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MINISTRY OF SUPPLY

SAFETY
RULES

OF THE

EXPLOSIVES RESEARCH

AND

DEVELOPMENT ESTABLISHMENT

WALTHAM ABBEY, ESSEX

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Introduction

IN an establishment mainly devoted to Explosives work, the hazards are by nature greater than elsewhere.

These rules have been drawn up for observance by all personnel employed at the Explosives Research and Development Establishment at Waltham Abbey in order to ensure orderly conduct and the prevention of accidents.

The rules of conduct are to be read in conjunction with the M.O.S. Staff Regulations, and subsequent amendments and Departmental Instructions.

Work at this station conforms to the requirements of The Explosives Act, 1875 and 1923, The Factories Act, 1937, and all statutory rules and orders issued in connection with these Acts, except buildings specially designated by the Chief Superintendent as laboratories.

Administration of the Rules and Regulations

1. All persons employed in the Station will be provided with a copy of these rules. This copy is to be kept in good order, produced when required, and surrendered on termination of service.
2. Portions of the rules and amendments selected by the Safety Officer are to be read monthly to all persons by the foreman responsible for their supervision. A certificate (Appendix B), will be passed by the foreman to the Safety Officer after each reading.
3. Special Rules and Operating Instructions (see para. 57), as posted in the various Danger Buildings, Proof Stands and Burning Grounds, are to be read weekly to the operators concerned by the person nominated by the scientist in charge of the group. A record of such readings will be kept by the scientist in charge.
4. Any infringement of the rules will render the offender liable to disciplinary action, which may involve suspension or discharge.

Definitions

5. The name "Danger Building" means any magazine, building or part thereof in which finished explosives, explosives or their ingredients in any stage of explosives manufacture, or explosives packages, are handled. The name also includes trucks and other means for conveyance used in connection with such manufacture or handling.
6. "Danger Building" as applied to buildings, platforms, trucks, clothing, etc., means that they are so constructed, arranged and maintained as to ensure absence of grit, dust or other extraneous matter and are only to be used for, or in connection with, explosives.
7. The name "Laboratory" applies to all buildings so designated by the Chief Superintendent in writing. These buildings are not subject to The Factories Act, 1937, or The Explosives Act, 1875.
8. The name "Proof Stand" applies to all buildings so designated by the Chief Superintendent in writing, and are subject to The Factories Act, 1937, and/or The Explosives Act, 1875.

General Rules

9. **Entering or leaving station.**—No person is to enter or leave the establishment except by the authorised gates, unless so authorised. No person under the rank of A.E.O. is to leave at any but his authorised time without a pass signed by the appropriate higher authority.

10. **Prohibited articles.**—All persons are forbidden to bring into the station, except by special permission of the Chief Superintendent, or his deputy, any of the following articles :—

Chemicals.
Dangerous articles such as firearms, explosives.
Cameras.

All persons are forbidden to bring into contraband areas without permission, any of the following articles :—

Tobacco pipes and smoking implements of all kinds.
Matches and any means of striking or procuring a light or fire.
Medicines or drugs.

All persons must ensure that they are free of any such articles before entering the area, and if not must deposit them in the contraband boxes provided at the entrances to the area.

11. No person in Danger Building Clothing is to be in possession of any personal articles except money (in the bag provided), a handkerchief, and plain rings without stones which are too tight to be removed.

It must be clearly understood that other personal articles are to be deposited in the shifting rooms at the owner's risk.

Any person finding himself when inside the station to be in possession of forbidden articles is at once to deliver them to the nearest official who will advise the police to collect.

12. **Searching.**—On entering or leaving the station all persons are to submit themselves or any bag, basket or parcel to be searched if so required by the police.

All persons, including service workmen employed in danger buildings, are to be searched before commencing work by the senior worker present.

13. **Smoking.**—No smoking is allowed in the Station except in places specially authorised by the Chief Superintendent.

14. **Food.**—All persons bringing in food must deposit it at the canteen before proceeding to work. Food is not to be taken into any other building except where authorised.

15. Fires.—

(a) *General.* No fires or naked lights are to be used in the station except in places or by persons duly authorised. Internal combustion or C.I., engines, electric drills, or steam engines, portable electric lamps, flint or electric lighters are for the purpose of the rules, fires.

(b) *Permanent fires.* Standing authority will be granted in respect of approved permanent fires or lights on application to the Safety Officer.

(c) *Temporary fires.* Application for temporary fires or lights must be made through the scientist in charge of the group in duplicate on the approved form (Appendix F) to the Safety Officer, who will specify any precaution necessary. One copy will be passed to the Fire Brigade Officer and the other retained by the worker responsible for the fire and afterwards returned, duly signed, to the Safety Officer.

Plant requiring burning or flaming is, in addition, subject to special precautions and dealt with in the Safety Regulations (page 14).

16. **Obedience to orders.**—All workers are to obey the orders of the foremen, senior workers, etc.

Should any grievance be felt against any order, representation may subsequently be made to higher authority.

No person is to pass any board, flag or notice forbidding entry without permission of the person in charge.

17. **Conduct.**—All persons are to check in themselves or others, any tendency towards skylarking or carelessness. There is to be no loitering or irresponsible conduct.

Undue noise is to be avoided.

18. **Keys.**—Keys of all buildings except laboratories will be under the custody of the foreman or officer in charge.

Keys, which will be three in number, for laboratories will be held by the scientist in charge or his deputy, and duplicates by the police for issue to authorised persons.

Keys are to be issued by the police only to persons authorised to receive them.

19. **Exits of buildings.**—Doors of buildings in use are to be kept unlocked and unbolted, and doors and passage-ways are to be kept free from obstruction.

20. **Security of buildings.**—When not in use buildings are to be kept locked. Leading workers are to see that windows and shutters are fastened and bolted, all lights extinguished, isolator switches switched off, and all outer doors locked on leaving their buildings.

21. **Anything unusual to be reported.**—All persons are immediately to report to higher authority anything unusual or apparently dangerous which they may observe.

22. **Workmen to keep to their own work.**—No person is to interfere with anything in the Station, such as lines and points, buildings and their fittings, plant, machinery, tools, etc., except in the fulfilment of his duty.

23. **Electrical and gas fittings.**—No unauthorised person is to interfere with the electrical or gas installations or fittings.

Permanent electrical equipment is to be inspected by the Electrical Section at intervals as laid down by the Chief Engineer.

24. **Factory cleanliness.**—Plant, buildings and the Station generally are to be maintained in a clean condition and free from accumulations of rubbish and waste. Service departments are responsible for removing their waste upon completion of their work.

25. **Sponge cloths and cotton waste.**—Sponge cloths and cotton waste which have been used with oils and turpentine are not to be taken into any building in the Station except for immediate use. After such use they are to be removed immediately to the metal containers provided solely for that purpose outside the building.

26. **Economy in the use of material.**—Strict economy is to be observed in the use of materials and service supplies. Arrangements made for salvaging are to be observed.

27. **Fire fighting equipment.**—The leading worker in each building is to arrange :—

- (a) To keep hoses, fire extinguishers, buckets, etc., ready for use and in the position assigned to them.
- (b) To keep drowning tanks filled as directed.
- (c) To ensure that fire-fighting equipment is not used for any but fire-fighting purposes.

It is the responsibility of the scientist in charge to ensure that the necessary equipment is available, or to obtain it from the fire brigade.

28. **First Aid equipment.**—Foremen will be responsible for ensuring that First Aid boxes in their area are kept in good order and supplies replenished.

First Aid boxes in laboratories will be in charge of the appointed First Aid assistant for the laboratory.

29. **Driving belts and machinery in motion.**—Driving belts are not to be put on or taken off pulleys, nor is overhead shafting to be lubricated or adjusted, by any but authorised persons.

All belts on machines when in motion are to be covered by a guard.

Machines are not to be cleaned when in motion.

Belts are not to be left resting on revolving shafting.

Ladders are not to be placed or left in positions giving access to unguarded shafting in, or liable to be set in, motion.

Fencing and machinery guards provided for safety purposes must be fixed except when a machine is being repaired or adjusted and is not in motion.

30. **Ladders and ropes.**—Ladders, when in use, are to be held by another person or secured at the top. Boys are not to hold ladders.

Ladders and ropes are not to be used in pools or sumps unless the nature and location of the work demands it; they are to be kept away from acids and other liquids likely to attack and rot the material.

Improvised or defective ladders are not to be used.

Ladders employed for access to tanks are to project approximately 3 feet above man-holes or the sides of the tanks.

31. **Scaffolding.**—Where it is necessary to erect scaffolding for repairs or maintenance work, it is to be constructed with due regard for normally accepted safety precautions.

No person is to use scaffolding at heights above 10 ft. from the ground or floor unless adequate hand-rails and toe-boards are provided.

32. **Vessels containing dangerous substances.**—No plank, gangway or covering other than that designed and fitted for the purpose, is to be placed across any uncovered vessel containing acid, hot water or any other dangerous substance.

No person is to walk on the covers of any covered vessel containing acid, hot water or any other dangerous substance. Only the gangways and planks designed for the purpose are to be used for crossing such vessels.

33. **Disconnecting pipe lines.**—No pipe line or valve liable to contain a dangerous substance is to be disconnected or repaired *in situ* until a clearance certificate has been obtained.

34. **Spillage of acids or dangerous liquids.**—In the event of the accidental spillage or leakage of acid or dangerous liquid, immediate notification is to be made to the foreman or higher authority who will take the necessary steps to minimise danger.

35. Cleaning, repair or decontamination work.—Where cleaning or repair work involves unsafe conditions a cautionary notice is to be displayed.

Any person removing floor boards, gratings, hand-rails or other protective appliances for any purpose, is to replace them immediately the work is completed, or temporarily suspended; otherwise an equally safe alternative is to be provided.

36. Toxic Gases.—No person is to enter any tank or place where there is reason to suspect danger from toxic gases until a clearance certificate has been issued.

Any person who feels the effect of dangerous fumes is immediately to report to the leading worker present, who will arrange for his removal to the surgery in the manner prescribed in Rule 134.

37. Use of goggles or eyeshields.—Persons employed on grinding, welding or on operations giving rise to flying fragments or abrasive dust or on processes involving risk of personal injury from splashes of dangerous liquids are to wear the goggles or eyeshields provided.

Persons employed in handling acids or corrosive chemicals must handle these substances with care, and avoid spillages and splashes. They must wear the protective clothing and equipment provided.

Danger Building Rules

38. Opening danger buildings for work.—Before commencing work in any danger building all doors are to be unlocked and unbolted. Keys and locking bars are to be removed and hung up on the hooks provided, and bolts withdrawn and placed in the loops or secured by means of the pins provided. Leading workers are responsible that this is done.

Doors, when unlocked, are to remain closed or are to be fastened back. Danger buildings are not to be left unattended unless locked.

39. Footwear.—All workmen entering danger buildings are to put on the special footwear authorised before crossing the entrance barrier, leaving their own footwear outside the barrier. A reverse procedure is to be observed when leaving the building.

Danger building footwear is not to be deposited in any place where it can come in contact with dirt, grit or acid. It is to be examined by the leading worker before being put on at the commencement of the shift.

The special footwear provided (overboots, goloshes, etc.) for the use of officials is not to be worn by any person below the rank of assistant foreman. Before using the footwear all persons are to remove where possible any dirt from the trouser turn-up.

40. Sticks and umbrellas.—Sticks and umbrellas are not to be taken into danger buildings.

41. Danger building limits.—The leading worker of each danger building is responsible that the number of persons and the quantities of explosives do not exceed the limits posted up in the danger buildings.

No unauthorised person is to approach or carry out work of any nature in the danger building area.

42. Care in work.—All work in danger buildings is to be carried out in accordance with the Special Rules and Operating Instructions applicable to the process.

Persons employed in danger buildings are to carry on their work as carefully as possible. Should any operation appear to require the employment of unusual force it is to be suspended at once and the matter referred to higher authority.

Tools and implements are to be used with the greatest care and movements involving blows or friction are to be avoided. Articles are not to be thrown down or allowed to fall or drop on to the floor.

No person is to carry out experiments in danger buildings or with explosives without the authority of the Chief Superintendent.

Pieces of chalk, pencils and similar articles are not to be placed behind the ear. Such articles must be kept in the places provided when not in use.

43. Handling of explosives and explosives receptacles.—Explosives and their receptacles are not to be exposed to direct sunlight.

Receptacles and packages of all kinds for explosives, whether full or empty, are not to be roughly handled or dropped. They are to be lifted clear from place to place, and are not to be dragged along, pushed, put down carelessly or slid except on conveyors.

Receptacles are to be examined for cleanliness and freedom from foreign substances before explosives are put into them. Should any foreign substance be found in any receptacle containing explosives both are to be put on one side and the matter referred immediately to the leading worker or higher authority.

Bags are to be turned inside out for examination.

All explosives are to be kept covered except when work is being carried out on them or where the nature of the process precludes this.

Bags containing explosives are to be securely tied and boxes securely fastened before conveyance by truck.

44. **Cleanliness.**—The danger building platforms, floors and interiors of danger buildings, trucks, plant and machines are to be kept free from dirt, grit, and unnecessary accumulations of materials. In buildings where floors are kept dry, any water accidentally spilled on to the floor is to be mopped up immediately.

45. **Upsetting or spilling of explosives.**—In the event of the accidental upsetting or spilling of explosives on tram lines, platforms or other places outside danger buildings, the leading worker or higher authority is to be informed at once. No attempt is to be made to move the truck or to clear up the explosives until the assistant foreman or higher authority arrives to superintend. Approaching traffic is to be stopped until the site has been cleared.

46. **Steam pipes.**—Explosives are not to be placed within 2 feet, and wood or other inflammable substances within 6 inches, of steam pipes, boilers or ovens except when authorised by the scientist in charge.

All steam pipes shall be lagged where they are in such a position to provide easy contact for personnel.

47. **Aluminium paint.**—Aluminium paint is not to be used in danger buildings.

48. **Internal combustion, C.I. or steam engines.**—Apparatus operated by internal combustion or C.I. engines is not to be used within 30 yards of any building containing explosives, except by written permission of the Chief Superintendent.

On the approach of trucks containing explosives the engine is to be stopped.

Steam engines are not to approach within 75 yards of any building containing explosives, except by written permission of the Chief Superintendent.

49. **Grass cutting.**—Grass in the vicinity of danger buildings is to be cut at frequent intervals, and after cutting is to be removed as soon as possible. If, for any reason, cutting should not be possible, or if after cutting it should not be possible to remove the grass, during dry weather it is to be kept wet in the vicinity of the danger building.

50. **Thunderstorms.**—On the approach of a thunderstorm, the foreman will close down any danger building in accordance

with the Special Rules for that building. The buildings vacated are to be secured until the storm has passed over. Danger building telephones are not to be used during a thunderstorm.

Traffic Rules

51. **Explosives trucks.**—Explosives trucks are only to be used for conveyance of explosives. They must be kept clean and examined before use.

Doors or loose flaps of explosives trucks are to be closed and fastened except when loading or unloading.

Trucks containing explosives are not to be left unattended except at the places approved for this purpose.

Bags containing explosives must be tied before putting them into trucks and must be so placed that the mouths are not facing outwards.

52. **Packages in open trucks.**—Cases, barrels, drums, cylinders, boxes or bags are not to project beyond or above the sides or ends of the trucks. Loads are to be adequately secured.

53. **Movement of tractors and trucks.**—Persons moving trucks by hand are to maintain a walking pace and are not to relinquish their hold of trucks in motion.

No person is to sit or ride on trucks or tractors except by permission of the assistant foreman or higher authority.

Rail trucks are not to be pulled or drawn by hand from the front except where it is necessary to pull them clear of the porches of buildings, etc.

All trucks are to give way to trucks loaded with explosives.

Empty trucks are to give way to loaded ones. Narrow gauge trucks are not to be lifted off the lines to allow others to pass.

Before taking trucks inside a traverse or porch of a danger building the trucker is to ascertain whether he may enter.

Rail tractors and trucks are to be kept to the left-hand tracks, and road trucks to the left-hand side of the road.

54. **Points.**—Persons in charge of trucks and tractors are to see that the trucks and/or tractors are clear of the points before the points are moved, and that they are not left standing over any points, or in any other position where they are liable to be fouled by other traffic.

Branch line points are to be altered after use to provide a clear course for traffic on the main lines.

55. **Stationary trucks.**—Trucks are not to be left standing on main lines.

Trucks are not to be left standing unless the brake is fully applied, or other steps taken to prevent movement,

Safety Regulations

AUTHORISATION OF BUILDINGS AND PLANT FOR EXPLOSIVES USE

56. (a) In the event of a building being required for use, notification for the purpose of inspection is to be made to the Safety Officer. The intended use of the building, the name of the explosive and the amount, are to be supplied.
- (b) The Safety Officer will then inspect the building, and advise on its use for the purpose stated, or submit recommendations for its improvement.
- (c) The appropriate Superintendent will give final approval for the building to be used as required.
- (d) A building must not be taken into use for a purpose different from its previous use without approval of the appropriate Superintendent being first obtained.
- (e) All plant and equipment intended for use in connection with explosives must be examined by the Safety Officer before being taken into use.
- (f) A clearance certificate must be obtained by the scientist in charge from the Safety Officer, in respect of each building which he vacates.

SPECIAL RULES, OPERATING INSTRUCTIONS, USE LISTS, EXPLOSIVES AND MAN LIMITS

57. In every danger building or proof stand there must be exhibited on a board :—
- (a) The limit by dry weight of explosive or ingredients allowed.
- (b) The Man Limit (this does not include scientific staff or visitors, but in the event of the leading worker considering that the work is in danger of being obstructed he may request some of the visitors to wait until the building is clear).
- (c) Special Rules for the safe conduct of the operation. These rules may be temporary in the event of the process being carried out under the control of a scientific officer. Permanent rules are to be prepared as soon as the process passes out of such control and are then to be submitted by the Head of Section for authorisation by the Superintendent concerned, through the Safety Officer.
- (d) Operating Instructions giving details of the method of carrying out the process.

- (e) Use List giving the items of movable equipment permitted in the building in connection with the process.

58. If the process is in a trial stage, the Operating Instructions and Use List may be entered in a Log Book, but as soon as possible the Instructions and the Use List are to be exhibited on the board.

59. A Log Book (as mentioned in Rule 58) is to be maintained in every danger building and proof stand. Recordings, instructions, and temporary tools as required by the scientist in charge are to be noted therein.

60. (a) Alterations or additions to Special Rules and Limits as required are to be submitted on the appropriate form (Appendix G), stating if temporary or permanent, to the Superintendent concerned through the Safety Officer.
- (b) Such alterations or additions will be passed by the Safety Officer to the Superintendent, either on a temporary card which after authorisation will be exhibited in the house concerned, or if permanent will be authorised on a typed slip and then posted to delete the obsolete limit or rule and added to the existing rules.

61. Copies of the Special Rules, etc., will be kept by the Safety Officer and Head of Section, who will be responsible for seeing that all amendments are duly posted in their copies.

62. Special Rules, etc., are to be kept in a legible condition.

CLEARANCE PROCEDURE IN DANGER BUILDINGS AND PROOF STANDS

63. (a) Before any repairs (other than repairs provided for under emergency or minor repairs) are carried out in any part of a building, that part and the plant in it must be cleaned of all explosives as far as possible, and so certified on the appropriate certificate (Appendix A) which is to be kept in the building during repair.
- (b) The Safety Visitor will certify that, in addition to the plant being clear of explosives, it is also isolated from all sources of gas, acid, or inflammable materials, and that all sources of motive power are cut off either by removal of fuses, locking of switchgear or removal of belts, and that where applicable a notice "Do not start" is exhibited on the starting gear.

64. (a) In the case where certain plant requires partial dismantling before thorough cleaning can be carried out, such operations are listed in the Special Rules of the house. The plant must be washed through before dismantling takes place, and the exterior must also be clear of all explosives. No metal tool is to be applied to any piece of plant contaminated with explosives. All bolts should be sprayed with a penetrating oil before removal.
- (b) While such dismantling is in operation, a process worker must stand by to remove any explosive which may be exposed, and all other work must stop until the explosive is removed. A tradesman is not permitted to remove explosive.
65. If a Safety Visitor is not fully satisfied regarding a particular part of the plant, such as a valve or pipe, etc., being clean, this fact is to be noted on the reverse of the clearance certificate, and care exercised during the dismantling.
66. (a) All fitters are to be provided with a box for storing small parts of plant removed. These must not be allowed to lie about.
- (b) Wherever possible safety tools are to be used.
67. Precautions must be taken to avoid damaging the floor. Waste gulleys are to be blocked to prevent the passing of grit, etc., into savealls.
68. Any plant found to be in any way contaminated is to be removed from the building and cleaned away from the scene of the repair in an approved place. Tools used for repair work must be passed as clean before removal from the building by the leading process worker.
69. The Safety Visitor is responsible for ensuring that the plant and building are thoroughly cleaned, and free from foreign material, and will complete the certificate to this effect. The scientist in charge will then satisfy himself that everything is in order before issuing instructions that the process work is to proceed.
70. (a) Any plant, pipes, motors, etc., which are to be removed for repair or salvage must first be certified as free from explosive or inflammable material by the scientist in charge, and a certificate (Appendix C) attached to the plant before removal. It is forbidden to work on any such plant unless the certificate is attached.

- (b) If the scientist in charge is not fully satisfied regarding the clearance of such plant, he is to give detailed instructions for repairs, or if for salvage the plant must be passed to the burning ground for burning and then recertified by the scientist in charge. More than one burning may be necessary.
71. No plant is to be stored for possible future use until it is certified clean.
Such plant will be marked in distinctive paint as follows :—
One dot denotes rough cleaning.
Two dots denotes thorough washing.
Three dots denotes flame or fire treatment.
72. Second-hand pipework must not be cut by sawing, but roller cutters used, and before complete penetration is obtained the pipe is to be broken.
73. All lead after certification is not to be re-used but passed back to the chemical plumbers for melting under approved conditions.

EMERGENCY OR MINOR REPAIRS (EXPLOSIVES PLANT)

74. Where repairs or adjustments are necessary to enable normal manufacture to proceed, emergency or minor repairs may be carried out under the personal supervision of the scientist in charge or responsible person appointed by him.
75. (a) Where possible all explosives must be removed before commencing work. Plant must be thoroughly cleaned down, especially where it is necessary to use spanners or grips. All nuts should be sprayed with penetrating oil.
- (b) Surrounding plant must be screened and if work is overhead, covering sheets placed underneath.
- (c) The area should be marked off to prevent intrusion but not to hinder a quick exit.
- (d) Waste gulleys should be blocked to prevent foreign matter entering savealls.
- (e) No metal tool is to be applied to any part which is contaminated with explosives.
- (f) A process worker is to stand by ready with a water hose or steam to remove any explosive exposed. A tradesman is not allowed to remove explosive from the plant. Any dirt or grit should be cleaned up as made.
- (g) Any explosive exposed or removed must be taken away immediately and placed in a waste receptacle outside the building.

- (h) The process worker must see that all small parts as removed are free from explosives and, if so, placed in a box. Any contaminated part is to be removed and cleaned away from the area of repair or alteration. No repair work is to be carried out on any part contaminated with explosives until cleaned.
76. (a) If the work undertaken is in connection with acid or if there is reason to apprehend the presence of dangerous fumes, a gas mask or breathing apparatus must be held ready.
- (b) Further precautions may be considered necessary, and in every case the Safety Officer or Safety Visitor is to be advised and will arrange inspection to see that these precautions are being adopted and the scientist's instructions complied with.
77. Normal instructions regarding the isolation of acid, gas and power must in all cases be carried out. (Chem. Works Reg. No. 7.)
78. The plant must be thoroughly washed or cleaned down after repair.

CLEARANCE PROCEDURE FOR EXPLOSIVES PLANT FOR REMOVAL FROM EXPLOSIVES BUILDINGS

79. Plant may be removed from a building for repair, scrap or salvage subject to the following precautions:—
- (a) Plant for removal to a cleansing centre is to be cleaned to remove any explosives which may be dislodged during transit. Pipes and ducts should be blocked at the ends, and the lids secured during transit.
- (b) Where no cleansing centre is installed then the plant must be thoroughly cleaned in the building. It should not be cleaned on a wooden platform or floor unless this is protected by a covering, *e.g.*, metal sheet or tray.
- (c) If solvents are used in the cleaning, care must be taken to ensure that the building is well ventilated, and that solvent is not spilled on the floor. The use of solvents for cleaning should be avoided as far as possible owing to their toxicity and/or inflammability. During their use, explosives precautions must be observed, and thereafter no naked flame be permitted in the building until the atmosphere is free from dangerous vapour concentration.

- (d) Before the plant is removed either from the cleansing centre, or building, it must be certified free from explosives by the scientist in charge who will sign the certificate (Appendix C), and securely attach it to the plant. Each item of plant must be labelled separately. Plant must be removed promptly from a building after certification.
- (e) If the scientist in charge, or authorised deputy not below the rank of E.O., is not fully satisfied and requires the plant to be subjected to flame treatment, he is responsible for supervising such treatment or ensuring the plant is passed to the burning ground, and finally is to certify the plant clear and attach the certificate.
80. Tradesmen must not work on any plant unless it carries a clearance certificate. In the event of the certificate becoming mislaid, application must be made by the foreman tradesman to the scientist in charge for a new certificate, and work suspended until this is forthcoming.

BURNING, WELDING OR FLAMING OF PLANT AND EQUIPMENT

81. Contaminated equipment of leather, timber, canvas, etc., is not to be salvaged but destroyed by burning.
82. Only metal plant and equipment passed by the Engineering Department for salvage is to be passed through the fire.
83. Metal plant and equipment for re-use must be cleared of explosives by flaming operations at the cleansing centre, after removal of all explosives as far as possible by normal cleaning methods.
84. (a) Where it is not possible to remove plant or equipment, this must be certified to be as free as possible from explosive, and suitable precautions adopted as detailed by the Safety Officer on Form (Appendix F).
- (b) Preliminary flame testing is to be carried out in the presence of a Safety Visitor before the flame is used in the normal manner.
- (c) Where any solvent, inflammable or otherwise, has been used in or for cleaning plant or equipment to be welded, it is essential that this is noted on the application for a Fire Pass, and the scientific officer in charge must ensure that the plant is thoroughly steamed, filled with water where possible and then emptied before any flame is applied.

- (d) A process worker must be in attendance with a running hose during the operation, and wherever possible the floor and walls must be thoroughly wetted.

REPAIR OF PLANT (OTHER THAN EXPLOSIVE) WHERE DANGEROUS GAS OR FUME MAY BE PRESENT

(Chemical Works Reg. No. 7.)

85. Chemical Works Regulation No. 7 states that where any person, other than for rescue purposes, enters any tank, tower, or any other place where there is reason to apprehend the presence of dangerous gas or fume, a certificate must be completed stating either :—

- (a) That the place has been examined personally by a responsible person who certifies in writing in a book kept for the purpose that such place is isolated and sealed from all source of gas or fume and is free from danger ; or
- (b) That it is not so isolated and free from danger and no person shall enter unless he is wearing a breathing apparatus and a life belt (provided there are no cross stays or obstructions likely to cause entanglement), the free end of which shall be attached to a rope left with a man outside, whose *sole* duty is to keep watch and arrange to draw the wearer out immediately if he appears to be affected by gas or fume.

In practice the word "place" is given a wide interpretation to include such places as an acid pump house, storage tank (open type).

A responsible person is the Head of Section or authorised deputy not below the rank of Experimental Officer.

86. (a) Whenever possible an enclosed vessel or place must be isolated and sealed from every source of gas, fume, or motive power, and made free from danger before anyone is allowed to enter.
- (b) Analysis for toxic gases applicable must be made in the vessel or place not more than one hour before anyone is allowed to enter. If there is reason to suspect the presence of inflammable gas from solvents or leakage, tests must be made and appropriate action taken.
- (c) Chemical Works Regulation Certificate (Appendix E) must be completely filled in and signed by the certifying scientist when his examination has been made.
- (d) The certifying scientist must enter and examine the vessel within 10 minutes of work being commenced in the vessel.

- (e) The procedure stated in Rule 86 (a), (b), (c) and (d), must be re-confirmed and carried out at the beginning of each shift whilst work is being done and whenever work recommences after an interval sufficiently long as to make the composition of the atmosphere in the vessel uncertain.
- (f) Work must immediately cease and a re-inspection made if any complaint is made by the workman.
- (g) Any person entering the vessel must wear a safety belt to which a rope is securely, attached the free end being held by a person outside, and where possible an escape ladder is to be provided.
- (h) Where possible a continuous fresh air supply is to be blown into the vessel or place.
- (i) Breathing apparatus is to be immediately available in the close vicinity.

87. Where there is a possibility of Arseniuretted Hydrogen being evolved during the cleaning out of any plant, *e.g.*, those used for sulphuric or hydrochloric acid, non-metallic scrapers and pails must be used (Chemical Works Reg. 9).

REPAIR OR MAINTENANCE TO NON-EXPLOSIVES PLANT OR TO PLANT NOT IN ANY PLACE WHERE THERE MAY BE DANGEROUS FUME OR GAS

88. The Section in normal control will arrange for the isolation of machinery from all sources of motive power either by removal of belts, removal of fuses or by locking of switch-gear, and will exhibit notices on the starting boxes, "Do not start."

89. If the work is on acid pipe lines, valves or other plant connected to sources of acid or other dangerous substances, the valves on each side are to be closed and locked if possible, and a notice "Do not start" placed on the valves. A hose pipe is to be kept running in the near vicinity.

90. (a) The Head of Section or his authorised deputy will then pass a certificate (Appendix D) to the Service Section, and state on the form if extra precautions will be required, *e.g.*, wearing of goggles, gloves, the possibility of acid being in the pipe lines, or the desirability of removing sections of pipes and fitting blank flanges.

- (b) The certificate will be held by the leading worker of the repair crew on the job until work is completed when he will sign the form and return it to the Section in normal control. No tradesman is to carry out repairs or maintenance on any plant or machinery unless a certificate is passed to the leading worker in charge of the job.
- (c) These certificates must be completed for each different job being done and whenever plant (except where the D.B. clearance certificate (Appendix A) operates) is handed from one group to another, *e.g.*, Engineering Dept. to Building Works Dept., or Plumbers to Electricians, etc.
- (d) The certificates must be re-confirmed by the submitting Section each day if work is in operation for more than one day.
- (e) These certificates will be retained in the Section Office for a period of 12 months before destroying.

SALVAGE

- 91. Plant or metal passed to the Engineering Department and agreed by them for salvage purpose must be certified as free from explosives, acid or dangerous liquid (Certificate, Appendix C). The Engineering Department will not accept plant unless it carries a certificate to this effect.
- 92. Lead work, after certification, will be passed to the chemical plumbers for melting under approved conditions.
- 93. Before any salvage plant or metal is allowed to leave the factory, a clearance certificate is to be obtained from the Safety Officer or Safety Visitor, and passed to the Stores before the Property Pass is completed.
- 94. Salvage dumps are the responsibility of the Engineering Department.

STORAGE OF EXPLOSIVES, AMMUNITION AND CHEMICAL WARFARE STORES

- 95. For the purpose of storage, explosives, ammunition and chemical warfare stores are grouped into 15 groups, and these groups should as far as possible be stored separately.

Where accommodation will not permit all groups to be stored separately, the following groups may be stored together as shown :—

- (a) Groups I, II and IV, under magazine conditions only.
- (b) Groups V, VI, VIII, X.
- (c) Group VII and safety cartridges from Group VI.
- (d) Groups IX and XI.
- (e) Groups III, XII, XIII and XV must always be stored in separate buildings.

Group 1. Explosives needing care in handling because they are liable to function by spark or friction, but which are not subject to deterioration with age. Liable, in a fire, to burn rapidly to violent explosion or detonation. All explosives requiring “lead-free” conditions are included in this Group.

Group 2. Explosives with risks similar to those of Group 1 but subject to deterioration with age. These explosives have usually an allotted “life” at the end of which they must be destroyed.

Group 3. Explosives of limited “life” but not liable to explode violently or detonate on catching fire. Cordite is the typical explosive of this group.

Group 4. As Group 1, but less sensitive.

Group 5. Unboxed shell.

Group 6. Boxed Service ammunition, containing high explosives, gunpowder and propellants only, except the types allotted to the following Groups.

Group 7. Mines, bombs, and underwater ammunition, filled H.E., plugged. With fuses, etc., in separate packages.

Group 7A. As for Group 7, but with fuses, etc., fitted.

Group 8. Mortar ammunition, grenades, and rockets containing H.E. and propellant only. Fuses, etc., in separate packages.

Group 9. Pyrotechnics.

Group 10. Detonators, initiating compositions.

Group 11. Incendiary and smoke compositions and ammunition. (Not containing white phosphorus, phosphides, inflammable liquids or gels.)

Group 12. Smoke and incendiaries containing white phosphorus or phosphides.

Group 13. Chemical Warfare ammunition.

Group 14. This is a Naval Storage Group.

Group 15. Incendiaries containing inflammable liquids or gels but not containing white phosphorus or phosphides,

96. Magazines will be under the supervision of the Safety Officer and reference should be made to him regarding storage.

97. Separate stores will be maintained for chemical laboratories where small quantities of explosives are required, and these stores will be under the supervision of the scientist in charge of the laboratory (see Appendix J).

TRANSPORT OF EXPLOSIVES

98. **Internal Transport.**—The internal transport of explosives is subject to the Traffic Rules and the Special Rules applying to trucks. These Special Rules will be detailed for each explosive and until so detailed no transport will be allowed. Special Rules will be drawn up by the Safety Officer and authorised by the Chief Superintendent.

99. External Transport (Road).—

- (a) Only the type of vehicle approved by the Safety Officer is to be used, and only explosives approved by him are to be carried.
- (b) The interior part of the vehicle for carrying the load is to be cleaned free from grit, oily rags, waste or other combustible material.
- (c) No vehicle is to carry more than 10,000 lbs. net of explosive. The limit in each case will be laid down by the Safety Officer.
- (d) Each package is to be marked in the following manner:
 - (i) Class of explosive.
 - (ii) Type of explosive.
 - (iii) Station monogram or address of consignor.
 - (iv) Address of consignee.
- (e) Wherever possible the load of each vehicle shall consist of explosives of one group only, except that to secure a full load, the load may consist of explosives of any or all groups excepting Groups I, XII and XIII.
- (f) All packages are to be well secured and are to be protected from weather, pilfering or sabotage.
- (g) The engine must be stopped during loading or unloading or whilst filling with fuel.
- (h) No smoking is allowed during loading or unloading.
- (i) The loading or unloading must be carried out without interruption. In wet weather packages of explosives are to be kept dry.
- (j) The driver is to be fully informed as to his conduct during the journey and the address and telephone number of the consignee.

- (k) No frozen explosive is to be handled without special instructions from the scientist in charge.
- (l) The person responsible for loading or unloading will ensure that the above rules are carried out.

BULK STORAGE AND USE OF SOLVENTS

100. (a) All solvents in bulk are to be kept in a store specially provided for the purpose.
- (b) Inflammable solvents are to be kept apart and the area of storage so labelled.
 - (c) The opening of drums is to be carried out in the open air or with doors and windows open to prevent toxic and/or inflammable concentrations of vapour arising.
 - (d) Inflammable solvents are to be opened only with the non-ferrous key provided. In event of this failing a wooden hammer may be used to assist unscrewing. Footwear free from iron or steel must be worn.
 - (e) A detachable earthing clip should be attached at the Solvent Store to drums in use to prevent the building up of static charges during filling of smaller vessels.

101. Drums which have contained solvent must not be used for any other purpose until they have been certified as clear by the Head of Section, or authorised deputy not below the rank of E.O., or by the Safety Officer. Such drums must not be heated by application of a flame, etc., without the special authority of the Safety Officer.

102. Solvents are only allowed into danger buildings in accordance with the Special Rules. Solvents must be kept in a marked container approved by the Safety Officer.

103. The use of solvents for cleaning plant should be avoided as far as possible, and on no account is a naked light to be allowed in a building where an inflammable solvent has been used until the Head of Section or authorised deputy not below the rank of E.O., has certified that the building is clear of inflammable vapour.

104. Solvents must only be used in a well ventilated building.

105. Care must be taken to avoid the spillage of solvents, and trays should be provided for holding solvent containers.

106. Rags and waste contaminated with solvents must be removed from the building as soon as possible after use, and placed in the metal bins provided.

DISPOSAL OF WASTE EXPLOSIVES, SOLVENTS, ETC.

107. Waste explosives, solvents and empty glassware should be segregated into approved categories as directed by the Safety Officer and a separate container maintained for each category.

108. The disposal of waste explosives and solvents forms one of the Special Rules exhibited in each house.

109. The waste is to be conveyed in a closed container appropriately marked "WASTE and TYPE THEREOF" to the Central Waste collecting station for the area and then deposited in the container similarly marked.

110. The burning ground attendant will visit each central collecting station daily and collect waste, conveying this by truck, clearly marked "WASTE ONLY." This truck must only be used for the collection of waste.

111. The attendant is responsible for keeping the waste station clean, and for seeing that a supply of waste containers is always available.

112. The attendant will remove the waste to the burning ground, ensuring that rags, broken boxes, glassware, etc., are kept separate from explosives, and carry out the burning in accordance with the Special Instructions exhibited at the Burning Ground.

REGISTERS TO BE KEPT IN ACCORDANCE WITH THE REQUIREMENTS OF THE FACTORIES ACT (1937)

113. Chains, rope, lifting tackle (Sec. 23).—

- (a) Shall be examined by a competent person at least once in every 6 months and a register containing the prescribed particulars kept.
- (b) No new chains, rope or lifting tackle shall be taken into use unless previously tested by a competent person and a record of such test made in the register.
- (c) Chains and lifting tackle, except rope slings, shall be annealed at least once in every 14 months; chains or slings of $\frac{1}{2}$ in. bar or less, once in every 6 months. If not in regular use annealing is required only when necessary (a record is to be kept).

114. Cranes and other lifting machinery (Sec. 24).—

- (a) Shall be examined by a competent person once in every 14 months and a register kept.
- (b) As with 113 (b) above.
- (c) Safe working loads must be plainly marked on the machine.

115. Hoists and lifts (Sec. 22).—

- (a) Shall be examined by a competent person at least once in every 6 months and particulars kept in a register.

116. Steam boilers (Sec. 29).—

- (a) Shall be examined by a competent person at least once in every 14 months and after any extensive repairs.
- (b) Examination is to be carried out in accordance with the requirements of the Act and a report kept in the prescribed register.
- (c) New boilers require a certificate from the manufacturers.

117. Air and steam receivers and steam containers (Sec. 30 and 31).—The above are to be examined by a competent person at least once in every 26 months and a report made on Forms 59 or 58 and kept in the register.

118. (a) Testing under Sec. 23 (Chains, ropes, etc.) and Sec. 24 (Cranes) will be carried out by the Engineering Department in accordance with specifications supplied by the Safety Officer.

(b) Hoists and lifts will be examined by the Engineering Department.

119. The examination in respect of steam boilers, receivers, containers, and air receivers will be carried out under contract by the Insurance Inspector.

120. The Engineering Department are responsible for the maintenance of the above records.

ISSUE OF LIFTING TACKLE AND LADDERS

121. The issue of lifting tackle and ladders will be made by the Foreman in charge of the Tackle Stores, who is responsible for their recall for testing and maintenance.

122. Issues to Sections will only be made on written requests specifying requirements.

123. The tackle is not to be used to lift weights greater than the safe working load shown on the tackle.

124. The Head of the Section will be responsible for seeing that :—

- (a) The tackle is kept in good order.
- (b) Ropes are not used in the presence of acid or acid fumes.
- (c) Ladders do not remain about the plant longer than is necessary, but are returned to the Section Store after use.
- (d) Any defect is at once reported to the Foreman of the Tackle Stores.
- (e) Tackle is at once returned on the request of the Foreman of the Tackle Stores.
- (f) Fixed tackle is not removed without the permission of the Foreman of the Tackle Stores.

**FENCING AND GUARDING OF MACHINERY, PITS
AND VESSELS**
(Factories Act, 1937)

125. Machinery, whether prime movers, transmission gear or otherwise, shall be fenced and/or guarded so as to render the machine safe to work. All pits and vessels containing dangerous liquid (hot water is considered dangerous) must be either closed in, or adequately fenced to a height of 3 feet above the ground or the platform surrounding.

126. Foremen are to ensure that all guards and fences are securely in place on all machinery before use.

127. The Safety Officer is to be consulted regarding the adequate guarding and/or fencing of machinery. He is to inspect all running machinery every month.

PORTABLE ELECTRICAL ENGINEERING EQUIPMENT

128. The following procedure will be adopted as regards all portable electrical engineering equipment such as drills, hammers, grinding wheels, lamps, grinding attachments, etc., having flexible leads :—

- (a) No new portable electrical equipment shall be put into service until it has been inspected by the Engineering Department Electrical Section, who will attach a certificate authorising its use for the next 3 months.
- (b) The user will hold the certificate and will be responsible for the return of the equipment to the Engineering Department Electrical Section every 3 months for further inspection and renewal of the certificate.

- (c) Any cable leads used with the equipment will be returned and inspected at the same time.
- (d) Should any defect develop between times of inspection, the user will immediately return the equipment to the Electrical Section for attention.

TOOLS

129. (a) Worn tools, mushroomed-headed chisels, split handles, etc., are not to be used. The fact that the tools may be the personal property of the tradesman does not permit their use if they are in a dangerous state.
- (b) The foreman in charge of each department, *e.g.*, Machine Shop, Electricians, Plumbers (Chemical), Woodworkers, etc., is responsible for carrying out a monthly inspection and rejecting such tools as he considers dangerous.
 - (c) A certificate is to be rendered on the last working day of each month to the senior engineer (maintenance) that the inspection has been carried out.

**CYLINDERS AND DRUMS OF LIQUEFIED OR
COMPRESSED GASES**

130. (a) Cylinders or containers must be handled carefully and must not be dropped or bumped.
- (b) Valves and cylinders must be kept clean, and valve sockets must be "snifted" before attaching any fitting to ensure that they are free from loose dirt.
 - (c) Cylinders must be strapped to a bench or carrier and stand in a platform or well base when in use.
 - (d) Cylinders or containers must not be stored near heat or combustible materials, or in places where corrosion or contact with oil and grease is likely.
 - (e) Gauges showing pressures other than those recommended by the gas suppliers must not be used.
 - (f) Valves or gauges should be tested for leakage. Tests should be carried out if required by applying soap solution to the valve socket and gland nut; naked lights or flame must not be used.

SAFETY APPLIANCES

Chemical Works Regulations (No. 6) requires that a sufficient supply of :—

- (a) Breathing apparatus
- (b) Oxygen and suitable means for its administration
- (c) Life belts

shall be provided where dangerous gases or fume is liable to escape.

Gas and dust masks.—

131. (a) Gas masks must be worn before entering a building where there may be a *light* concentration of gas or fume.
- (b) Gas masks and canisters are to be provided wherever there is a liability of dangerous gas or fume arising. These masks will be inspected weekly by the Safety staff and replaced if necessary.
- (c) After the gas masks are used the Foreman is responsible for obtaining replacements from the Safety Officer ; these must be installed before the process is recommenced.
- (d) In any process where a dust or other impurity likely to be injurious is given off, suitable masks are to be worn (Factories Act, Section 47).

Breathing apparatus.—

132. If the concentration of gas or fume is heavy, breathing apparatus must be used.

133. (a) Compressed air breathing apparatus is placed at convenient points throughout the establishment, for use in emergency.
- (b) This apparatus will be inspected monthly by the Safety Officer, and a record kept of such inspections.
- (c) Scientists in charge must ensure that a suitable number of their staff are trained and practised in the use of this apparatus. The Safety Officer is responsible for training, and will maintain a record of staff so trained.

134. Gas casualties are not to be allowed to walk but must be taken by stretcher or ambulance to the hospital for treatment.

Baths, goggles, gloves, etc.—

135. Where grit or foreign substances may be ejected by force—*e.g.*, grinding operations, chipping of bricks, etc., protective goggles must be worn.

136. (a) Where strong acids or dangerous corrosive liquids are used and injury through splashing or otherwise is possible, safety baths, eye wash bottles, goggles and rubber gloves are to be provided.

(b) The Foreman is responsible for seeing that :—

- (i) The gloves are collected, cleaned and examined each day, and repaired or renewed as necessary.
- (ii) Eye wash bottles are provided and kept filled with distilled water in a clearly marked cabinet.
- (iii) Safety baths are kept filled with clean water.

(c) Acid proof clothing is to be kept in the Foreman's office for use where there is an escape of dangerous liquid, *e.g.*, acid, ammonia.
Breathing apparatus is to be worn underneath this clothing.

137. First Aid boxes distinctly marked are to be provided in the Foremen's offices and laboratories. The person in charge of these boxes is responsible for ensuring that they are checked over weekly and replacements obtained from the Surgery.

138. Life belts will be issued from the Safety Office as required.

SAFETY PRECAUTIONS FOR LABORATORIES

139. Separate laboratories or parts thereof are to be allocated for work on different types of explosives.

140. As small an amount of explosive as possible should be brought into the laboratory at one time. Explosives must not be left uncovered.

141. Solvents and explosives are to be removed as far as possible at the end of the day to their appropriate store, where they are to be kept under clean conditions. Solvents are not to be kept in the same store as explosives, but a separate store maintained.

142. Filters and/or catchpots are to be fitted in sinks to prevent the passing of explosives into drains. The filters will be cleaned out regularly and the waste disposed of according to the laboratory instructions.

143. Acid should be returned to the plant as far as possible, but if poured into the sinks must first be thoroughly diluted.

144. Separate receptacles containing just enough water for complete covering of the contents must be kept for H.E. and propellant waste, and these are to be kept covered, away from possible contact with acids or alkalies, and removed to the central waste collecting centre daily. No initiating explosives are to be placed in the waste receptacles but are to be dealt with in accordance with the special regulations laid down by the scientist in charge.

145. Solvents are to be clearly labelled and are to stand in metal trays to prevent dripping on to the floors.

146. Waste solvents are to be returned to containers clearly labelled "Waste . . ." and these containers are to be emptied at regular intervals into waste solvent containers at the central waste collecting centre for burning, unless recovery has been authorised by the scientist in charge. Waste solvents are not to be kept in bottles fitted with ground glass stoppers or cocks.

147. Bottles containing acid are only to be conveyed in the special carriers provided. They should be placed in drip trays, and not allowed to stand on wooden benches.

148. Solvent drums are only to be opened under non-sparking conditions with the non-ferrous tools provided.

149. Special Rules regarding limits, conduct of operations, face protection, wearing of goggles or gas masks and toxicity, will be issued in writing by the scientist in charge in respect of each programme. Unauthorised experimental work is forbidden.

150. All fire appliances are to be kept in good order and ready for use. It is the responsibility of the scientist in charge to ensure that the necessary equipment is obtained from the fire brigade.

151. All gas burners are to be extinguished when not required and the main supplies to the building turned off at cessation of work each day, except when required for special work when the Temperature Recorders are to be advised.

PROCEDURE IN CASE OF FIRE DURING WORKING HOURS

152. The person first discovering a fire will summon anyone working in the vicinity to his aid and endeavour to put it out. If unable to extinguish the fire IMMEDIATELY he will operate the nearest fire alarm or telephone the switchboard operator.

153. The senior person present at the scene of the fire will take charge until the arrival of the Fire Brigade and will see that immediate steps are taken to extinguish the fire with the emergency apparatus available.

154. If the fire involves organic solvents, oils or other liquid combustible material immiscible with water, WATER must NOT be used. Sand, earth, foam extinguishers, blankets or rugs only will be used in such cases.

155. Water must not be directed on to electric wires or apparatus.

156. If more than small quantities of explosives are present in the immediate vicinity of the fire and are likely to be involved, all persons in the neighbourhood are to be warned to take cover. Measures taken to extinguish the fire will be conducted from behind cover. No one is to enter the building or traverse without permission from the senior official present.

157. To avoid the spreading of the fire the following steps will be taken :—

- (i) Gas or electricity will be at once cut off from the building in which the fire has occurred.
- (ii) All doors and windows in the vicinity will be closed.
- (iii) All inflammable material will, as far as possible, be removed from the immediate neighbourhood.

158. When the local fire alarm is sounded all auxiliary firemen will at once report to their area assembly point and await instructions.

ACTION IN CASE OF SERIOUS ACCIDENTS OR FIRE

Action by the senior person present.—

159. (a) DIAL 222
requesting ambulance and/or Fire Brigade, and arrange
if necessary for First Aid to be rendered.
- (b) Dispatch workmen to fetch stretcher, and, if required,
rail ambulance carriage.
- (c) Arrange for the senior worker present to prepare best
position for ambulance or stretchers.
- (d) Arrange for nothing to be disturbed apart from the
necessary rescue work.
- (e) Arrange for the Foreman to take a roll call.
- (f) Telephone the Superintendent of the branch.

160. Action by the switchboard operator.—

- (a) Pass the call through to the Fire Brigade.
- (b) Give priority to incoming calls from the Fire Brigade.
- (c) Advise the Safety Officer or Deputy.

APPENDIX A

DANGER BUILDING CLEARANCE CERTIFICATE

Building.....Section
Nature of work :
B.W.D.
Electrical
Machinery
Plumbers

Safety Visitor.

All explosives have been removed and plant isolated.
.....19.....
Foreman.

Scientist in charge.

Safe for work to proceed except as noted overleaf.
.....19.....
Safety Visitor.

Foreman (Trades Section).

You are authorised to commence work at once, subject to
the precautions noted overleaf.
.....19.....
Scientist in charge.

Scientist in charge.

Work completed.
.....19.....
Foreman (Trades Section).

Scientist in charge.

Plant, machinery and building thoroughly cleaned and
ready for operation.
.....19.....
Safety Visitor.
Building and plant ready for operation.
.....19.....
Scientist in charge.

APPENDIX B

RULE READING CERTIFICATE

Safety Officer.

I certify that the rules and amendments as advised have been read to all workers present under my control.

.....19.....

Foreman,

APPENDIX C

.....Section.

Certified that the plant attached (description).....

is free from explosive and/or acid and/or dangerous liquid and is ready for repair/disposal.

Date.....

APPENDIX D

CLEARANCE CERTIFICATE FOR REPAIR OF PLANT.

Chemical Works Regulation No. 7.

(i) DOES APPLY to this job and the person handing over has seen the signature of the Responsible Person in the Special Book. Regulation 7, Certificate No.....

(ii) DOES NOT APPLY. (One of the above statements must be struck out).

Serial number.....

Certified that :-

(a) The Machine or vessel is isolated from every dangerous source of gas and liquid and motive power.

(b) The machine or vessel is not isolated from every dangerous source of gas and liquid and motive power. Any special precautions to be taken are detailed below.

(One of the above statements must be struck out).

Signature..... Date..... Time..... (Person handing over).

SECTION OF PLANT			
HANDED OVER.		HANDED BACK.	
Job to be done and special precautions to be taken	Signature of Parties concerned	Particulars of Job done	Signature of Parties concerned
	Date		Date.....
	Time		Time
	<i>Renewed.</i>		
	Date		
	Time		
	<i>Renewed.</i>		
	Date		
	Time		
	<i>Renewed.</i>		
	Date		
	Time		

If Chemical Works Regulation No. 7 applies, the person taking back the plant after completion of the job MUST NOTIFY the Responsible Person (see (i) above) that the job is complete and this clearance certificate is signed off.

APPENDIX E
CHEMICAL WORKS REGULATIONS, 1922
Regulation 7

Certificate No.....

Certified that the under-noted place which requires to be entered and in which there is reason to apprehend the presence of dangerous gas or fume :—

- (a) Is isolated and sealed from every source of such gas or fume and is free from danger.
- (b) Is not so isolated and sealed from every source of such gas or fume and free from danger, and therefore must not be entered by any person unless he is wearing a "breathing apparatus" and (where there are no cross-stays or obstructions likely to cause entanglement) a "lifebelt," the free end of the rope attached to which shall be left with a man outside whose sole duty shall be to keep watch and to draw out the wearer of the lifebelt if he appears to be affected by gas or fume.

(Either (a) or (b) must be crossed out in full.)

Particulars of place referred to :—

Date and time.....

Signature.....

(of responsible person appointed for the purpose).

Renewed :

Date and time..... Initials.....

Renewed :

Date and time.....

Renewed :

Date and time.....

Renewed :

Date and time.....

COMPLETION OF JOB : This Regulation 7 Certificate is hereby cancelled.

Date and time..... Signature.....

APPENDIX F

Safety Officer. PERMANENT APPLICATION FOR TEMPORARY FIRE.

Date	Time	Place	Method of Lighting	To be Lighted by	To be Extinguished by
Have solvents been used for cleaning purposes :—					
Special precautions :—					
.....19.....					
Approved					
.....19.....					
I certify that the fire has been extinguished.					
.....19.....					
Note :—This authority should be returned to the Safety Officer, immediately after the completion of the service for which the fire is authorised.					
..... Head of Section					
..... for Superintendent					
..... Head of Section					

APPENDIX G

Safety Officer.

The following TEMPORARY alterations in (limits) are
 PERMANENT (use lists) required in.....house,.....section, for the
 purpose of

Limits :—

Explosives.

lb. Use Lists :—

Workmen.

Rules.

Head of Section.

Superintendent,

Forwarded.

Safety Officer.

Safety Officer,

Approved.

Superintendent.

Head of Section,

Please note.

Safety Officer.

Safety Officer,

Noted and arranged.

Head of Section.

APPENDIX H

BRITISH STANDARD IDENTIFICATION COLOURS FOR
 GAS CYLINDERS, EXCLUDING CYLINDERS FOR
 MEDICAL PURPOSES

Gas	Ground Colour of Cylinder	Colour of Bands
Acetylene	Maroon	None
Air	Grey	None
Ammonia	Black	Red and Yellow*
Argon	Blue	None
Carbon Dioxide, for temper- ate use	Black	None
Do. for tropical and marine use	Black	White or alum- inium paint
Carbon monoxide	Red	Yellow
Chlorine	Yellow	None
Do. cylinders fitted with in- ternal dip pipes	Yellow	Black
Coal Gas	Red	None
Ethyl Chloride, inflammable	Grey	Red
Do. non-inflammable	Grey	None
Ethylene	Mauve	Red
Helium	Medium Brown	None
Hydrocyanic Acid	Blue	Yellow
Hydrogen	Red	None
Methane	Red	None
Methyl Bromide	Blue	Black
Methyl Chloride, inflam- able	Green	Red
Do. non-inflammable	Green	None
Neon	Medium Brown	Black
Nitrogen	Dark Grey	Black
Oxygen	Black	None
Phosgene	Black	Blue and Yellow*
Sulphur Dioxide	Green	Yellow

* The red or blue band shall be placed adjacent to the valve fitting and the yellow band between that and the ground colour of the cylinder.

APPENDIX I
COLOUR CODE FOR IDENTIFICATION OF PIPING

<i>Service</i>	<i>Colour</i>	<i>Colour of band</i>	<i>B.S. No. for paint</i>
Water	Cold	Nil	101
	Hot	French blue	101 & 166
Steam	Crimson	Nil	None available
Gas	Green	—	218
	Orange	—	557
Electricity	A.C. D.C.	—	—
Refrigerated brine	Light grey	—	631
Compressed air	White	—	None available
Vacuum	Black	—	None available
Fire	Signal red	—	B.S. 537

Condensate two rings against long band for steam

D.C. to be added—black transfer

Bands are to be placed at all joints and should extend for at least 6 inches from the joints.

APPENDIX J

LOCKER MAGAZINES

Locker magazines under the control of the Heads of Sections are provided for small quantities of ready use explosives, for experimental explosives and for those whose stability is doubtful. The quantity of explosive in each locker should be kept as small as possible and in no case is it to exceed the following limits :—

High Explosives ...	...	...	...	...	8 lb.
or Propellants ...	...	...	...	...	8 lb.
or Fulminate class ...	...	...	...	...	1 lb.
or Gunpowder and Pyrotechnic Compositions ...	...	...	...	...	2 lb.

Each package put in any magazine must be labelled with its contents, the name of the scientist and the date upon which storage commenced. No explosive package or container is to be opened in the locker enclosure.

The types of explosives mentioned above must not be mixed in any one locker. While the doors of the magazines or of the enclosure are being opened or closed, explosive samples must be put on the shelves provided and not on the ground. Unless absolutely necessary, explosives should not be retained when the work for which they were obtained is finished. The contents of locker magazines should be reviewed every 3 months, and only those explosives whose retention is essential should be kept. The person using the magazine is responsible that it is afterwards securely locked and the keys returned to the appointed place.

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