity to manage the sites effectively.

37 Where the operator is a body of persons, it may be appointed as the operator for a number of sites but responsibility and authority for individual sites

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and where necessary individual borehole operations should be clearly defined, specified and allocated to competent individual staff. It remains, however, the duty of the appointed operator to comply with the relevant requirements under these Regulations.

38 Where a large drilling operation is carried out on a production site, it may be necessary to demarcate the drilling and production sites as separate sites and appoint separate operators for each operation. Some individuals may be competent to be operators for both production and drilling operations on the same site.

39 At sites where numerous fairly shallow boreholes are to be drilled to a standard pattern, for example in the case of exploration for shallow coal reserves, the operator appointed for the site may be in control of several simultaneous drilling operations.

40 It is recommended that an individual person should not be expected to exercise overall control of more than one deep drilling operation at any time.

41 An individual person may be appointed as the operator for a drilling operation while at the same time being the appointed operator for a number of sites where drilling is not being carried out.

42 An individual person may be appointed as the operator for a number of production borehole sites.

43 If the operator is an individual, during short periods of absence, for example during holidays or periods of sick leave, a suitable substitute should be appointed.

### Duty of owner to furnish operator with requisite information

44 Regulation 4(1) recognises the need for operators of borehole sites to have available all the information necessary for them to discharge their duties under these Regulations. It puts a duty on owners to furnish appointed operators with all such information in their possession.

45 In addition to seeking improvements to the safety and protection of health of persons who work at borehole sites, these Regulations are also aimed at protecting the safety of persons who do not work at borehole sites but who may be put at risk by the drilling of boreholes.

46 Owners, operators and other persons entitled to drill boreholes, who may be employers, are required to comply with their general duties under the HSW Act and under these Regulations for the safety and health of persons who do not work at their borehole sites. They should take all reasonably practicable measures to ensure that they have identified how their boreholes may create hazards to persons other than their employees.

47 These include in particular, underground mineworkers, visitors at tourist mines and persons working at other borehole sites. Boreholes may also create hazards to potholers, persons working in deep construction works or underground storage facilities and persons on the surface in the case of boreholes drilled from high ground towards the surface of lower lying land or boreholes which may allow underground fluids to escape and be released at the surface.

48 Where owners appoint persons other than themselves to be the operators of borehole sites, they are required to ensure that they supply the operators with all the information in their possession which is relevant to the safety and health of

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persons on the site and persons who may be remote from it but who may be affected by it.

### General duties of the operator

49 Regulation 4(2) places a duty on appointed operators to exercise overall control of the borehole site and to co-ordinate the measures taken by themselves and every other employer and self-employed person at the site to comply with the requirements and prohibitions imposed upon them by or under the relevant statutory provisions.

50 It is not necessary for individual operators or persons acting on behalf of a body of persons appointed as an operator to be present at a site at all times during borehole operations. Such persons should make arrangements to be contacted at any time in the event of an emergency or when their direction is required.

51 Operators have a duty to exercise overall control of the borehole site. They should make suitable arrangements for the effective control of the site. These should provide for competent supervision of operations, inspection of the site and the issue of necessary rules or instructions. These should take the form of written 'operator's rules' or 'operator's instructions' or when appropriate may be direct spoken instructions. Operators should ensure that suitable arrangements are made for all rules and instructions to be received, understood and complied with by those for whom they are intended.

52 They should ensure that during drilling operations and operations involved with the repair, maintenance or modification of a well, the site is constantly supervised by a competent person capable of recognising an ingress of well fluids under pressure and taking the actions required to maintain the safety of the well and thereafter safely restore it to normal operation. In the case of borehole operations associated with exploration or production of oil, gas and coal bed methane or drilling for deep coal reserves in poorly documented land, that person should possess relevant evidence of competence in well control (see paragraphs 285–328).

53 Operators have a duty to co-ordinate their work and their safety measures with those of other employers and self-employed persons working at the site.

54 Further guidance on co-ordination duties is given in paragraphs 97–104 of the section covering the health and safety document.

55 Regulation 4(3) imposes on operators all the duties imposed on employers by these Regulations, so far as they relate to matters under their control. Operators therefore carry the duties detailed in:

- (a) regulation 7(4), dealing with the need to have regard to the health and safety document;
- (b) regulation 9, dealing with the additional health and safety requirement; and
- (c) regulation 10, dealing with health surveillance,

to the extent of matters under their control.

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### Regulation 5 Co-operation

*Every employer of persons at work at a borehole site (other than the operator) shall co-operate with the operator, to the extent necessary to enable him to comply with the relevant statutory provisions at the site.*

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56 Regulation 5 recognises that many borehole operations involve a number of different employers and self-employed persons who provide various specialist services. It places a duty on all employers (including by virtue of regulation 3(2), self-employed persons) at work at borehole sites to co-operate with the operators as far as necessary to enable them to comply with the relevant statutory provisions. In particular, this co-operation is necessary to enable operators to co-ordinate the safety and health measures at the site.

57 Co-operation of employers may require them to provide information relevant to health and safety such as risk assessments for their specialist work activities, technical information relating to safe use of equipment or substances and documents certifying competence of employees. It may involve the provision of special training relating to a specific site hazard or the adoption of special site rules and the taking of certain precautions peculiar to that site.

58 It will require them to comply with any directions relating to health and safety given to them by or on behalf of the operator. Such directions may be general or specific. They may be given in writing in the form of operator's rules or instructions or, when appropriate, as direct spoken instructions.

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## Regulation 6 Notice of the commencement of drilling operations and the abandonment of boreholes

(1) *In the case of petroleum, the operator of a borehole site shall ensure that no drilling operation, abandonment operation or other operation on a well which would make a significant alteration to it, or involve a risk of the accidental release of fluids from the well or reservoir, is commenced at that site unless he has notified to the Executive the particulars specified in Part I of Schedule 1 at least 21 days in advance, or such shorter time in advance as the Executive may agree.*

(2) *The operator of a borehole site at which a borehole is intended to be drilled with a view to the extraction of minerals by mining shall not commence drilling such borehole unless he has notified to the Executive the particulars specified in Part II of Schedule 1 at least 21 days in advance, or such shorter time in advance as the Executive may agree.*

(3) *Where a borehole (not being a borehole to which paragraph (1) or (2) relates) is being drilled within a mining area to a depth of 30 metres or more, the person entitled to drill the borehole, within 30 days after the commencement of its drilling, shall notify to the Executive the particulars specified in Part III of Schedule 1.*

(4) *The operator of a borehole site at which a borehole, drilled with a view to the extraction of minerals by mining, is being abandoned shall, within 21 days after the commencement of its abandonment, notify to the Executive the particulars specified in Part IV of Schedule 1.*

(5) *The operator of a borehole site or, in the case of particulars previously notified under paragraph (3), the person entitled to drill the borehole shall ensure that the Executive is notified as soon as reasonably practicable of any material change of circumstances which would affect particulars previously notified under paragraph (1), (2), (3) or (4).*

(6) *Where, in pursuance of this regulation, plans and other documents have been sent to the Executive they shall be retained by the Executive or in accordance with arrangements approved by the Executive.*

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(7) *In paragraph (1) "petroleum" means any mineral oil or relative hydrocarbon and natural gas existing in its natural condition in strata, but does not include coal or bituminous shales or other stratified deposits from which oil can be extracted by destructive distillation.*

(8) *Subject to paragraph (9) and to any of the provisions imposed by the Communities in respect of the encouragement of improvements in the safety and health of workers at work, the Executive may, by a certificate in writing, exempt any person, borehole, borehole site, or class of persons, boreholes or borehole sites from any requirement or prohibition imposed by the preceding provisions of this regulation and any such exemption may be granted subject to conditions and with or without limit of time and may be revoked by a certificate in writing at any time.*

(9) *The Executive shall not grant any such exemption unless, having regard to the circumstances of the case and, in particular, to –*

- (a) *the conditions, if any, which it proposes to attach to the exemption; and*
- (b) *any other requirements imposed by or under any enactments which apply to the case,*

*it is satisfied that the health and safety of persons who are likely to be affected by the exemption will not be prejudiced in consequence of it.*

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### Notifications to HSE

#### *Petroleum and mining boreholes*

59 Regulation 6(1) places a duty on operators of petroleum borehole sites to ensure that no drilling operations, abandonment operations or workover operations which would make a significant alteration to the well or involve a risk of accidental release of fluids from the well or reservoir are carried out at a site unless they have notified to HSE, the particulars specified in Part I of Schedule 1 at least 21 days in advance. The notification must contain all of the information listed in Part I of Schedule 1.

60 Regulation 6(2) deals with the notification requirements for the intended drilling of boreholes associated with mining operations but not quarrying or opencast coal operations. Such boreholes include exploratory and other boreholes for coal, gypsum, potash, salt, fluorspar, lead, tin, limestone and other minerals which are to be extracted by underground mining operations.

61 The notification requirements apply regardless of the location of the borehole or its depth.

62 The persons who have a duty to make advance notifications should, when possible, provide greater notice as this will reduce any delays to the operations which may arise due to inadequacy of the particulars given. This is especially relevant to new operators or operations involving new techniques.

63 In certain situations, due to unplanned or unpredictable events, there may be a need to carry out these operations at shorter notice and provision is made for HSE to agree a shorter period of notification.

64 The operators of petroleum borehole sites or mining borehole sites may begin the notified operation after a period of 21 days, or other period agreed, from the date of notification, unless HSE has taken enforcement action to prohibit or to improve the operation for health or safety reasons.

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65 Regulation 6(4) deals with the notification requirements for the abandonment of boreholes associated with the extraction of minerals by mining. It requires details of such abandonments to be notified within a period of 21 days after the commencement of abandonment.

### Boreholes other than for petroleum or mining

66 Regulation 6(3) deals with the notification requirements for the drilling of boreholes not associated with petroleum and mining exploration or extraction. It applies to boreholes intended for any other purpose, which are 30 metres deep or more inside a mining area, for example those associated with:

- (a) quarries and opencast coal quarries, but not shotfiring or blasting holes;
- (b) geophysical exploration or geotechnical investigation;
- (c) construction works including those for underground storage facilities, civil engineering tunnels, shafts or other civil engineering projects;
- (d) prospecting for water or extraction or disposal of water, except in connection with mineral exploration or extraction;
- (e) extraction of landfill gas; and
- (f) any other activity other than petroleum or mining.

It requires that the drilling of such boreholes to a depth of 30 metres or more, within a mining area, must be notified within 30 days after the commencement of drilling.

67 In cases where a series of boreholes with similar directional paths and within a specified range of depths are being drilled in close proximity within a designated area, for example for proving quarry deposits or for extracting landfill gas, it may be appropriate to make a collective notification for the area giving the details specified in Part III of Schedule 1.

68 There is no requirement under these Regulations to notify the abandonment of a borehole which is not associated with petroleum or mining.

### Notification of changes to previously notified details

69 If, during the period of advance notice, there is a change in the planned details of the operation, or during the operation, there is an unplanned deviation from the notified details due to unpredicted circumstances or for safety or other reasons, the operator, or in the case of boreholes not associated with petroleum or mining, the person entitled to drill the borehole, is required to notify HSE of the changes as soon as reasonably practicable.

70 A change in notification should, in the first instance, be made by telecommunication. When initially made by telephone, it should be followed up in writing.

71 When due to a change in plan before operations have started, a change of details is notified to HSE, the operations to which those changes refer should not be commenced within a period of 21 days of the new notification, unless HSE agrees a shorter period of notice.

72 When due to unpredicted circumstances or due to deliberate changes for safety or other reasons, a change of details is notified to HSE during an operation, the operation may continue unless HSE takes enforcement action to prohibit or improve the operation for safety or health reasons.

73 Table 2 summarises the notification requirements.



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**Table 2** Notification requirements

<b>Type of borehole</b>	<b>Notification of drilling (and other operations in petroleum wells)</b>	<b>Notification of abandonment</b>	<b>Information required</b>	<b>Changes of notification details</b>
Petroleum	Minimum of 21 days in advance	Minimum of 21 days in advance	Schedule 1 Part I	As soon as reasonably practicable
Mining	Minimum of 21 days in advance	Within 21 days after starting	Schedule 1 Part II and Part IV	As soon as reasonably practicable
All others of 30 metres deep or more in a mining area	Within 30 days after starting	Not required	Schedule 1 Part III	As soon as reasonably practicable

**Exemptions**

74 HSE may, by a certificate in writing, grant exemption from the requirements of regulation 6 only, providing it is satisfied that the health and safety of persons who are likely to be affected by the exemption will not be prejudiced by it. Any such exemption may contain special conditions, may be for a limited or unlimited period and may be revoked by a certificate in writing.

**Confirmation of receipt of notifications**

75 HSE will confirm in writing to the operator that a notification has been received.

**Effect of notifications on general duties**

76 The notification of specified details to HSE in accordance with the requirements of regulation 6 does not remove or reduce any of the other duties placed on dutyholders by these Regulations or by any other relevant statutory provisions.

77 In particular, the notification of details of location of a borehole and its position relative to nearby wells and mine workings does not remove or reduce any general duty on dutyholders to ensure, so far as reasonably practicable, that persons who do not work at the borehole site in question are not exposed to risks to their health or safety.

78 Dutyholders should consult with knowledgeable bodies and authorities, such as the Coal Authority and British Geological Survey, mineral owners, mine owners, the owners of other underground structures, facilities or boreholes and other sources of relevant information which will allow them to assess the effect which a borehole operation is likely to have on other persons.

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**Regulation 7 The health and safety document**

(1) No borehole operation shall be commenced at a borehole site unless the operator has ensured that a document (in these Regulations referred to as “the health and safety document”) has been prepared, which –

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- (a) demonstrates that the risks to which persons at the borehole site are exposed whilst they are at work have been assessed in accordance with regulation 3 of the Management Regulations;
- (b) demonstrates that adequate measures, including measures concerning the design, use and maintenance of the borehole site and of its plant, will be taken to safeguard the health and safety of the persons at work at the borehole site; and
- (c) includes a statement of how the measures referred to in sub-paragraph (b) will be co-ordinated.
- (2) In addition to the matters referred to in paragraph (1), the health and safety document shall also include where appropriate –
- (a) an escape plan with a view to providing employees with adequate opportunities for leaving work places promptly and safely in the event of danger and an associated rescue plan with a view to providing assistance where necessary;
- (b) a plan for the prevention of fire and explosions including in particular provisions for preventing blowouts and any uncontrolled escape of flammable gases and for detecting the presence of flammable atmospheres;
- (c) a fire protection plan detailing the likely sources of fire and the precautions to be taken to protect against, detect and combat the outbreak and spread of fire; and
- (d) in the case of a borehole site where hydrogen sulphide or other harmful gases are or may be present, a plan for the detection and control of such gases and for the protection of employees from them.
- (3) The operator shall ensure that the health and safety document is –
- (a) kept up to date and revised if the borehole site has undergone major changes (including natural changes), extensions or conversions; and
- (b) made available to each employer of persons at work at the site.
- (4) Each employer of persons at work at the site shall have regard to the health and safety document in meeting his obligations under the relevant statutory provisions.
- (5) In this regulation “the Management Regulations” means the Management of Health and Safety at Work Regulations 1992.<sup>(a)\*</sup>

(a) SI 1992/2051; amended by SI 1994/2865.

\* Revoked by the Management of Health and Safety at Work Regulations 1999 SI 1999/3242.

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### The health and safety document

79 Regulation 7 recognises the special need for borehole operations to be planned and organised from the outset with health and safety in mind. It places a duty on operators to ensure that borehole operations do not commence until a health and safety document has been prepared.

80 The document should form an important part of the operator’s approach to health and safety on the site. It should be based on the records required by regulations 3 and 5 of the Management of Health and Safety at Work Regulations 1999 and be linked to other health and safety records or documents, such as the safety policy required under section 2(3) of the HSW Act and any document relating

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to risk assessments carried out under regulation 6 of the Control of Substances Hazardous to Health Regulations 2002 (SI 2002/2677) (as amended).

81 The document should be appropriate to the hazards of the operation to which it applies. For example, the hazards associated with boreholes through strata which does not contain fossil fuels are recognised as being considerably less than those associated with boreholes through coal measures or petroleum reservoirs.

82 In compiling and updating the document, the site operator should consult with other employers or self-employed persons who may be contracted to work on the site. The document should take into account and where necessary include relevant parts of their records of risk assessment and health and safety arrangements.

83 In the case of existing borehole operations such as extraction and preparation at established borehole sites, a document should be prepared as soon as reasonably practicable and before any new drilling or workover operations begin at that site.

84 For operations which have clearly defined successive stages, eg drilling, testing and production, where the details of one stage may depend on the outcome of the previous, the document may be compiled in stages but in all cases must be complete for each stage of the work before that stage is started.

85 Operators do not necessarily have to prepare the document themselves, but in most cases they will be best placed to direct its preparation, given their authority, responsibility, knowledge of the operation and the co-operation required to be given to them by other employers of persons working at the site.

### Risk assessment and health and safety measures

86 The health and safety document must demonstrate that the risks to employees at the borehole site have been determined and assessed and that adequate measures will be taken to safeguard their health and safety. It must also demonstrate that the design, use and maintenance of the workplace and of the equipment are safe.

87 The document should record the significant findings of the assessment of risk carried out to comply with regulation 3 of the Management of Health and Safety at Work Regulations 1999 and the health and safety arrangements made in compliance with regulation 5 of those Regulations. It should state the hazards identified, include the assessment of risk and specify the relevant actions and arrangements for the effective planning, organisation, control, monitoring and review of health and safety at the site.

88 In assessing the risks and identifying the measures needed to control them, consideration should be given to the additional health and safety requirements listed in Schedule 2 of these Regulations.

### Design, use and maintenance of workplace and equipment

89 The document must demonstrate that adequate measures concerning the design, use and maintenance of the borehole site and its plant will be taken to safeguard the health and safety of persons at work at the borehole site.

90 The Workplace (Health, Safety and Welfare) Regulations 1992 (SI 1992/3004) place duties on employers relating to the design, construction, suitability and maintenance of workplaces. They do not explicitly address the use of workplaces.

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The way in which workplaces are used is obviously a factor which must be considered when assessing their suitability. Consideration should be given to the controls necessary to prevent workplaces from being used for purposes for which they may be unsuitable. This is particularly relevant to workplaces which may be within hazardous zones.

91 The Provision and Use of Work Equipment Regulations 1998 (SI 1998/2306) place duties on all employers who provide work equipment to ensure that it is suitable by way of design, construction or adaptation for the work that it is provided for. They also require work equipment to be properly maintained and to be used only in conditions and for work for which it is suitable.

92 Separate guidance on these Regulations is available.<sup>4,5</sup> Compliance with these Regulations will go a long way to meeting the aims of this part of the health and safety document.

93 In the case of borehole operations associated with petroleum or coal measures there are the special hazards arising from the presence of flammable or toxic atmospheres.

94 These hazards require that plant and equipment for such operations comply with special standards. Only equipment suitable for use in hazardous atmospheres should be provided for use where such conditions are likely to occur. Consideration should be given to the extent and nature of hazardous atmospheres at the planning and procurement stages, when equipment is installed or brought onto site and when changes in site conditions which may alter the extent or nature of hazardous zones occur.

95 Operators should make arrangements to ensure that unsuitable equipment is not taken or used inside hazardous zones.

96 Mechanical and electrical equipment in particular should be provided to recognised standards for the duty. Useful guidance on appropriate standards and the suitability of electrical and mechanical equipment for use in hazardous environments is given in the publications listed in Appendix 1.

### Co-ordination of health and safety measures

97 Borehole operations usually involve the use of several contractors to carry out specific jobs and specialist work. Good co-ordination of the work of contractors is essential for safe working of the site. Contractors may be unaware of certain site hazards such as the extent and nature of any hazardous zones and the special precautions necessary to minimise risk from them. Contractors may themselves introduce hazards to a site, for example, by the bringing onto site of sealed radioactive sources or toxic substances. The regular workers on the site need to be instructed regarding any special precautions they must take in such situations.

98 Borehole sites, during drilling and workover operations in particular, can be compact areas of high activity. Safety of the site is greatly determined by the safety of the work being carried out at that time. When hazardous activities are being carried out, such as flowing well fluids, jarring, perforating, loading radioactive substances for borehole logging etc, special restrictions may be required on other works at the site.

99 There may be certain stages of a drilling, workover or testing programme which require contingency plans to be firmly in place before starting the work.

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100 These factors call for high standards of co-ordination and control of site activities.

101 The co-ordination of work at the site is aimed at planning, organising and controlling the programme of work and the contributions made by various contractors so that they may be conducted with minimum risk to health and safety. The establishment of effective communication and co-operation with and between contractors and the issuing and enforcement of operator's rules and instructions will be important aspects of co-ordination.

102 Specific objectives will commonly include:

- (a) the creation of awareness and understanding of the influences and interactions between the various employers working on the site;
- (b) the clarification of roles and responsibilities of different employers on the site and the extent to which these may overlap requiring regular discourse and close co-operation;
- (c) the forming of good working relationships based on co-operation and responsibility between the various employers on the site;
- (d) the prevention of misunderstandings or lack of awareness relating to hazards, including fire hazards, on the site and the control measures required to minimise risk from them;
- (e) the clarification of emergency and evacuation procedures.

103 The co-ordination required to meet these objectives is likely to require:

- (a) the proper planning, organising and control of the operations by the operator and the selection and engagement of competent contractor employers or self-employed persons;
- (b) the provision by employers to the operator of relevant health and safety information including specified safe systems of work, method statements, codes of practice and risk assessments and associated control measures;
- (c) the integration of contractors' hazard identifications and risk assessments with that of the operator and the production of a composite hazard list and risk assessment for the site and the operation being carried out there;
- (d) the specification of general site control measures and control measures specific to various stages of an operation or a particular activity;
- (e) effective communication and co-operation between the operator, contractors and employees. This may be by site safety meetings, daily progress meetings, operator's site rules, employer's rules and on the job briefings etc;

104 The health and safety document must state how the measures necessary to safeguard the health and safety of persons at work at the borehole site are to be co-ordinated.

## Plans

105 The health and safety document must, where appropriate, include plans dealing with:

- (a) provision of escape and rescue;
- (b) prevention of fire and explosions with particular reference to blowouts and escapes of flammable gas;
- (c) general fire prevention; and
- (d) detection and control of toxic gases.

106 Operators should consider, taking into account all relevant circumstances and factors, whether the hazards to which these plans are directed may arise during

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the borehole operations. If they may arise, then the plans are required. If they are highly unlikely to arise, then the plans are not required.

107 If the plans are required, they should be suitable for the particular site and operations carried out there.

### *Site planning and design*

108 Fires, explosions, blowouts and gas escapes and the necessary measures required to control risk from these hazards and to facilitate escape and rescue should be addressed at the site design and planning stages.

109 At the planning stage, the local Fire and Rescue Service should be consulted on both operational fire-fighting and fire safety matters, including provision of suitable water supplies and access for fire appliances.

110 Local factors such as the proximity of highways, rights of way, buildings, housing, woodland, crops, electricity lines, underground services and other matters which may affect the safety of the site should be considered. Where necessary, the relevant authorities should be consulted.

111 Sites should be located and be of suitable size and layout so as to allow hazards to be confined within the site boundaries. Safe separating distances and where necessary fire breaks should be provided between hazardous zones on the site and external premises and public rights of way.

112 Consideration should be given to the location and extent of hazardous zones in which explosive or combustible atmospheres may exist. The site should be planned and designed so that these are away from site boundaries to which persons other than those working on the site may have access, so as to prevent risk to them or risk being created by them. This may, for example, arise from a person smoking or driving a car on a public right of way running alongside a borehole site which has a hazardous zone at the boundary fence.

113 Consideration should be given to the need for site security in order to minimise hazards from and to persons other than those authorised to be on the site. Requirements will depend on such factors as site size, layout, proximity of public rights of way, farm stock, whether the site is unattended or manned and the extent and degree of on-site hazards.

114 Where perimeter security fences are required, they should be to recognised standards and where necessary, emergency exits should be provided so as to permit safe exit without having to pass through an area which may be affected by fire or gas escape.

115 Adequate separation should be provided between sites and crops, grass or woodland so as to provide an effective fire-break.

116 The area of land given to a site should allow adequate space for suitable siting of equipment, such as drilling rigs, pumps, power generators, test vessels, storage vessels, workover rigs, diverters, flares, workplaces, offices, laboratories, welfare facilities and sleeping accommodation, where it is necessary to provide this on a site.

117 Safe separating distances should be provided between hazardous zones and site accommodation and where practicable, workplaces.

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118 Only equipment suitable for use in hazardous atmospheres should be used where such conditions are likely to occur. Consideration should be given to the siting of unsuitable equipment outside such zones and in particular to the permissible working areas for unprotected vehicles and mobile plant outside such zones.

119 Consideration should be given at the planning and design stage to the provision of a suitable supply of water for fire-fighting and where necessary for use in well control. Further guidance on water supplies for fire-fighting is given in paragraphs 186–192.

### *Arrangements for attendance of emergency services and site access*

120 Emergency services should be informed of the location of borehole sites, access routes from public roads and the nature of the operations and circumstances which they may be called upon to attend. Reference to relevant parts of the health and safety document may be of assistance to them in planning emergency responses.

121 Telephones or radios should be provided for contacting emergency services.

122 Suitable arrangements should be made to provide access to sites for rescue services in an emergency and on arrival to provide them with reliable information about the site, operations and the hazards which may exist.

123 Access routes from public roads should be capable of carrying the weight of a fully laden fire engine serving the area in which the site is situated. Road surfaces and gradients should be suitable for access of emergency vehicles with single-driven axles in adverse weather conditions.

124 Roadways should throughout their length be at least 3.7 metres wide and wide enough to allow the unimpeded access of all emergency vehicles and should have passing places where necessary. At the roadway terminus there should be an area sufficient to allow the largest emergency vehicle to turn around without undue manoeuvre. Gateways along the route should be at least 3.1 metres wide and there should be no height restrictions below 4.0 metres or which would prevent access of a high-reach emergency vehicle.

125 Provision should be made for suitable rendezvous and forward control points with sufficient suitable parking space for emergency vehicles close to the site and its access road.

126 Operators should consult with the local Fire and Rescue Service on these matters.

### **Plans required by regulation 7(2)**

#### *Escape and rescue plan*

##### *Escape and rescue consultation*

127 Escape and rescue procedures will vary according to the size and layout of the site and the nature of operations. The emergency services should be consulted at the planning stage so that such matters as rescue methods, casualty handling, the need for any decontamination zones and any special equipment can be discussed and procedures agreed. In the case of complex sites, there may be a need to arrange for joint incident-response training exercises.

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### *Escape and rescue*

128 In the case of persons working in the open at ground level, outside hazardous zones, no special provisions beyond the normal arrangements for evacuation in an emergency should be required. The plan should be aimed mainly at those persons who, due to their location or circumstances, may require special provisions to allow them safe escape in the event of danger. Examples of this would include the escape of: derrick men and floor crew in the event of a blowout at a drilling site, maintenance workers in the event of an uncontrolled escape of gas at a production site, or workers in an accommodation cabin in the event of a fire.

129 The overriding objective of the escape plan should be to provide the quick and safe escape of all persons to a safe place. This will require the provision of a suitable alarm system, direct and unrestricted escape routes from working areas and any equipment necessary to facilitate escape.

### *Escape from buildings and structures*

130 Escape routes should allow persons to reach a safe place quickly without passing through the affected area. Where this is not possible and distances of travel are short, a safe passage may be provided by fire-resisting screens, partitions and doors.

131 The provision of adequate means of escape from fire will usually require more than one exit, each sufficiently remote from the others to ensure that a single fire cannot adversely affect more than one exit.

132 All emergency escape routes and exits should be suitably marked.

### *Single escape route*

133 The higher the fire risk, the shorter should be the distance of travel to safety. Travel distances should be kept as short as reasonably practicable, according to the risk. Where there is only a single exit from a room which is used as a workplace, the distance of travel to the room exit should not exceed 18 metres. The total distance of travel along a single escape route to a final exit, including travel across the room, should not exceed 45 metres. Where such a room is used for sleeping accommodation, the distance of travel to the room exit should not exceed 12 metres. In this case, the total distance of travel along a single escape route to a final exit should not exceed 25 metres.

### *Escape in more than one direction*

134 The higher the fire risk, the shorter should be the distance of travel to safety. Travel distances should be kept as short as reasonably practicable, according to the risk. Where a room is used as a workplace and escape is possible in more than one direction, the distance of travel to any exit should not exceed 45 metres. The total distance of travel along an escape route where there is a choice of direction leading to separate final exits should not exceed 60 metres. Where such a room is used for sleeping accommodation, the distance of travel to any exit should not exceed 25 metres and the total distance of travel along an escape route where there is a choice of direction leading to separate final exits should not exceed 45 metres.

135 The escape plan should specify the safe assembly areas or muster points and include a scheme for identifying missing persons and the need for rescue assistance. Designated assembly points should be located as far off site as



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possible to avoid the need to move and reassemble should the fire spread to other parts of the site.

136 The escape plan should identify the recognised workplaces, the hazards and situations which might give rise to the need for escape, the methods by which alarms are to be communicated, the escape routes and any special equipment needed for escape, eg emergency exit doors in buildings, fire-resisting screens, emergency lighting, escape lines, ladders or chutes from elevated workplaces and escape breathing apparatus.

137 The plan should ensure that adequate lighting, including emergency lighting, is provided to facilitate escape in the absence of adequate daylight. This may take the form of self-contained units or a reserve generator where this can be started automatically and reach a sufficient output level within 15 seconds. Single point units may be suitable for inside areas and beam-type units suitable for outside areas of the site. Emergency lighting units or generator systems should have a minimum effective duration of 3 hours.

138 The system should be arranged to operate automatically upon failure of the primary lighting supply serving that particular area of the site or building. Where a well-distributed proportion of the light fittings in any area are served by separate fuses, the emergency system may be arranged to operate upon failure of the next nearest fuse to the main fuse.

139 In some circumstances, such as at small sites of simple layout with short escape routes, the provision of handlamps strategically placed along escape routes may suffice. Suitable arrangements should be in place to ensure that emergency handlamps are always adequately charged and in effective working order.

140 A prerequisite for safe evacuation in the event of danger is an effective means of announcing the need to evacuate. Suitable means of quickly and effectively announcing an emergency situation and communicating the need for assistance, evacuation or rescue should be provided. In situations where persons may not be able to hear audible alarms due to high background noise levels or the wearing of hearing protection, additional visual alarms should be provided.

141 Public address systems have been found useful in assisting the evacuation of large sites. On smaller sites a loud hailer system may be useful.

142 When persons work alone at sites, a reliable communication system to allow assistance to be summoned should be provided and where necessary a system of routine report-backs should be used.

143 Although the primary objective should be safe escape, the plan should cater for the possible need for rescue of persons who due to injury or entrapment require assistance to escape in the event of danger.

144 The plan should include arrangements for the response of the emergency services. Where they are likely to be able to respond within a short time, allowing for foreseeable difficulties such as adverse weather conditions etc, reliance on these services may suffice. Where the response is likely to take longer owing to, for example, the remoteness of the site, special contingency rescue arrangements should be provided including control procedures, trained personnel and suitable equipment such as working sets of breathing apparatus, safety harnesses, rescue lines and lifting equipment to rescue persons working in tanks and cellars.

145 In very special cases where it is necessary for persons to carry out planned work in high-risk areas, for example, within harmful atmospheres, special

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arrangements should be made for them to work with a standby rescue team in attendance.

146 Where on-site rescue provisions are necessary, the plan should identify the rescue equipment to be provided and its location on the site. It should specify the minimum number of trained persons to be available and a system for control of a rescue operation.

147 The plan should specify a suitable scheme for the routine inspection and maintenance of all escape and rescue equipment. This should be based on manufacturers' recommendations taking into account site operating conditions including weather conditions, cleanliness, vibration and proneness to damage.

148 The plan should specify the frequency of escape drills and, where necessary, rescue drills to ensure that the arrangements remain effective.

### *Plan for the prevention of fires, explosions, blowouts and gas escapes*

149 The plan should place emphasis on three key objectives:

- (a) to prevent the release of liquids, vapours or gases in circumstances or in quantities which could endanger persons by fire, explosion or any other means;
- (b) to detect and control the release of flammable or toxic vapours or gases before they could endanger persons; and
- (c) to prevent the ignition of flammable or explosive atmospheres.

### *Hazardous zones*

150 The plan should be directed mainly at the hazards arising from the presence of flammable fluids which have come from the borehole. The hazards from other sources of such fluids at the borehole site also need to be considered. In addition to formation fluids these include oil-based drilling fluids, production fluids, waste fluids and fuels.

151 A plan showing areas which may be hazardous due to the presence of flammable fluids should be drawn. It should highlight the following locations where a flammable atmosphere may be present:

zone 0: where a flammable atmosphere is normally present;

zone 1: where a flammable atmosphere is likely to occur during normal operations;

zone 2: where a flammable atmosphere is unlikely to occur in normal operations, other than for a very short time.

Detailed guidance on the extent of such zones is given in Model Code of Safe Practice: *Area classification code for installations handling flammable fluids*.<sup>6</sup>

152 The main aim should be to keep hazardous fluids safely confined within the well, pipes or vessels and to allow escape only at designed vent or flare points which are suitably located and controlled so as to minimise risk. This aim is particularly relevant to operations involving flowing of well fluids to the surface, including underbalanced drilling operations.

153 The provision of detection and monitoring equipment should be intended to support, but not to substitute for, effective containment.

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154 The primary means of preventing a dangerous release of hazardous fluid from a borehole should be by high standards of well control and from vessels, tanks etc by good standards of design, maintenance and operation.

155 Vents delivering to burners should be provided with suitable flame traps. Oil storage tanks and vessels should be provided with suitable devices for relieving any excess pressure or vacuum to a suitably located vent point and suitable means for containment of leaks.

156 All locations of stored flammable liquids, vapours or gases (fluids) or locations where accumulations of flammable fluids may occur should be identified. These should include possible fluid sources such as boreholes, cellars, circulating pumps and tanks, shale shakers, mud pits, diverters, vent lines and flares as well as containers and vessels of fluids such as mud tanks, separators, oil tanks, oily-water storage tanks, blow-down pits, knock-out vessels and fuel tanks etc.

157 Fuel storage tanks and fuel lines should be clearly identified and fuel lines should be of robust construction. Where fuel lines extend from a central storage tank to remote engines, they should be suitably protected from damage.

### *Detection and monitoring of hazardous fluids*

158 In accordance with an assessment of the risks, the plan should specify the equipment and procedures required for detecting and monitoring, where necessary, flammable and toxic gases in the atmosphere. The provisions should match the potential risks. In potentially high-risk situations, it may be necessary to have a comprehensive continuous monitoring system with automatic alarms and devices allowing rapid shut-down of possible sources of ignition such as electrical power and internal combustion engines in the affected area. In relatively low-risk situations, such as at established oil production sites with low gas ratios, regular checking with a portable instrument may suffice.

159 During drilling operations, returns of drilling fluids should be monitored to detect the presence of formation fluids. In the case of drilling operations for hydrocarbons, continuous monitoring for hydrocarbons and hydrogen sulphide at the discharge point of the return fluid, normally at the shale shaker, should be carried out. Alarms should be set to indicate abnormal levels, when levels reach 25% of the lower explosive limit and in the case of toxic gases when they reach the long-term exposure limits. It may also be prudent to arrange for alarms to indicate abnormally high rates of increase of gas levels. For guidance on exposure limits reference should be made to the current edition of HSE publication EH40 *Workplace exposure limits*<sup>7</sup> (compliance with which is a duty under the Control of Substances Hazardous to Health (Amendment) Regulations 2002).

160 Facilities should be provided for reliable communication between the person supervising the monitoring instruments and the driller and site supervisor. The person supervising the monitoring instruments should have a suitable means of initiating a site alarm in the case of an emergency. The plan should specify the arrangements for responding to alarm levels and initiating site alarms.

161 During drilling operations, normal production and workovers, portable gas monitoring equipment should be provided for the purpose of carrying out routine checks for accumulations of gas in pits, cellars and vessels etc and for locating gas leaks from flanges, valves, seals and other fittings. A scheme for the routine checking for gas leaks and accumulations of gas should be provided and carried out.

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162 The results of routine checks should be recorded and used to validate the extent of the hazardous zones and where necessary modify the hazardous zone plan and monitoring arrangements.

163 Special checks may be required when hazardous or non-routine operations are being carried out such as prior to, during and after completion of maintenance work on lines and vessels. These should be specified in the permit-to-work issued for such work.

164 Persons carrying out such checks should be trained to use the instrumentation, know the normal acceptable levels and be instructed on what action to take when abnormal levels are found or alarm levels are reached.

165 Where persons have to work in places at which accumulations of gas may occur, portable continuous monitoring equipment with integral alarms should be provided.

### *Prevention of ignition*

166 Having identified any possible sources of flammable fluids and the associated hazardous zones, and provided any necessary monitoring and alarm systems, measures for the prevention of ignition fall into three main categories:

- (a) the selection of suitable fixed equipment for safe use in the hazardous zones and the effective planned preventive maintenance of that equipment;
- (b) the prevention of other possible sources of ignition inside the hazardous zones by prohibiting the use of unsuitable portable and mobile equipment and by suitable earthing to prevent a risk of fire from static electricity; and
- (c) the prevention of fire and the spread of fire from external sources by good standards of housekeeping, maintenance and operation, and by provision of suitable fire safety measures.

167 Unsuitable equipment is any equipment which could ignite a flammable atmosphere and would include, for example, certain types of electrical equipment, unprotected internal combustion engines and other mechanical equipment which could produce flames or sparks and have hot surfaces which could ignite flammable atmospheres, welding and gas cutting equipment, grinding equipment, smoking materials, light alloy tools which can cause incendive sparking and equipment producing high-powered radio waves which may be capable of igniting a flammable atmosphere.

### *Fire protection plan*

168 The fire protection plan for the site should be based upon the findings of a fire risk assessment. This assessment should have identified the fire hazards, such as readily combustible materials and highly flammable substances, sources of heat and sparks and unsatisfactory structural features, and assessed the risks taking into account the likelihood of a fire, the type of fire and the likely effects on health and safety.

169 The plan should specify the measures which must be taken to control sources of heat or sparks or prevent combustible materials from being within an ignitable range. It should specify any special precautions or controls required for the safe use of heat sources which could give rise to fire.

170 The plan should detail the necessary provisions for fire detection, fire warning and fire-fighting equipment.

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171 The plan should specify the actions to be taken on discovery of a fire and on hearing a fire alarm. Printed notices should be displayed in conspicuous positions on the site and in any buildings specifying the actions to take in an emergency. The notices should be securely fixed in position and be suitably protected to prevent loss, defacement or weather damage.

172 The plan should specify the training required by persons working at the site, the frequency at which fire drills should be carried out and the intervals at which fire safety equipment should be inspected, serviced and tested.

### *Fire detection systems*

173 The need for automatic fire detection systems should be carefully considered as they will give an early warning of fire and should allow persons to escape in safer conditions. They should be provided in sleeping accommodation, workplaces where open flames and smoking may be permitted, in main electrical switch rooms, generator rooms, fuel storage rooms, places where enclosed diesel engines are operating unsupervised and at other locations where the risk of fire warrants them.

174 Fire detection systems should be incorporated into electrical fire warning systems where these are provided. In small single storey, stand-alone buildings, self-contained single point fire detectors may suffice. However, it should be borne in mind that the operation of a single point self-contained detector will not trigger the general warning system and a procedure will be necessary to ensure the warning system is activated.

### *Fire warning systems*

175 Suitable means for warning of fires should be provided. Fire warning systems must give a perceptible audible warning supplemented where necessary by a visible warning to all areas of the site which they are intended to cover. These areas should include areas which may be affected by a fire or its products.

176 Warning systems may consist of bells, sirens, klaxons, horns, warblers or other suitable sounders. They may be operated by hand on small sites where a single sounder is considered sufficient but, where more than one sounder is needed to warn the whole site and any surrounding area, an electrically operated system may be necessary. In the case of a site where there is a high level of background noise or areas where ear protection is worn, audible systems may need to be supplemented by flashing lights or other effective visual devices.

177 Where a single sounder is considered sufficient, it should be positioned near the main entrance in a safe area. Alternatively, a similar device may be provided at each exit from the site where this is considered necessary to avoid delay in operation. Where an electrical system is provided, a breakglass call point should be positioned at each exit.

178 Where comprehensive site alarm systems are considered necessary, they should incorporate the buildings, so that the operation of any call point activates all sounders and visual indicators.

### *System standards*

179 Fire detection and fire-warning systems should comply with suitable recognised technical standards for design and installation. Where they are installed in areas where flammable or explosive fluids may be present, they should comply with recognised standards for safe working in such conditions.

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### *Fire-fighting equipment*

180 Suitable means for fighting fire in its early stages should be provided at appropriate points on the site. The equipment may include water or sand buckets, fire blankets, beaters, hose reels, hand-held portable extinguishers, trolley-mounted portable extinguishers, water hydrants and associated equipment and, where necessary, manually initiated or piped automatic fire-fighting systems such as sprinkler systems or pressurised powder, foam or carbon dioxide systems.

181 The equipment provided should be suitable for the type of fire which may occur.

182 Fires involving flammable liquids require an extinguishing medium which cuts off the supply of oxygen to the flame such as foam, carbon dioxide or dry powder. For some sites, it may be necessary to make arrangements for foam compound to be readily available. The local Fire and Rescue Service should be consulted on this.

183 Fires involving gases are difficult to extinguish and normally require the gas source to be isolated. Fires involving minerals such as aluminium, magnesium, sodium or potassium should only be tackled by specially trained personnel. For these situations, the aim should be to isolate the fuel supply and prevent escalation to other fuel sources.

184 Suitable hand-held portable extinguishers should be provided at salient locations on the site and at all enclosed workplaces and accommodation where fires may occur.

185 Where fire-fighting equipment is provided, it should be sited within 30 metres of persons who may need it and the location should be clearly marked. Extinguishers for different purposes may be grouped together to form **fire points**. All equipment located outdoors should be protected from the elements.

### *Water for fire-fighting*

186 The water requirements for all sites should be agreed with the Fire and Rescue Service during the site planning stage. Consideration should be given to the different kinds of operations which may take place on the site and the associated risks, for example, the water requirements during normal production at a small unmanned oil site will be different to those during a drilling operation at the same site. The provisions should be reviewed with the Fire and Rescue Service if circumstances change.

187 There should be adequate water supplies for full-scale fire-fighting. For sites which are normally manned, consideration should be given to the provision of suitable equipment for fighting a fire in its early stage.

188 Where natural water supplies are located near to the proposed site, it may be possible to utilise them for fire-fighting purposes. This may require some adaptation of the site to improve access or, in the case of streams or other water courses, to increase the depth of the water at the access point. Suitable arrangements should be made with the fire service where water is to be pumped from a remote source.

189 Where the use of a third party's private water supply is contemplated, this should be arranged by prior agreement.

## Guidance

190 Where no natural water supplies exist or where those that do are considered insufficient to cope with a fire on the site, alternative arrangements should be made. These may consist of a purpose-made reservoir or static tanks and where necessary a hydrant ring main. Where closed water tanks are provided, they should be fitted with standard couplings and connections compatible with Fire and Rescue Service equipment.

191 At remote sites, where due to anticipated long response times from the fire service, or where for other reasons on-site pumps and equipment are provided for use by trained staff, the connections of such equipment should be compatible with those of the Fire and Rescue Service. The equipment provided and its location should be detailed on the fire safety plan.

192 Fire-fighting equipment should be examined, tested and serviced in accordance with the manufacturers' recommendations. Routine inspections of fire-fighting equipment should be carried out at least once a month.

### *Plan for detection and control of toxic gases*

193 For sites where hydrogen sulphide or other toxic gases are or may be present, the health and safety document shall include a plan for the detection and control of such gases and for the protection of employees from them. This plan should be in the form of a comprehensive written scheme.

194 In determining which sites have or may have toxic gases present in the atmosphere, employers should consider existing relevant information available from drilling, testing or production records.

195 In the absence of reliable records, it should be assumed that toxic gases may occur or may be present.

196 The primary aim should be to contain toxic gases in recognised enclosures, such as vessels, tanks, pipelines etc and to allow them to escape only at designed outlets such as vents and flares which are sited at a safe location. This aim is particularly relevant to operations involving flowing of well fluids to the surface including underbalanced drilling operations.

197 The provision of detection and monitoring equipment should be intended to support, but not to substitute for, effective containment.

198 The scheme should specify the arrangements for detecting and monitoring the presence and concentrations of gases, the precautions to be taken during operations which may result in the emission of toxic gas and the procedures to take in the event of toxic gas being detected.

199 Consideration should be given to the classification of areas according to the risk from toxic gases.

200 High-risk areas would, for example, be those where there would be present during normal operations, concentrations of gas for durations which would exceed the long-term exposure limits as specified in the current edition of HSE publication EH40.<sup>7</sup>

201 Medium-risk areas would be those where toxic gases would occur in concentrations and for durations which would exceed the long-term exposure limits during certain planned operations, such as drilling through known reservoirs or carrying out maintenance on lines or tanks.

## Guidance

202 Low-risk areas would be those where during normal operations, it would be unlikely for toxic gases to occur in concentrations and for durations which would exceed the long-term exposure limits.

203 The scheme should specify the appropriate precautions which should be taken for the safety of persons working in the various areas of risk. Consideration should be given to arrangements for the control of entry to medium and high-risk areas and warning notices should be posted at all points of access to them.

204 The scheme should list the protective equipment required to minimise risk, detailing the type, amount and location.

205 It should include arrangements for periodic testing of detectors and monitoring equipment, training in the use of this equipment, including sampling techniques where appropriate, and training and practice drills for the use of breathing apparatus.

### Revision of health and safety document

206 The health and safety document should be kept up to date. It should be reviewed if any relevant changes occur to the site or the operations carried out there, if any new information comes to light as the appreciation of hazards and risk develops and in response to operating experience, accidents and incidents.

207 At some sites, unplanned changes may occur such as a significant increase in the ratio of hydrogen sulphide in the well fluids. A document for a production site will require revision before a workover or drilling operation on the site. In some cases, the documents may cater for routine repetitive operations such as workovers, but they should be revised when changes to these routines are planned.

208 The aim should be to ensure that the document is at all times suitable and relevant.

### Availability of health and safety document

209 Operators have a duty to ensure that the health and safety document is made available to each employer who has employees at work on the site. They are not required to give a copy of the document to each employer but should make arrangements for all employers to have a copy available as and when required and for sufficient time to allow them to fully appreciate those matters which relate to the health and safety of their employees and the effect that their work may have on the health and safety of other persons working on the site.

210 It may be appropriate to provide relevant extracts to particular employers whose work on the site is clearly defined and specific. In the case of main employers such as drilling contractors, the whole document may be required for close examination and reference for the duration of the operation. In any case, a copy of the complete document should be readily available at the site at all times for reference.

### Employers' duty to consider health and safety document

211 Regulation 7(4) requires employers to consider the provisions of the health and safety document when making their own risk assessment in compliance with regulation 3 of the Management of Health and Safety at Work Regulations 1999.



Guidance

7

212 Employers will in most cases have suitable risk assessments for the standard work they carry out or the services they provide regardless of the particular factors which have to be taken into account at a site. For each site, the special factors relating to that site, as detailed in the health and safety document, should be considered and the basic risk assessment should be suitably revised to cater for them.

Regulation

8

## Regulation 8 Additional duties of the operator

(1) *The operator shall ensure that every workplace on a borehole site is designed, constructed, erected and maintained and has sufficient stability to afford adequate protection for employees and to withstand the environmental forces anticipated at the site.*

(2) *The operator shall ensure that adequate means are provided and maintained for –*

- (a) *the prompt and swift escape and where necessary the rescue of employees from workplaces in the event of danger; and*
- (b) *communicating and giving warning when escape or rescue is necessary.*

(3) *In this regulation “workplace” has the same meaning as in regulation 2(1) of the Workplace (Health, Safety and Welfare) Regulations 1992.<sup>(a)</sup>*

(a) *SI 1992/3004.*

Guidance

8

## Stability, strength and suitability of workplaces

213 Regulation 8(1) places a duty on operators to ensure that all workplaces on a borehole site are designed, constructed, erected and maintained and have sufficient stability to afford adequate protection for employees and to withstand the environmental forces anticipated at the site.

214 Workplaces include all parts of a borehole site which are made available to any person as a place of work, eg drilling rigs, workshops, generator rooms, engine rooms, pump rooms, control rooms, logging rooms, mud farms, storage areas, main working areas, offices and accommodation units where these are required to be on the site. In addition they include all means of access to or egress from a workplace on the site, eg stairs, corridors, gantries, roads and evacuation routes. They do not include access roads and tracks to a borehole site.

215 For practicable purposes, most accessible areas within a borehole site will be a workplace.

216 Sites should therefore be designed, constructed, erected and maintained so that they provide adequate protection to employees from hazards. A useful start at the planning stage will be to minimise the extent of hazardous zones. A secondary step will be to arrange for as many workplaces as possible to be sited outside of hazardous zones. Where workplaces are within hazardous zones, special protective measures will be required as detailed in other sections of this guidance.

217 Workplaces exposed to the weather, such as elevated derrick platforms and drilling rig floors, should be provided with suitable protection to prevent the weather from creating a hazard to employees.

Guidance

218 Sites should be constructed so that they provide a suitable foundation, where necessary level and firm, for the siting of heavy or tall plant and equipment such as drilling derricks, workover derricks, cranes and other structures. Account needs to be taken of the manufacturer's recommendations for erection of such equipment. Particular attention should be paid at the design and planning stages of the site or operation to the need for guy lines, their location and the provision of suitable foundations and anchorages.

219 Some derricks or structures may be designed to operate without guys or anchorages in particular circumstances, for example within certain lifting or racking loads and below certain wind speeds. Suitable measures should be taken to minimise the risk of collapse or overturning of high structures due to wind loading. Account should be taken of recommended maximum wind speeds specified by suppliers or in relevant design or operating standards. Consideration should be given to the use of weather forecast services or on-site anemometers to warn when high winds are expected or wind limitations are being approached.

220 Prevailing wind directions should be considered when planning the site and locating equipment. Where wind direction may affect health and safety, for example by blowing water, dusts or gases into working areas or where tall structures may be sensitive to it, a wind direction indicator should be provided.

221 Consideration should be given to environmental factors, including flammability of the atmosphere, when choosing electrical and mechanical equipment to ensure that it is suitable for the environmental conditions in which it will be used.

**Escape and rescue from workplaces**

222 Guidance on the necessary escape and rescue provisions are given in the section dealing with the health and safety document.

8

Regulation

**Regulation 9 Additional health and safety requirements**

*(1) Subject to paragraph (2), it shall be the duty of every employer of persons at work on a borehole site to ensure that the additional health and safety provisions set out in Schedule 2 are applied as they are appropriate having regard to the nature and circumstances of the work carried on there and to the provisions of the health and safety document.*

*(2) The additional health and safety requirements referred to in paragraph (1) shall apply without prejudice to the requirements of the other relevant statutory provisions relating to the borehole site.*

9

Guidance

223 Regulation 9(1) requires employers, and by virtue of regulation 4(3) operators in so far as any duty relates to matters under their control, to apply the additional health and safety requirements detailed in Schedule 2 as they are appropriate to the nature and circumstances of the work carried on at the site.

224 At some complex sites, all of the additional health and safety requirements may be relevant. At many sites, many of the requirements may not be relevant, for example, the requirements relating to well control are unlikely to apply to a small drilling operation to prove the rock deposits in a quarry.

9

Guidance

225 Some of the requirements apply to certain specified risks and are only necessary if those risks exist. Some of the requirements are necessary only if they are required by the health and safety document.

226 Operators should have considered the additional health and safety requirements when compiling the health and safety document. This document should therefore contain the information necessary to determine whether a particular risk exists and whether the additional health and safety requirement is appropriate and must be satisfied.

227 Employers should exercise their own specialist judgement and where they perceive the need for any of the minimum requirements, even in cases where they are not addressed or required by the health and safety document, they must meet that requirement. In such cases, they should discuss the matter with the operator and where necessary the document should be revised in compliance with regulation 7(3)(a).

228 Employers should apply the additional health and safety requirements which are indicated to be appropriate by the health and safety document. If they consider that an additional requirement is not appropriate, contrary to the content of the health and safety document, they should still comply until the discrepancy can be resolved by discussion with the operator and if necessary the health and safety document is revised accordingly.

229 Table 3 summarises the additional health and safety requirements and when they must be satisfied.

Guidance

**Table 3** Summary of additional health and safety requirements

<b>Requirement</b>	<b>To be satisfied in all cases</b>	<b>To be satisfied only when required by health and safety document</b>
1 Safety signs etc	Yes	-
2 Supervision	Yes	-
3 Sufficient employees	Yes	-
4 Written instructions	Yes	-
5 Work permits	-	Yes
6 Maintenance	Yes	-
7 Well control	-	Yes
8 Protection against harmful atmospheres	Yes, if risk exists	-
9 Prevention of explosions	Yes, if risk exists	-
10 Remote controls	-	Yes
11 Communications and alarms	-	Yes
12 Means of evacuation and escape	Yes	-
13 Safety drills	Yes	-
14 Fire detection and firefighting	Yes	-
15 Safe assembly points and muster lists	-	Yes

9

Regulation

**Regulation 10 Health surveillance**

*(1) An employer of a person engaged in borehole operations shall ensure that he is provided with such health surveillance as is appropriate; and where that person is assigned to the work after the coming into force of these Regulations, the health surveillance shall be commenced before he is so assigned.*

*(2) In this regulation "appropriate" means appropriate having regard to the nature and magnitude of the risks to the safety and health of the person referred to in paragraph (1).*

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Guidance

230 Regulation 6 of the Management of Health and Safety at Work Regulations 1999 requires employers to provide employees with health surveillance as is appropriate having regard to the risks identified by the risk assessment made in compliance with regulation 3 of those Regulations.

231 Regulation 10 of these Regulations, which is specific to borehole operations, requires the same provision but additionally calls for employees who are assigned to borehole operations after the coming into effect of these Regulations to be provided with appropriate health surveillance prior to being assigned to that work.

232 If health surveillance is already being carried out in compliance with the Management of Health and Safety at Work Regulations 1999, this will fulfil part of the duty required by regulation 10. To comply fully with this duty, employers must begin health surveillance on employees newly assigned to borehole operations prior to deploying them to that work.

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Guidance

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233 An Approved Code of Practice<sup>8</sup> supporting the Management of Health and Safety at Work Regulations 1999 describes how to comply with the duty to provide health surveillance.

234 Further guidance is given in *Health surveillance at work*.<sup>9</sup>

Regulation

11

### Regulation 11 Defence

*In any proceedings for an offence under these Regulations, it shall be a defence for any person to prove that he took all reasonable precautions and exercised all due diligence to avoid the commission of that offence.*

Schedule

## Schedule 1 Particulars required for notifications under regulation 6

### Regulation 6

#### Part I Notification under regulation 6(1)

*The particulars required for a notification under regulation 6(1) are as follows:*

- 1 *Name and address of the operator.*
- 2 *Particulars of the type of well, its number and its name.*
- 3 *Particulars of the rig or other plant which is to be used in connection with the operations on the well.*
- 4 *Particulars of the surface equipment and of the circulation fluids to be used to control the pressure of the well.*
- 5 *Particulars, with scale diagrams, where appropriate, of –*
  - (a) *the Ordnance Survey National Grid reference of the location of the top of the well;*
  - (b) *the directional path of the borehole;*
  - (c) *the terminal depth and location; and*
  - (d) *its position and that of nearby wells and mine workings relative to each other.*
- 6 *A description of operations to be performed and a programme of works including –*
  - (a) *the dates on which operations are expected to start and finish; and*
  - (b) *a diagram showing details of the intended final completion or recompletion of the well.*
- 7 *A description of –*
  - (a) *any activities during operations on the well which will involve a risk of the accidental release of fluids from the well or reservoir; and*
  - (b) *such hazards.*
- 8 *In the case of a well which is to be drilled –*
  - (a) *particulars of the geological strata and formations and fluids within them through which it may pass and of any hazards with the potential to cause fire, explosion or a blowout which they may contain;*
  - (b) *the procedures for effectively monitoring the direction of the borehole and the effects of intersecting nearby wells; and*
  - (c) *particulars of the design of the well, sufficient to show that it takes account of the matters in sub-paragraph (a) of this paragraph, and that it will so far as is reasonably practicable be safe.*
- 9 *In the case of an existing well –*
  - (a) *a diagram of the well;*
  - (b) *a brief history of the well including a summary of previous operations and any problems encountered; and*

1, Part 1

Schedule

1, Part I

(c) *its present status and condition.*

10 *In the case of an abandonment operation details of the proposed sealing or treatment.*

Schedule

1, Part II

**Part II Notification under regulation 6(2)**

*The particulars required for a notification under regulation 6(2) are as follows:*

- 1 *Name and address of the operator.*
- 2 *Particulars with scale diagrams, where appropriate, of –*
  - (a) *the Ordnance Survey National Grid reference of the location of the top of the borehole;*
  - (b) *its directional path; and*
  - (c) *its terminal depth and location.*
- 3 *A description of the operations to be performed and a programme of works which includes the dates on which operations are expected to start and finish.*

Schedule

1, Part III

**Part III Notification under regulation 6(3)**

*The particulars required for a notification under regulation 6(3) are as follows:*

- 1 *Name and address of the person entitled to drill the borehole.*
- 2 *Particulars with scale diagrams, where appropriate, of –*
  - (a) *the Ordnance Survey National Grid reference of the location of the top of the borehole;*
  - (b) *its directional path; and*
  - (c) *its terminal depth and location.*
- 3 *A description of the operations to be, or being, performed and a programme of works which includes the dates on which operations are expected to start and finish or (if past) the dates they started and finished.*

Schedule

1, Part IV

**Part IV Notification under regulation 6(4)**

*The particulars required for a notification under regulation 6(4) are as follows:*

- 1 *Name and address of the operator.*
- 2 *Particulars with scale diagrams, where appropriate, of –*
  - (a) *the Ordnance Survey National Grid reference of the location of the top of the borehole;*
  - (b) *its directional path; and*
  - (c) *its terminal depth and location.*
- 3 *Details of the sealing or other treatment.*

Schedule

2,(1)

## Schedule 2 Additional health and safety requirements Regulation 9(1)

### 1 Delineation and provision of safety signs

*Areas where there is a special hazard shall be delineated and appropriate safety signs placed.*

Guidance

235 In deciding which areas should be marked and require appropriate safety signs in place, two considerations should be made:

- (a) whether there are areas within the site which have special hazards specifically addressed by other Acts, Regulations, Approved Codes of Practice, Orders etc, for example:
  - (i) Control of Noise at Work Regulations 2005;
  - (ii) Ionising Radiations Regulations 1999;
  - (iii) Control of Substances Hazardous to Health Regulations 2002;
  - (iv) Dangerous Substances (Notification and Marking of Sites) Regulations 1990;
  - (v) Construction (Head Protection) Regulations 1989.

Where other special requirements apply, they must be met.

- (b) whether there are other special hazards which persons need to be warned about for their own health and safety, for example:
  - (i) flammable substances;
  - (ii) live electrical conductors;
  - (iii) overhead power cables;
  - (iv) moving machinery, equipment or particles;
  - (v) falling objects;
  - (vi) hot surfaces.

Appropriate signs warning of these or other hazards should be clearly posted. Safety signs should comply with the recognised styles for 'prohibition', 'hazard warning', 'mandatory requirement', 'safe condition' and the subject to which they refer. Reference should be made to current safety signs regulations and supporting standards.

236 However, the marking of hazardous areas and the provision of safety signs should never be a substitute for reasonably practicable action to remove or adequately control a hazard.

237 In high-risk situations, unauthorised entry to hazardous areas should be prevented, where practicable, by providing locked enclosures, eg the enclosure of live parts of electrical switchgear or the locking of accesses to vessels containing hazardous atmospheres.

238 It may not be practicable to provide locked enclosures to prevent entry into the hazardous zones in which flammable or toxic gases may occur during normal operations at an exploratory drilling site or hydrocarbons production site.

239 In these situations it is important that the hazardous zones are clearly marked, so that in conjunction with operator's rules and instructions, all practical measures are taken to prevent unauthorised entry of persons and non-permitted substances or equipment. In addition to being clearly marked on the hazardous zone plan,

Schedule 2(1)



Guidance

they should be clearly marked on the site. This may be done by use of floor marking, barrier tapes, bollards, posts and chains, colour coding of structures and equipment and coloured lighting supplemented by appropriate signs warning of the hazards and/or specifying mandatory protective measures and prohibitions.

240 In some situations it may be sufficient to post warnings and mandatory notices clearly, for example at a diesel fuel storage tank: '**Diesel fuel, highly flammable – No smoking, switch off engine**'. It may also be necessary to post procedural notices or instructions, for example notices relating to procedures in the event of a fire (see paragraph 171).

241 Several companies specialise in the supply of safety signs, notices and suitable means of delineating hazardous areas.

Schedule 2(1)

Schedule

**2 Person in charge and supervision**

2(2)

*A competent person appointed by the operator shall be in charge of every borehole site where employees are present and there shall be sufficient competent persons appointed by the operator to exercise immediate supervision of borehole operations with a view to ensuring the health and safety of the persons at work at the site.*

Guidance

242 This requires that each borehole site where employees are present must be under the charge of a competent person appointed by the operator. It also requires that there shall be sufficient persons appointed by the operator to exercise immediate supervision of borehole operations with a view to ensuring the health and safety of the persons at work at the site.

243 The appointed persons need not be employees of the operator; they may be self-employed persons or employees of a contractor. The appointments should be made in writing specifying the extent of their function and responsibility, reporting procedures, rules and instructions and other information necessary to ensure effective supervision.

244 Operators should, to comply with their duties to exercise overall control of the borehole site and to co-ordinate health and safety measures, arrange for the borehole site and operations to have a suitable structure of management and supervision.

245 During complex operations such as drilling when several employers may have employees working on the site, it may be necessary to have several supervisors, one or more generally supervising operations on the site and others provided by other employers, but appointed by the operator, to supervise particular works that they are carrying out.

246 The operator should consult with each employer to ensure that sufficient competent persons are appointed to exercise immediate supervision of any work on the site. In appropriate cases, competent persons may be appointed to be working supervisors, provided that they can exercise immediate supervision of the activities under their supervision.

247 Where single persons work alone at a workplace, it may be permissible for them to work under their own immediate supervision providing they are competent to do so, but they should work under the supervision of a person who visits them at appropriate times and to whom they can report. For small remote production sites which operate unmanned, the work of persons who visit the site to make routine inspections may come under the supervision of a supervisor based at a central location. Arrangements should be made to provide effective communications

Schedule 2(2)

Guidance

between the employees and the supervisor, to carry out planned supervisory over-inspections and to provide direct supervision when necessary.

248 Competent persons may be appointed to be in charge of several workplaces at a borehole site providing their individual duties are within their capacity to exercise immediate supervision.

249 Persons appointed to be in charge of specified workplaces should exercise immediate supervision and control only for matters relating to their work and within their recognised span of control.

Schedule 2(2)

Schedule

### 3 Provision of competent persons

*Where borehole operations are carried on, there shall be provided a sufficient number of competent persons with a view to enabling those operations to be carried on safely.*

2(3)

Guidance

250 Site operators in conjunction with other employers should ensure that there are sufficient competent persons on the site to perform those functions required for its safe operation. They should ensure that when work is allocated to persons, the demands of the job do not exceed the persons' ability to carry out the work without risk to themselves or others.

251 Persons being trained may work on borehole sites but they should work under the immediate supervision of a person competent to do that work and give that training. The ratio of trainees to competent persons should be limited to that which would not prejudice the safe operation of the site or individual health or safety.

252 Operators should satisfy themselves that their staff and the staff of any other employers working on the site are properly trained and competent. Employers themselves should ensure that their employees have been fully trained and are competent to do the work to which they are assigned.

253 In order to satisfy themselves that persons who are not their employees are fully trained and competent, operators may wish to see evidence of training and competency.

254 Specific training to cover peculiar aspects of the site may be necessary for persons who are in other respects trained and competent. Operators in conjunction with employers should identify such needs and satisfy themselves that the necessary training is given. In some cases, a site safety teach-in and the issue of operator's instructions or site rules may be sufficient to cover this need.

Schedule 2(3)

Schedule

### 4 Written instructions

*(1) Where borehole operations are carried on, employers shall provide written instructions containing:*

- (a) rules necessary for ensuring the health and safety of their employees; and*
- (b) information on the use of emergency equipment and the action to be taken in the event of an emergency at or near the borehole site.*

*(2) Copies of the written instructions referred to in sub-paragraph (1) above shall be made available to all employees who may be affected by them.*

2(4)

Guidance

255 This requirement builds upon existing duties under the HSW Act and other relevant statutory provisions by requiring instructions, rules and other information necessary for health and safety to be provided in **written** form.

256 All employers have a duty under the HSW Act to provide such information and instruction as is necessary to ensure, so far as reasonably practicable, the health and safety at work of their employees. Employers have duties under regulation 10 of the Management of Health and Safety at Work Regulations 1999 to provide information to employees on the risks to their health and safety at work and the measures to be taken to address them. In addition they have duties under regulation 8 of the Provision and Use of Work Equipment Regulations 1998 to provide information and where appropriate written instructions to employees for the safe use of work equipment and duties under regulation 9 of the Personal Protective Equipment at Work Regulations 1992 to provide information and instruction relating to the use and maintenance of personal protective equipment.

257 Operators and employers should ensure that such instructions, rules and other information are provided in comprehensible **written** form. They should ensure that they are brought to the attention of all employees and other persons who may need some knowledge of them for health and safety purposes. The arrangements for doing this should be appropriate to the importance of the instruction, rule or information. For safety critical instructions, special arrangements should be made to ensure that the instructions have been received, are fully understood and accepted by the persons concerned.

258 Copies of written instructions should be made available to all employees and other persons, to whom they may be directed, including those who may not need to be provided with them personally but who may in some way be affected by them. Copies should be available at the site, at all times, for employees to refer to. Employees should be informed that the information is available and where it may be seen.

259 Further information and instructions for employees are given in the Approved Code of Practice supporting the Management of Health and Safety at Work Regulations 1999,<sup>8</sup> the guidance on the Provision and Use of Work Equipment Regulations 1998<sup>5</sup> and the guidance on the Personal Protective Equipment at Work Regulations 1992.<sup>10</sup>

Schedule 2(4)

Schedule

5 Work permits

*(1) Where borehole operations are carried on and it is shown in the health and safety document that such a measure is necessary, a system of work permits shall be introduced for carrying out hazardous operations and usually straightforward operations which may interact with other activities to cause serious hazards.*

*(2) Work permits shall specify the conditions to be fulfilled and the precautions to be taken before, during and after the work concerned and shall be issued by the person in charge of those operations in accordance with a scheme agreed with the operator of the borehole site.*

2(5)

Guidance

260 This requirement is aimed at the need for properly formulated and regulated control of inherently hazardous operations or operations which themselves are simple and straightforward but may interact with other operations, systems or plant to cause a serious hazard.

Schedule 2(5)

Guidance

261 The health and safety document should identify which operations need to be controlled by a permit-to-work system. Operators and employers must use permit-to-work systems for these operations.

262 Some employers who provide specialist services at a site may normally operate permit-to-work systems in connection with their work. Operators should discuss such matters as part of their duty to co-ordinate health and safety measures and should update the health and safety document to include these.

263 Operators should have a scheme for the issue of permits to work by appointed supervisors. They should ensure that employers and their supervisors understand this and comply with it.

264 Useful additional guidance is given in the following HSE publications, but operators and employers must ensure that the permit-to-work system adopted addresses the conditions and precautions which are necessary **before, during and after** the work is carried out:

*Guidance on permit-to-work systems: A guide for the petroleum, chemical and allied industries*<sup>11</sup>

*Electricity at work: Safe working practices*<sup>12</sup>

Employers should ensure that any existing permit-to-work systems which they operate are amended if necessary to comply with this special requirement.

Schedule 2(5)

Schedule

6 Maintenance

(1) *Where borehole operations are carried on, a suitable scheme shall be set up for the systematic examination, maintenance and, where appropriate, testing of mechanical and electrical equipment and plant.*

(2) *All examination, maintenance and testing shall be carried out by competent persons and a record of any examination and tests shall be made and kept for at least 3 years after the equipment or plant concerned was last used.*

(3) *The foregoing sub-paragraphs of this paragraph shall also apply in relation to the safety equipment provided, with a view to ensuring that it is ready for use and in good working order at all times having regard to the uses to which it may be put.*

2(6)

Guidance

265 This regulation, which builds on the more general duty in the HSW Act, requires the provision of a suitable scheme for the maintenance of plant and equipment on the site.

266 The scheme should ensure that plant and equipment is maintained in good and efficient working order in all respects which might affect health and safety: in the case of a degasser or ventilation system, for example, reduction in the efficiency may affect the health and safety of persons working on the site, whereas a reduction in the efficiency of a pump for removing nuisance water might not.

267 The extent and complexity of maintenance will vary according to needs, for example: from simple pre-use inspection of hand-held tools to a comprehensive integrated programme of inspection, detailed examination and testing for complex plant and equipment such as a blowout preventer system.

268 Schemes of maintenance should aim to **prevent** reductions in performance or failures which could affect health and safety. They should specify the frequency

Schedule 2(6)

## Guidance

at which inspection, examination, testing or other maintenance activities should be carried out and the nature of those activities.

269 The frequency of inspection should be based on the likelihood of reduction in performance or failure and the effect that this may have on health and safety. Frequency may be specified in a variety of appropriate ways, eg daily, weekly, monthly, in terms of hours of operation, distances travelled, revolutions made, loads carried etc.

270 The likelihood of malfunction or failure may depend, for example, on the type of equipment, its record of reliability, its duty, operating conditions such as the environment it is working in and the manufacturer's operating and maintenance recommendations. The maintenance scheme should take these into account.

271 The nature of the maintenance activity may range from simple external visual inspection, routine lubrication and adjustment to detailed internal examination and testing and the scheme of maintenance may specify a combination of these at specified frequencies.

272 The scheme should be reviewed and amended in the light of operating experience and in response to changes in use, operating conditions and other factors which may affect performance.

273 In order to be suitable, schemes of maintenance should also take account of the requirements of the Provision and Use of Work Equipment Regulations 1998 (regulation 6 dealing with the maintenance of work equipment and regulation 22 dealing with the safety of maintenance activities) and the requirements of the Personal Protective Equipment at Work Regulations 1992 (regulation 7 dealing with maintenance).

### Maintenance activities

274 Inspection, examination, testing and other maintenance activities should only be carried out by competent persons. Persons undergoing training may be involved in maintenance work providing the work they carry out is within their competence or under the direct supervision of a person competent to give that training and carry out that work.

275 Plant operatives may be competent to carry out visual inspections and simple functional checks, skilled craftsmen may be required to undertake more technical checks and specialists may be required for detailed examinations of, for example, pressure vessels, lifting equipment, monitoring equipment and instruments.

276 Many maintenance activities will be routine but activities which are considered routine in normal working situations may require special planning and the taking of certain precautions at a borehole site where there may be hazardous zones which may or may be likely to contain flammable or toxic fluids.

277 A permit-to-work scheme should be used for the control of maintenance activities which could be directly hazardous or affect the safety of the site.

### Maintenance reports and records

278 The scheme of maintenance should require the making of suitable reports which should include the reporting of defects found and any remedial actions taken. It should specify that defects which are likely to seriously affect the health and safety of persons should be treated with urgency and be properly reported both to the employer and the operator. It should specify a system for ensuring this.

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279 Records should be made detailing when examinations and tests were carried out and the reported findings.

280 Records should be kept in a suitable manner, so as to provide easy retrieval for auditing or review of the scheme of maintenance. They should be retained during the life of the equipment and for a period of three years after the equipment was last used or for longer periods if required by other statutory provisions.

281 The keeping of records has three main purposes:

- (a) to provide a maintenance history which may assist in improving future maintenance of the equipment;
- (b) to provide useful information about the condition and likely suitability and reliability of the equipment;
- (c) to provide evidence that the equipment has been properly maintained.

282 Operators and employers may wish to examine maintenance records as part of their procedures for assessing the suitability of plant and equipment which is to be used at a borehole site. Where records are inadequate for this purpose, they may wish to arrange for the equipment to be thoroughly examined and tested if necessary, prior to being used on the site.

283 In the case of equipment forming part of the permanent equipment of a site, records of maintenance carried out on that equipment during its use on the site, including initial commissioning reports, should be held by the operator.

284 In the case of temporary equipment, provided by contractors or hired in, the supplier should hold main records of maintenance but copies of relevant extracts, relating to commissioning and to maintenance carried out while the equipment is in use at the site, should be held at the site. In the case of equipment which is required by relevant statutory provisions to have specified examinations and tests undertaken at specified intervals, for example thorough examinations and tests of cranes or pressured systems, operators should arrange to have in their possession copies of the latest relevant reports.

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7 Well control

(1) *Suitable well control equipment shall be provided for use during borehole operations to protect against blowouts having regard to the provisions of the health and safety document.*

(2) *The deployment of such equipment shall take into account the prevailing well and operational conditions.*

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285 The purpose of this requirement is to reduce the risks to persons on site and in adjoining areas by preventing uncontrolled escapes from wells (blowouts) of flammable, explosive or toxic fluids by safely disposing of influxes of hazardous fluids from well bores and by mitigating the consequences of any blowout which may develop.

286 The need for well control equipment should be determined by an assessment of risks. This should be based on knowledge of the underground rock formations through which the borehole is intended to pass and in particular the permeability and porosity of the formations and the likelihood of them containing fluids, whether hazardous or not, under pressure.

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287 Other relevant information, such as records of previous boreholes through those formations and the proximity of other boreholes and underground works, should be considered when assessing the risks.

288 For shallow boreholes in well documented formations where it is known with confidence that there is minimal risk from underground fluids, for example in the case of proving holes for hard rock reserves, well control equipment may not be necessary.

289 In the case of shallow boreholes for coal exploration for opencast mining, in well documented reserves where there is minimal risk from coal bed methane, well control equipment may not be necessary, though arrangements for routine checking for methane and controls on sources of ignition should be provided.

290 For deep boreholes for exploration of minerals other than oil, gas and coal bed methane, in well documented reserves where there is minimal risk from underground fluids, no well control equipment may be necessary, though arrangements for routine checking for gas emissions should be provided.

291 For boreholes for the exploration or production for oil, gas, coal bed methane or any deep boreholes where fluids under pressure may be encountered, well control equipment should be provided.

292 Where there is insufficient information on which to make confident risk assessments, well control equipment should be provided.

293 Where there are known or suspected deposits of oil, natural gas or coal, permeable and porous formations may contain hazardous fluids. In such areas, the only permeable, porous formations which may be considered unlikely to contain hazardous fluids are:

- (a) those so shallow that it is unlikely that the overlying rock formations could entrap the fluids under pressure; or
- (b) those which outcrop at the surface.

Even in such cases, operators should ensure that there are no special factors which may cause fluids to be trapped under pressure within these formations.

294 Where well control provisions are required by the risk assessment, the health and safety document should detail the well control arrangements and the type of equipment required for each stage of the borehole operations.

### Basic requirements

295 A fundamental prerequisite for effective well control is the suitable design and construction of the borehole. The addition of suitable well control equipment should ensure that the uncontrolled release of formation fluids to other formations, places elsewhere underground or to the surface may be prevented.

### Well control equipment

296 Well control equipment includes all equipment used to:

- (a) detect unplanned influxes of formation fluids into the well;
- (b) prevent, control or divert the flow of fluids from the well;
- (c) purge formation fluids from the well;
- (d) separate formation fluids from the drilling fluid.

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297 It includes monitoring and indication equipment for pit levels, flow detection, low and pressure measurement and other important instrumentation required for recognising and responding to an unplanned change in well parameters which could result in a loss of well control.

298 It includes surface, downhole and internal blowout preventers, rotating heads, circulating heads, tubing injection heads, diverters, wireline lubricators and stuffing boxes, kelly cocks, stabbing valves, choke lines and manifolds, mud gas separators, kill-lines, valves and other equipment required for killing a well including high-pressure kill pumps and plugs, valves and other devices necessary to prevent a well from flowing. It also includes all pipework associated with the above equipment.

299 Well control equipment should be suitable for the type of operation being carried out in terms of size, connection type, pressure, temperature and the chemical properties of the formation fluids which may be encountered. It should be designed, constructed, installed, commissioned, used and maintained in accordance with appropriate recognised standards.

300 The equipment should have an adequate level of redundancy to minimise the consequences of a failure to function, and prevent total loss of well control. Particular consideration should be given to critical system components which experience shows may be likely to malfunction.

### Drilling and workover operations

301 While shallow sections of a well, or in other circumstances where the well cannot be safely closed in at the surface due to limitations of rock strength or impracticability, but where there is a risk of the well flowing, diverter equipment or an alternative system for controlling the well should be provided.

302 Where drilling fluid is the primary means of well control, suitable arrangements and equipment for ensuring an adequate supply of the fluid at the required density should be provided. Adequate supplies of materials to cater for losses should be readily available.

303 If diverter lines are installed, consideration should be given to the size of lines, bends and other flow restrictions, routing of the lines across the site, location of the discharge points, the security of lines to withstand flow reactions and protection from mobile plant.

304 Where underbalanced drilling is carried out, suitable well control equipment and arrangements should be provided to ensure that the flow of fluids from the well is at all times controlled within the designed working pressures and capacities of the surface equipment. The well control equipment should include a reliable and responsive system for measuring and recording the flow of fluids from the well to the surface and the pressure of well fluids at the well head.

305 Blowout prevention equipment capable of closing in the well should be installed on the first casing that is adequately cemented in a rock formation strong enough to contain the maximum estimated pressure that will be encountered in the next section of the borehole. Suitable blowout prevention equipment should be maintained on the well until it is permanently plugged and abandoned.

306 Blowout prevention equipment should be capable of isolating all possible routes from the well to the surface. It should cater for contingencies when drillpipe, casing, lining or other strings of equipment pass from the surface into the well. Suitable provision should be made to prevent uncontrolled flow of the well through

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or around that equipment. The blowout prevention equipment should be readily available for immediate use in an emergency.

307 It should be provided with a reliable reservoir of energy for its operation, designed to an appropriate recognised standards.

308 Where stored fluid pressure is used as the energy source, hoses, pipes and fittings used to transmit the pressure should be suitable for the duty and be carefully routed to the blowout preventer and where necessary protected from damage.

309 Suitable controls for the operation of diverter and blowout preventer equipment should be provided on the rig floor adjacent to the driller's position. In addition, remote controls should be provided at an easily accessible position at a safe distance from the rig floor for use in an emergency. The controls should include those necessary to operate any valve on the annulus side of the well which requires remote operation in conjunction with the operation of a diverter or blowout preventer.

310 All of the controls should be clearly marked to indicate their function.

311 For workover operations which require well control equipment at the surface to be removed, adequate barriers such as downhole plugs or kill fluid should be installed between the formations and the surface before that equipment is removed.

312 For workover operations using wireline, coiled-tubing or snubbing units, suitable well control equipment should be provided.

### Choke manifold, valves etc

313 Equipment should be provided to control the annulus pressure in a borehole when a blowout preventer is being used. This should include a choke manifold which allows controlled release of pressure in the annulus. A kill-line should be provided to allow kill fluids to be pumped into the annulus.

314 The choke manifold should be provided with pressure gauges showing the drill-pipe and annulus pressures; pressure readings should be clearly visible to the choke manifold operator.

315 The flowline from the choke manifold should be routed to a suitable degasser provided with bypass facilities and a vent line. The vent line should be routed to a place clear of working areas where vented gases may be safely dispersed.

316 All valves and other controls provided for or in connection with the control of pressures in a borehole should be clearly marked to show the open and closed positions.

317 Where choke manifolds are sited away from the driller's position, pressure gauges showing drill-string pressure and annulus pressure should be provided for the driller. The driller and choke manifold operator should be able to communicate reliably and, where necessary, suitable communication aids should be provided between them.

### Well production operations

318 Wells should be provided at all times with suitable equipment to prevent the uncontrolled release of fluids from the well. This will normally entail the provision

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of a suitable well-head assembly (christmas tree) with associated control valves, instrumentation and where necessary monitoring equipment and actuating systems.

319 The well control system should be suitable for the application and appropriate, considering the risks which could arise from a loss of containment. It should be suitable for the production methods used and the pressure, temperature and chemical composition of the produced fluids, especially the presence of hydrogen sulphide or carbon dioxide. The potential for sand production and hydrate or wax formation should also be considered.

320 For wells which do not flow naturally and which do not produce significant amounts of gas, a simple well-head assembly, designed to recognised standards, should suffice. However controls should be provided to stop the well pump in the event of a significant leak of well fluids and to prevent loss of fluids from storage tanks or adjacent flow lines due to reverse flow towards the well.

321 For wells which flow naturally or which are assisted by pumps but also produce gas under pressure from an annulus, equipment should be provided to stop the well pump and to isolate the well from surface flow-lines automatically in the event of a significant leak of well fluids or abnormal operating pressures.

322 All well-head assemblies should be provided with means for measuring the pressure in each annulus.

323 Pump control systems should be designed so that in the event of a pump stopping automatically due to abnormal operating parameters, they prevent it from restarting automatically or remotely without first being reset from a safe position close to the well.

### Deployment of well control equipment

324 Where well control equipment is provided, suitable arrangements should be made to ensure that it is deployed as and when necessary to prevent loss of containment of the well.

325 In the case of drilling and workover operations, the conditions demanding manual activation of the well control equipment should be understood by those authorised to operate it. Suitable instrumentation and monitoring equipment should be provided to indicate when these conditions are developing.

326 In the case of production operations, the conditions demanding manual activation should be specified by the operator; instrumentation and, where necessary, monitoring equipment should be provided to indicate when these conditions exist or are developing.

327 In the case of automatic systems, the monitoring system which initiates activation should be set, as far as reasonably practicable, allowing for normal fluctuations in well operating parameters, so as to minimise fluid loss. Alarm systems should be an integral part of any automatic blowout prevention system.

328 Automatic systems should be designed so as to be fail-safe and so that once activated, they cannot be reset except by manual intervention at a safe position at the borehole site.

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### 8 Harmful atmospheres

*Where there is a risk that employees may be exposed to atmospheres that are hazardous to health, there shall be provided:*

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- (a) *sufficient appropriate breathing and resuscitation equipment and apparatus; and*
- (b) *a sufficient number of employees trained to use the apparatus present at the borehole site.*

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329 Atmospheres may be hazardous for a number of reasons, for example:

- (a) owing to the presence of toxic or harmful substances in the air;
- (b) owing to a lack of oxygen in the air as a result of displacement or depletion by other substances which are not themselves toxic or harmful; and
- (c) owing to other physical properties such as temperature, flammability, explosivity etc.

330 The Control of Substances Hazardous to Health Regulations 2002 (COSHH) apply to those situations in paragraph 329(a).

331 This minimum requirement addresses those situations in paragraph 329(a) and (b) and complements the duties which employers already hold under the COSHH Regulations.

332 Employers should assess whether there is a risk of employees being exposed to atmospheres described in paragraph 329(a) and (b) and if so comply with the requirements appropriate to the risk.

333 The primary objective should be to provide systems of work that do not require persons to work where there is a risk of exposure to hazardous atmospheres. There may, however, be special situations where this is not possible. These fall into two categories:

- (a) *escape situations*: where owing to failure of plant or control measures, atmospheres inadvertently become hazardous, for example during loss of control of a well or failure of a pressure vessel or other container;
- (b) *planned operations*: where atmospheres are known to be hazardous and it is necessary for work to be carried out in them on a planned and controlled basis, for example:
  - (i) where permanent control measures are being installed and respiratory protective equipment (RPE) is necessary as a temporary measure for the purpose of carrying out that work;
  - (ii) where there is a need for maintenance work;
  - (iii) where exposures of very short duration occur, for example during the connection of filling lines to tanks, and the permanent installation of other control measures is not reasonably practicable;
  - (iv) when it is necessary to rescue persons.

334 The requirement for breathing apparatus is aimed at those situations described in paragraph 333 where other forms of RPE such as filter respirators would not be suitable. For example, filter respirators may be suitable for persons who are working in the open and are exposed to dusts or certain vapours during the addition of chemicals to drilling fluids. They would not be suitable for drilling rig crew who may be exposed to formation gases and oil mists. Breathing apparatus would be required in these cases.

335 Breathing apparatus should be provided for protection against unpredictable mixtures of gases or vapours, which have immediate and acute effects if inhaled and where there is any danger of loss of consciousness or asphyxiation.

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336 Employers should ensure that breathing apparatus provided by them is suitable for the particular circumstances for which it is provided.

337 Further guidance on the suitability of breathing apparatus is given in *Respiratory protective equipment at work: A practical guide*.<sup>13</sup> The Personal Protective Equipment at Work Regulations 2002 apply to the provision, use and maintenance of breathing apparatus.

### Escape apparatus

338 Employers should assess the risk of a hazardous atmosphere occurring where employees work. Where there is a risk, sufficient and appropriate breathing apparatus should be provided to allow them a safe escape.

339 It should be remembered that provision of escape apparatus alone will not be sufficient to ensure safe escape. Suitable and sufficient equipment and systems for detecting and announcing a build-up of gases and the need to take corrective action or escape should be provided. Employees should use escape apparatus whenever they consider it necessary for their safety or when an escape alarm is raised.

340 At drilling sites for oil, gas or coal or for other purposes where oil, gas or vapours under pressure may be encountered, but where the flow of fluids from the well is normally being prevented by hydrostatic pressure, suitable breathing apparatus of the self-contained type should be provided for escape purposes at the following locations:

- (a) close to the rig floor, at elevated positions on the derrick and at other places where well fluids return to surface where persons normally work;
- (b) in cellars, other low-level areas and in confined spaces where atmospheres may become hazardous due to leakage or accumulation of fluids when persons are working there.

341 At drilling sites where underbalanced drilling is being carried out or where a well is being flowed for test purposes and at oil and gas production sites, suitable breathing apparatus of the self-contained type should be provided for escape purposes at the following locations:

- (a) in cellars, other low-level areas and confined spaces where atmospheres may become hazardous due to leakage or accumulation of fluids when persons are working there;
- (b) at locations where persons work, from which they would not be able to escape immediately to a safe place if the atmosphere became hazardous owing to an escape of fluids under pressure or any other cause. Examples of this might be at elevated positions on workover derricks or on storage tanks, constricted working areas adjacent to pressurised pipelines or vessels and poorly ventilated areas containing pipelines or vessels;
- (c) at suitable locations at sites where hydrogen sulphide or any other toxic substance may be present, so as to be easily reached by persons working on the site.

342 The apparatus should offer protection for sufficient time to allow a safe escape. Sufficient sets should be provided for all employees who may be working at these locations at any point in time. Spare sets should be provided in a safe place to cater for damage or an increase in the number of persons who may require them.

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343 The apparatus should be kept in easily removable, protective covers and be located so as to be easily seen and reached in an emergency.

344 Escape apparatus should not be used for purposes other than providing escape in an emergency.

345 It should be maintained in good working order, should be visually inspected daily and examined at least at weekly intervals and before work begins when it is provided to cover a specific task of work. More frequent inspections and examinations should be carried out if recommended by the equipment manufacturer.

346 All persons who may be required to use it should be provided with suitable initial training and any necessary periodic refresher training required to ensure that they are and remain competent to use it.

### Working apparatus

347 Where it is necessary for persons to work in a hazardous atmosphere, they should be provided with suitable breathing apparatus. Spare sets should be provided for rescue purposes when work is being carried out using breathing apparatus.

348 It should be provided and maintained in good working order and should be visually inspected daily and examined at least weekly when at a site and prior to use.

349 It is not necessary to keep breathing apparatus for this purpose at a site unless it is required continuously for rescue purposes.

350 It should only be used under a stringent system of control and by persons who are properly trained and competent in its use.

351 Where it is provided for rescue purposes, sufficient trained and competent persons should be available to use it during the period that it is required to be present at the site.

352 Breathing apparatus may be provided for the purpose of rescue in the event of an emergency when escape apparatus has been used. Where it is provided for this purpose at least three sets, two for use and one as a spare, should be provided.

353 Where breathing apparatus is provided for planned work in a hazardous atmosphere, resuscitation equipment and sufficient persons competent to use it should be provided for the duration of that work. Resuscitation equipment should be provided and used in a safe place and not be taken into a hazardous atmosphere unless it is suitable for use in such an atmosphere.

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2(9)

### 9 Prevention of explosions

*Where there is a risk of explosion, all necessary measures shall be taken with a view to –*

- (a) *preventing the occurrence and accumulation of explosive atmospheres;*  
*and*
- (b) *preventing the ignition of explosive atmospheres.*

Guidance

354 Operators and employers should assess whether there is a risk of explosion. In cases where there is such a risk, they should take all measures necessary to prevent the occurrence and accumulation of explosive atmospheres and prevention of ignitions. The provision of suitable and sufficient equipment and systems for detecting flammable gases and vapours plays an important role in explosion prevention.

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355 Guidance on the prevention of explosions is given in the section on the health and safety document dealing with prevention of fires, explosions, blowouts and gas escapes (see paragraphs 149–192).

Schedule

**10 Remote control in emergencies**

2(10)

(1) *Where the health and safety document shows that such a measure is necessary, certain equipment shall be capable of remote control from suitable locations in the event of an emergency.*

(2) *The equipment referred to in sub-paragraph (1) above shall, in any case, include systems for the isolation and blowdown of wells, plant and pipelines.*

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356 If the health and safety document specifies the need for facilities for the remote operation of plant or equipment, employers must provide them.

357 In some cases these facilities will be to allow shutdown of plant or equipment, isolation of wells and pressurised systems and where necessary, controlled depressurisation or ‘blowdown’ of wells and pressurised systems in an emergency.

358 Where the provision of a diverter or blowout preventer is necessary, facilities for remote operation from a safe place as well as from the driller’s position should be provided. These should include facilities for the remote operation of any valve between the annulus and the diverter line or choke line, where such a valve is provided and requires operation to control the well in an emergency. The remote facilities should be located in an easily accessible place clear of any hazardous zone or area which may be affected by a blowout.

359 Where suitably equipped diesel engines are used within hazardous zones for drilling or workover operations, facilities for shutting down the engines should be provided at the engine and at the driller’s position. Where they are used unattended in hazardous zones, in addition to suitable protective equipment provided for automatic shutdown, facilities for shutting them down remotely from a safe place should be provided.

360 At production sites where it is necessary to provide fail-safe systems or valves for automatic isolation of wells or other plant and equipment, facilities for remote operation of these should be provided at a safe place on the site. Where it is necessary, owing to the quantities and pressures of fluids in pressurised systems and pipelines, to depressurise or blowdown these systems by venting them in a controlled manner to a safe discharge point, facilities should be provided to allow this to be done from a safe remote position.

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**11 Communications, general and emergency**

2(11)

(1) *Where the health and safety document shows that such a measure is necessary, every borehole site at which employees are present shall be provided with –*

(a) *an acoustic and optical system capable of transmitting an alarm to every part of the site as necessary; and*

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2(11)

- (b) *an acoustic system capable of being heard distinctly at all parts of the site where employees are frequently present.*
- (2) *The facilities for raising the alarm shall be situated at suitable places.*
- (3) *Where employees are present at sites that are not usually manned, appropriate means of communication shall be placed at their disposal.*

Guidance

361 If the health and safety document specifies the need for alarm systems and communication facilities, employers must provide them.

362 Alarms may be required for a variety of purposes and they should be suitable for the purpose for which they are intended. Where they are used as part of a monitoring system to indicate an abnormal status of plant to an attendant, they may only need to alarm at the attendant's workplace. Where they are used to raise an emergency alarm, say in the event of smoke in a standalone building, they may only need to alarm in that building and at a control station. In the event of a gas escape which could endanger the whole site, they may need to alarm generally across the whole site and at specific workplaces.

363 Where general site alarms are required, they should be capable of being distinctly heard by all employees on the site.

364 Alarm systems should provide an effective alarm to all locations on a site where employees who need to respond to that alarm may be working. Depending on the circumstances, alarms may need to be given in audible or visual form and where necessary both.

365 The means by which alarms are raised should be suitable. In some cases they may be raised automatically by detectors and monitoring equipment. In some cases they may be given locally to a main control point so that suitable action can be initiated from that point. In other cases, for example where portable gas monitoring devices with integral alarm systems are used, they may alarm locally to the persons at risk.

366 In all cases, effective arrangements and facilities for raising alarms should be provided at suitable locations on a site. The locations should be easy to identify and access and allow raising of an alarm, in accordance with the specified arrangements, with minimal delay.

367 A means of quickly communicating the need for assistance in the event of an emergency should be provided to all employees. This is particularly important in the case of employees who work alone. In the case of employees who visit remote unmanned sites, provision of a suitable portable telephone or radio may be required. On large sites with extensive hazardous zones this equipment should be suitable for use in those zones.

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2(12)

**12 Means of evacuation and escape**

- (1) *Employees shall be trained in appropriate action to be taken in the event of an emergency.*
- (2) *Rescue equipment shall be provided at readily accessible and appropriately sited places and kept ready for use.*
- (3) *Where escape routes are difficult and where irrespirable atmospheres are or may be present, self-contained escape apparatus shall be provided for immediate use by employees at the workstation.*

Guidance

368 All employees should be trained to react appropriately when an emergency arises. The training should have two key objectives:

- (a) it should ensure that every employee knows what action to take;
- (b) it should ensure that every employee is competent to take that action.

369 Employees will need to know what action to take when they perceive an emergency situation developing. This may include the taking of immediate remedial action, the raising of the alarm and evacuation to a safe place.

370 Employees will need to know what action to take in response to various alarms. In most cases this may simply be to leave their place of work and go by the quickest possible route to a designated safe place or muster station.

371 Some employees may have certain specified tasks to perform, such as the initiation and control of evacuation procedures, the shutdown and making safe of plant and the taking of certain remedial action such as fire-fighting.

372 Every employee must know what to do and how to do it. Contractor's employees may require special instructions or training relating to specific requirements of the site. Additional training should be appropriate to the size and complexity of the site and the hazards present. On small sites the issue of simple rules and familiarisation with the site layout may be sufficient. At large or complex sites, special training sessions and practice drills may be required.

373 Regulation 8 of the Management of Health and Safety at Work Regulations 1999 requires employers to establish and implement appropriate procedures to be followed in the event of serious and imminent danger. The Approved Code of Practice<sup>b</sup> gives additional guidance on this subject.

374 The need for rescue equipment should be specified in the escape and rescue plan included in the health and safety document. The equipment specified in this plan should be provided and sited as specified in the plan. It should be easily accessible and should be maintained so that it is at all times ready for use.

375 The provision of escape and rescue apparatus is covered in paragraphs 136–148 dealing with the escape and rescue plan and in paragraphs 338–353 dealing with escape and rescue breathing apparatus.

Schedule 2(12)

Schedule

13 Safety drills

*(1) Safety drills shall be held at regular intervals at all borehole sites at which employees are usually present.*

*(2) The main purpose of such drills shall be to train and check the skills of persons to whom specific duties have been assigned in the event of an emergency involving the use, handling or operation of emergency equipment taking into account the criteria laid down in the health and safety document.*

*(3) Where appropriate, employees who have been so assigned shall also be drilled in the correct use, handling or operation of that equipment.*

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376 Employers should, with reference to the health and safety document, identify those potential emergency situations which could occur at the site. These may include, for example:

- (a) spillage or leakage of oil, gas or other potentially hazardous substances;
- (b) escape of oil, gas or other fluids under pressure;

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- (c) fire or explosion;
- (d) blowout of a well;
- (e) failure of safety critical equipment;
- (f) injury or illness of an employee;
- (g) entrapment of an employee;
- (h) loss of consciousness of an employee in a confined space;
- (i) severe weather conditions affecting the stability of site structures or plant such as drilling or workover rigs and cranes;
- (j) sabotage or bomb threat.

377 Response procedures for such situations should be provided and these should allocate specific duties to nominated employees.

378 Employers should ensure that safety drills are carried out regularly at sites where employees are usually present. In the case of temporary operations such as drilling operations or workovers, employees should practice safety drills before and during the course of those operations.

379 Drills are aimed at establishing competence by practicing a routine. They should be arranged to be sufficiently realistic to be effective. Their frequency should be chosen to ensure that all persons maintain competence in their individual role in an emergency. They also prove the availability and adequacy of emergency equipment. In deciding upon necessary frequencies of drills, account should be taken of the complexity of the tasks the individuals have to perform and the frequency at which they may be called upon to carry out those duties in a real emergency.

380 The performance achieved during a drill should be used to evaluate existing arrangements and introduce any necessary improvements.

381 Training for emergency situations should include where appropriate:

- (a) the action to be taken on discovering an emergency or potential emergency situation;
- (b) how to raise alarms and an appreciation of the procedures which alarms should set in motion;
- (c) the action to be taken on hearing an alarm;
- (d) the procedures for alerting members of the public in surrounding areas where necessary;
- (e) the arrangements for calling the emergency services;
- (f) the procedures for evacuating to a safe assembly area or muster point;
- (g) the location and correct use of the emergency equipment provided on site;
- (h) the location of escape routes, particularly those not in regular use;
- (i) how to open all escape doors;
- (j) the importance of correct use and maintenance of safety devices and equipment, including fire doors and partitions;
- (k) the procedures for stopping machines and processes and for isolating power supplies when necessary for safety;
- (l) the importance of general safety and fire precautions and good housekeeping;
- (m) an awareness of practical risk assessment procedures and the measures which can be taken to reduce risk from relevant hazards.

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2(14)

**14 Fire detection and fire-fighting**

*(1) Adequate measures shall be taken to prevent fires from starting and spreading from sources identified in the health and safety document.*

*(2) Provision shall be made for fast and effective fire-fighting.*

Schedule

(3) *Borehole sites shall be equipped with appropriate fire-fighting equipment and as necessary with fire detection and alarm systems.*

(4) *Non-automatic fire-fighting equipment shall be easily accessible and simple to use and where necessary protected from damage.*

(5) *The fire protection plan referred to in regulation 7(2)(c) shall be kept available on the site.*

2(14)

Guidance

382 The plans for the prevention of fires and explosions and for fire protection included in the health and safety document should identify the likely sources of fires and the measures required to prevent them from arising and to control them.

383 Employers should ensure that the measures identified as being necessary are provided. They must include provisions for fast and effective fire-fighting, the emphasis being on rapid detection and subsequent initiation of fire-fighting.

384 The fire protection plan required within the health and safety document should be available on site. Arrangements should be made for all employees to be familiar with those parts of it which relate to their role in the plan.

385 Arrangements should be made to implement all training and maintenance requirements identified in the plan.

Schedule 2(14)

Schedule

**15 Safe assembly points and muster list**

*Where required in the health and safety document, safe assembly points must be specified, muster lists maintained and the necessary action shall be taken.*

2(15)

Guidance

386 Operators and employers should by reference to the health and safety document determine if safe assembly points are required. Where they are required, they should ensure that their location is specified in relevant plans, procedures and instructions and is clearly identified on the site.

387 Where required by the health and safety document, up-to-date lists of persons present on the site should be available for the purposes of checking that all persons are accounted for in the event of an emergency evacuation.

388 Arrangements should be made for nominated competent persons to take control of safe assembly points, check for missing persons and initiate search and rescue operations.

Schedule 2(15)

# Appendix

## Publications giving useful guidance on appropriate standards for mechanical and electrical equipment used in hazardous zones

*Drilling and production safety code for onshore operations, Part 4 of the Institute of Petroleum model code of safe practice in the petroleum industry* 1989 Wiley ISBN 0 471 90985 9

*Recommendations for the protection of diesel engines for use in zone 2 hazardous areas* Publication No 107 Engineering Equipment and Materials Users Association ISBN 978 0 85931 060 4

BS 7244:1990 *Specification for flame arresters for general use* British Standards Institution

*Memorandum of guidance on the Electricity at Work Regulations 1989. Guidance on Regulations* HSR25 (Second edition) HSE Books 2007 ISBN 978 0 7176 6228 9

*Electricity at work: Safe working practices HSG85 (Second edition)* HSE Books 2003 ISBN 978 0 7176 2164 4

*A single market: equipment for use in potentially explosive atmospheres* Department of Trade and Industry 1992

*Model code of safe practice Part 15: Area classification code for installations handling flammable fluids* EI Publications 2005 ISBN 978 0 85293 418 0

BS EN 60079-14:1997 *Code of practice for selection, installation and maintenance of electrical apparatus for use in potentially explosive atmospheres (other than mining applications or explosive processing and manufacture)* British Standards Institution

BS 5501-8:1988 *Electrical apparatus for potentially explosive atmospheres encapsulation 'm'* British Standards Institution

BS 6651:1992 *Code of practice for protection of structures against lightning* British Standards Institution

BS 5958-1:1991 *Code of practice for control of undesirable static electricity* British Standards Institution

BS 4444:1989 *Guide to electrical earth monitoring and protective conductor proving* British Standards Institution

## References

- 1 *The management and administration of safety and health at mines. Management and Administration of Safety and Health at Mines Regulations 1993. Approved Code of Practice L44* HSE Books 1993 ISBN 978 0 7176 0618 4
- 2 *The prevention of inrushes in mines. Approved Code of Practice L46* HSE Books 1993 ISBN 978 0 7176 0620 7
- 3 *Health and Safety at Work etc Act 1974 (c.37)* The Stationery Office 1974 ISBN 978 0 10 543774 1
- 4 *Workplace health, safety and welfare. Workplace (Health, Safety and Welfare) Regulations 1992. Approved Code of Practice L24* HSE Books 1992 ISBN 978 0 7176 0413 5
- 5 *Safe use of work equipment. Provision and Use of Work Equipment Regulations 1998. Approved Code of Practice and guidance L22 (Second edition)* HSE Books 1998 ISBN 978 0 7176 1626 8
- 6 *Model Code of Safe Practice Part 15: Area classification code for installations handling flammable fluids (Third edition)* Energy Institute 2005 ISBN 978 08529 3418 0
- 7 *EH40/2005 Workplace exposure limits: Containing the list of workplace exposure limits for use with the Control of Substances Hazardous to Health Regulations 2002 (as amended)* Environmental Hygiene Guidance Note EH40 HSE Books 2005 ISBN 978 0 7176 2977 0 (revised annually – see [www.hse.gov.uk](http://www.hse.gov.uk) for further information)
- 8 *Management of health and safety at work. Management of Health and Safety at Work Regulations 1999. Approved Code of Practice and guidance L21 (Second edition)* HSE Books 2000 ISBN 978 0 7176 2488 1
- 9 *Health surveillance at work HSG61 (Second edition)* HSE Books 1999 ISBN 978 0 7176 1705 0
- 10 *Personal protective equipment at work (Second edition). Personal Protective Equipment at Work Regulations 1992 (as amended). Guidance on Regulations L25 (Second edition)* HSE Books 2005 ISBN 978 0 7176 6139 8
- 11 *Guidance on permit-to-work systems: A guide for the petroleum, chemical and allied industries HSG250* HSE Books 2005 ISBN 978 0 7176 2943 5
- 12 *Electricity at work: Safe working practices HSG85 (Second edition)* HSE Books 2003 ISBN 978 0 7176 2164 4
- 13 *Respiratory protective equipment at work: A practical guide HSG53 (Third edition)* HSE Books 2005 ISBN 978 0 7176 2904 6

The British Drilling Association *Code of safe drilling practice, Part 1: Surface drilling* contains useful guidance on drilling operations.

## Further information

HSE priced and free publications can be viewed online or ordered from [www.hse.gov.uk](http://www.hse.gov.uk) or contact HSE Books, PO Box 1999, Sudbury, Suffolk CO10 2WA Tel: 01787 881165 Fax: 01787 313995. HSE priced publications are also available from bookshops.

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