

Summary of Industrial Safety Laws in Gujarat, India

(Notes by- Dr. K U Mistry)

Some Safety and incidental Acts and Rules of India are listed below:

1. Factories Act, 1948.
2. Gujarat Factories Rules, 1963 (Similarly there are other State Factories Rules).
3. Boilers Act, 1923.
4. Gujarat Boiler Rules, 1966.
5. Gujarat Boiler Attendants' Rules, 1966.
6. Gujarat Smoke Nuisance Act, 1963.
7. Gujarat Smoke Nuisance Rules, 1966.
8. Indian Boilers Regulation, 1950 (IBR).
9. Electricity Act, 1910.
10. Electricity Rules, 1956.
11. Electricity Supply Act, 1948.
12. Explosives Act, 1884.
13. Explosives Rules, 1983.
14. Static and Mobile Pressure Vessels (Unfired) Rules, 1981.
15. Gas Cylinders Rules, 1981.
16. Explosive Substances Act, 1908.
17. Petroleum Act, 1934.
18. Petroleum Rules, 1937 & 1976.
19. Calcium Carbide Rules, 1987.
20. Cinematography Film Rules, 1948 .
21. Inflammable Substance Act, 1952.
22. Atomic Energy Act, 1962.
23. Radiation Protection Rules, 1971.
24. Insecticides Act, 1968.
25. Insecticide Rules, 1971.
26. Poisons Act, 1919.
27. Poisons Rules.
28. Mines Act, 1952.
29. Mines & Mineral (Regulation and Development) Act, 1957.
30. Dangerous Drugs Act, 1930.
31. Drugs & Cosmetics Act, 1940.
32. Narcotic Drugs and Psychotropic Substances Act, 1985.
33. Plantation of Labour Act, 1951.
34. Employers' Liability Act, 1938.
35. Fatal Accidents Act, 1855.
36. Workmen's Compensation Act, 1923.
37. Employees State Insurance Act, 1948.
38. Prevention of Food Adulteration Act, 1955 & Rules 1955.
39. Bombay Weights & Measures Act, 1958 & Rules 1958.
40. Excise and Prohibition Act .
41. Bombay Lifts Act 1939 and rules, 1958.
42. Industries (Development & Regulation) Act, 1951.
43. Dock Workers (Safety, Health & Welfare) Act 1986, Rules & Regulations.

44. Port Act, 1908.
45. Merchant Shipping Act, 1958.
46. Dock Workers (R & E) Act, 1948.
47. Fisheries Act, 1897.
48. Forest Act, 1927 and Wildlife (Protection) Act, 1972.
49. Motor Vehicles Act, 1988 and Rules 1989 including Transport of Hazardous Goods Rules.
50. Railway Red Tariff Rules, 1960.
51. Arms and Ammunition Act.
52. Water (Prevention & Control of Pollution) Act, 1974 and Rules, 1975.
53. Air (Prevention & Control of Pollution) Act, 1981 and Rules 1982.
54. Environment (Protection) Act 1986, and Rules 1986.
55. Hazardous Wastes Rules, 1989.
56. MSIHC Rules, 1989.
57. Environment Tribunal Act, 1995.
58. Chemical Accidents Rules, 1996.
59. Environment Appellate Authority Act, 1997.
60. Bio-medical Wastes Rules, 1998.
61. Child Labour Act 1986 & Rules 1988.
62. Public Liability Insurance Act & Rules, 1991.
63. The Building and other Construction Workers (Regulation of Employment and Condition of) Service Act, 1996, and Rules.

Laws of Foreign Countries :

- 1 Occupational Safety & Health Act (OSHA) 1970, USA.
- 2 United States Department of Transport's Hazardous Material Regulations.
- 3 Health & Safety at Work Act (HSWA), 1974, UK.
- 4 Control of Industrial Major Accidents Hazards (CIMAH) Regulations 1984, UK.
- 5 Notification of Installation Handling Hazardous Substances Regulations (NIHHS), 1982, UK.
- 6 The JK Blue Book (Governing the carriage of dangerous goods in ships).
- 7 British Railways list of dangerous goods and conditions of acceptance.
- 8 British Regulations governing transport by road within UK of certain inflammable liquids, corrosive substances and organic peroxide.
- 9 The European Agreement concerning International carriage of Dangerous goods by Road (ADR).
- 10 International Maritime Dangerous Goods (IMDG) code published by Inter Governmental Maritime consultative Organisation (IMO).
- 11 International Regulations concerning carriage of Dangerous goods by rail (IRD).
- 12 International Air Transport Association (IAA) Rules for restricted articles (cargo) regulations.
- 13 International Convention for the Safety of Life at Sea 1974 (SULAS 74.)
- 14 Code of Safe Practice for Shipment of Bulk Cargoes (BC Code), 1965.
- 15 Emergency Procedures for Ships carrying dangerous goods (EMS) and its supplement 1984.
- 16 Medical First Aid Guide for use in Accident involving Dangerous Goods (MFAG) revised in 1982 and its supplement 1984.
- 17 International Convention for the Prevention of Pollution from Ships 1973 (MARPOL 73),
- 18 IMO recommendations on safe transport, handling and storage of Dangerous Substances in Port Areas.
- 19 IMO recommendations on the safe use of pesticides in Ships, revised in 1980.
- 20 IMO/ILO guidelines for packing cargo in freight containers, or vehicles.
- 21 World Bank and IFC Guidelines for identifying, analysing and controlling major hazard installations in developing countries 1985.
- 22 EEC Directive on Hazardous Installations.
- 23 Transportation Emergency Assistance Plan (TEAP), Canadian Chemical Producers Association.
- 24 Federal List of 403 very toxic chemicals, EPA, USA.
- 25 UN (Numbers) List of dangerous chemicals.

ABSTRACT OF SOME SAFETY LAWS

Only an abstract (short summary) of some Acts and Rules is given below. *For full details the statute books must be referred. For the Factories Act and Rules Chapter-27 should be referred.*

Laws on Boiler Safety:

Boilers Act, 1923

The Boilers Act (No. 5 of 1923) was notified on 4-12-1923 and came into force from 1-1-1924. It has 34 sections.

Section 2 of the Act defines as under:

Boiler: Means any closed vessel exceeding 22.75 litres in capacity which is used expressly for generating steam under pressure and includes any mounting or other fitting attached to such vessel which is wholly or partly under pressure when steam is shut off.

Economiser: means any part of a feed-pipe that is wholly or partially exposed to the action of flue gas for the purpose of recovery of waste heat.

Feed-Pipe: means any pipe or connected fitting wholly or partly under pressure through which feed water passes directly to a boiler and which does not form an integral part thereof.

Steam Pipe: means any pipe through which steam passes from a boiler to a prime mover or other user or both if (i) The pressure at which steam passes through such pipe exceeds 3.5 kg/cm^2 above atmospheric pressure or (ii) Such pipe exceeds 254 mm in internal diameter and includes, in either case any connected fitting of a steam pipe.

Accident as defined u/s 2(9) means an explosion of a boiler or steam pipe or any damage to a boiler or steam pipe which is calculated to weaken the strength thereof so as to render it liable to explode.

The Act applies to feed pipes, steam pipes and economisers as defined above. The Act does not apply to steam-ship and sterilise or disinfect of a type such as is commonly used in hospitals if the boiler does not exceed 91 litres in capacity.

Unregistered or uncertified boiler shall not be used save as otherwise provided in the Act. Prior sanction of the Chief Inspector is necessary before carrying out any structural alteration, addition or renewal in or to any boiler or steam pipe. Any accident to a boiler or steam pipe shall be reported to the Inspector within 24 hours. His report shall be in form E (Rule 48). This Form is very inadequate and needs further details to be added. See Part 3.8 of Chapter-19.

Section 27A provides to form a *Central Boiler Board* consisting of members, not exceeding 15, and nominating by the Central Government the representatives from the Central Government, Union territories, Railways, Coal industry, ISI, Boiler manufacturing industry, Users and other interests. Each state will also nominate a senior technical officer conversant with inspection and examination of boilers. Section 28 provides power and matters of regulations by the Board. Sec. 28A and 29 are for the rule making power of Central and State Govt. respectively.

Central Boilers Board makes and notifies regulations consistent with this Act. The main duties of the Boiler Inspector are the inspection and examination of boilers and steam-pipes in accordance with chapter IX of the Regulations and Chapter IV and V of the Gujarat Boiler Rules 1966. Reduction of pressure can be suggested. Sanction for repairs to boilers shall be obtained beforehand. Provisional orders should be issued after hydraulic tests.

Gujarat Boiler Rules, 1966

These rules were notified and came into force on 20-10-1966. They have 162 rules, of which R.73 to 136 repealed, and Forms A to D.

The Chief Inspector shall issue instructions to owners for safe working of boilers. Form C under rule 8 provides such instructions regarding precautions before starting the fires, raising steam, pressure gauge, steam pressure, safety valve, low water safety valve, water gauges, blow-off cock, scum cock, manhole and other door joints, steam pipes, scale and grease, wear and tear, scale removal. treatment of

feed water and preservation of boilers when not in use. These instructions (Form C) are most important and should be hung up in each boiler house. It is reproduced below as it contains safety instructions.

FORM C (See Rule 8)

General Working of Boilers; Instructions to Boiler Attendants:

These instructions should be frequently and carefully studied, with view to keeping in mind the precautions to be observed and the ordinary procedure to be followed in the *Safe working of boilers*.

Precautions before starting the Fire

Before starting the fires in a boiler, the attendant should :

- 1 See that there is sufficient water in the boiler, and that the gauge cocks are working freely.
- 2 Ease safety valves, or open cock on top of boiler to allow air to escape.
- 3 See that the blow-off cock is fully closed and tight :
- 4 See that the safety valves and feed check valve are free and workable.
- 5 See that water is not leaking from any part of the boiler:
- 6 Note if the pressure gauge pointer is at zero.
- 7 See that the feed pump is in working order.

He must not rely on the supposition that the water he has previously put in is still in the boiler, as it may have run out without his knowledge through a leak or open cock, nor can be sure that the gauge glass shows the true water level until he has tested it. This is done in the following manner, shut off the lower gauge cock and empty the glass by the drain cock; then shut the drain cock and open the gauge cock ; if everything is in order, the water will then rise in the glass to the same height as before.

Raising steam : In getting up steam in all types of boilers the operation should be as gradual as circumstances will allow. Nothing turns a new boiler into as old one sooner than getting up steam too quickly. Forcing the fires when starting work is liable to cause straining of the steams and tubes of the boiler. In the case of large boilers generally, steams should not be got up in less than six hours. Before getting up steam, the water level should be observed, to ensure that water is at the proper height in the glass, the pressure gauge noted, and the safety valves tried to see they are free. The blow-off cock should be examined to see that it is completely shut and tight.

Pressure gauge : The pressure or steam gauge should be kept in order, and be in such a position as to be easily seen by the boiler attendant. There should be a plain mark on it showing the highest pressure allowed for the boiler, and the dial should be kept clean so that the figures may easily be read.

Steam pressure : Ordinarily the safety valve will prevent steam from rising much above the working pressure, but if the steam gauge shows so rapid an increase of pressure as to indicate danger of exceeding the highest limit, water should be immediately fed into the boiler and the dampers partially closed in order to diminish the effect of the fire. If however, the water has fallen so low that there is danger of an accident from this cause, the fires should be withdrawn before feeding in water, the safety valves eased and if the engine is at rest it should be started so as to reduce the pressure.

The safety valves are provided to guard against over pressure.

They should be moved by hand every day so as to prevent them from sticking. If moved only occasionally, they are liable to leak.

The valve can be tested by slowly raising it a little, and when let down it should close perfectly tight. It should never be opened by a sudden knock or pull. If it does not close tight, turn it on its seat until it fits or when its construction does not permit this, raise it slowly a few times and let it down again but on no account must the valve be screwed down further or loaded more than what has been allowed by the Inspector.

Safety valves must never be overloaded, and spring valves should have ferrules or other provisions against the valves being screwed down too far. In case of an accident resulting from wilful over loading, the culprit might be held criminally responsible at the official inquiry or inquest.

Low water safety valves : If there is a low water safety valve, test it occasionally by lowering the water level to see that the valve, being to blow at the right point. It should give warning “before the water level has sunk too low and before damage can be done.” When the boiler is open examine the floats and lever and see that they are free and that they give the valve the full rise. With the ordinary type of high steam and low water safety valve the float should be down at its lowest position and the valve full open when the boiler is empty.

The water gauges: These will be kept in best order by frequently blowing through. The cocks are thus kept in good working condition without leaking. Blow through the drain cock at the bottom of the gauge, and shut and open the steam and water cocks every few hours. These cocks should be blown through more frequently when the water is dirty. Should either of the passages become choked, or whenever the water in the gauge glass moves sluggishly the passages must be cleaned. This is best done with a wire. The gauge glass is so arranged that its top cock connects with the steam space and its bottom cock is below the water line. The water line will ordinarily be near the middle of the glass tube. Always test the glass water gauges thoroughly the first thing in the morning and at the commencement of every shift. This is done by first opening the drain cock and then shutting the upper cock which should give water; the upper cock should then be opened and the bottom cock closed which should give steam; during this test the drain cock should be kept open.

If water and steam do not appear in proper order the cocks are choked and the passage should be cleaned. To lessen the risk of breaking the gauge glass the water cock should always be reopened after steam cock.

Gauge glasses with a narrow white stripe running the whole length of the glass on the side next the boiler are recommended as they show the water line more clearly, especially when the water is dirty.

The boiler regulations framed by the Board require every water gauge glass to be fitted with a guard to prevent injury to the attendants. See that it is always in place, and clean when there is steam in the boiler.

Special Note: It does not follow that there is plenty of water in the boiler because there is plenty of water in the gauge glass. The passages may be choked, and empty gauge glasses are sometime mistaken for full ones and explosions have resulted the reform. Hence it is important to keep the gauge cocks perfectly tight and clean blowing through the test cocks frequently.

A large number of accidents have been due to inoperative water gauges and to negligence of the attendant in not carefully reading the water level.

The Blow-off Cock: The blow-off should be used daily if the water is at all dirty or sedimentary, especially with Locomotive type and Vertical Boilers, as their narrow water spaces are liable to get choked with mud, which soon hardens into a solid mass. The amount of water to be blown out depends on the size of the boiler and can be determined only from experience. When blowing out, the best result is obtained if the water has been at rest for some time (say before the engine is started) thus giving the sediment time to settle. If the feed water is clean merely turn the cock round.

The Scum Cock: When Scum cocks are fitted, if the feed water is dirty, a little should be blown off daily, if the water is clean, merely turn the cock round. Before opening the scum cock, see that the water is at the height indicated by the water-level pointer, otherwise the scumming will be ineffective. Water should be blown from the surface through the scum cock when steam is being drawn off i.e. when the engine or other machinery is working.

Manhole and other Door joints: When making such joints the jointing materials should never be of round - sectioned packing. Care must be taken that the spigot of the door is centrally placed in the hole, as many accidents have resulted from packing being blown out between the spigot and side of hole, even when the clearance was only 3 millimetres. The nuts must be carefully and evenly tightened. Further tightening should be made during the process of heating up the boiler when raising steam.

Steam pipes : When properly arranged, should give no trouble. Frequently, however, they are so designed as to contain pockets, in which, while out of use, condensed steam accumulates. Such water is exceedingly dangerous and great care should be taken to see that the pipes are properly drained *before the stop valve is opened* otherwise “water hammer” will take place even with the best designed steam pipes, and disastrous explosions, causing loss of life and property may occur.

Scale and Grease : Roughly speaking, scale offers a hundred times as much resistance to the passage of heat as does a similar thickness of the steel or iron. A half inch furnace plate covered with 2.5

millimetres scale is as efficient a heat retarder as a steel furnace 250 millimetres thick. Grease is about ten times worse than scale. In a boiler at work the temperature of a clean furnace plate is only slightly in excess of that of the water in the boiler; but if the scale or grease interposed between the water and the plate, the latter acquires a temperature more early approximately that of the flame with which it is in contact. If the fire is fierce (artificial draught) the furnace tube may grow so hot that it elongates considerably. If in addition, cold air is admitted during each firing, a converting action of the furnace takes place, which is one of the worst causes of boiler wear and tear.

Wear and Tear: Can be reduced and the life of a boiler prolonged if scale and grease are prevented from accumulating in a boiler. The combined effects of scale or grease and artificial draught are disastrous. Scale or greases also causes waste of fuel.

Grease: A mixture of sedimentary water, soda and grease produces an adhesive scum. Where this is suspected the water level should never be lowered below the furnace top unless the boiler is afterwards entered and this scum cleaned off the furnace plate before the firing again.

Scale Removal: The customary method is not a satisfactory one. The boiler is emptied and then cooled down by opening all the manholes and the result is that the scale, which would otherwise be soft, hardens through contact with the air, and requires laborious chipping off.

A very effective, but slower method, is to retain the water in the boiler until cool, and not to run it out until the men are ready to enter the boiler with water hose, brushes and scrapers. The scale will then be soft and easily removable.

If time is a consideration, the cooling can be accelerated by adding cold feed to the hot water in the boiler and slowly running off the cooled water. Another method is to blow off the boiler with the lowest possible pressure (not more than 1.4 kg/cm^2) and to keep it closed until cold. The scale will then be easily removed.

Treatment of Feed water: Many feed waters require soda or other chemicals to arrest corrosion or to change the nature of the scale.

There is *no harmless chemical* which will remove scale or sediment when it has once got into the boiler and the only effective process is to purify the feed water before it enters the boiler. By this means, the sediments and generally, too, the added chemicals can be deposited in tanks or in filters, and therefore never goes into the boiler. Excepting when the water obtainable is very good, water-purifying apparatus ought to pay any boiler owner, particularly at those works where three or more boilers are in constant work. Boiler owners wishing to have definite advice as to the best treatment of their feed should have it analysed at some Chemical Laboratory and ascertain the best treatment in the particular circumstances.

Special attention is drawn to the not infrequent but *very bad* practice of allowing the waste steam from the Engine Cylinders or Pumps to be drained into the boiler Feed Water Tanks. The waste steam from cylinders is always mixed with a certain amount of oily matter, which will be deposited in the feed water tanks and ultimately be pumped into the boiler, with possibly disastrous results, as it will be obvious to every careful boiler attendant that should the oil be deposited on the furnace crowns, they may become overheated and collapse,

It should be the first care of the Boiler Owner and the Boiler Attendant to see that the feed water is kept as pure as possible. Impure feed water means additional expense on the upkeep of the boiler.

Preservation of Boilers when not in use : Steam boilers when not in use are liable to deterioration from corrosion and unless well cared for and made rust-proof, they may depreciate more rapidly than when in use. They should be thoroughly drained and thoroughly dried and all valves, cocks and openings closed so as to exclude moisture. Another plan is to fill the boiler with water to which about 1/100 per cent, caustic soda has been added.

Gujarat Boiler Attendant Rules, 1966:

These rules were notified on 23-12-1966 and have 56 rules and Forms A to C.

Boiler shall be in charge of a qualified boiler attendant. Rules for examinations to grant certificate of competency as a Boiler Attendant are also prescribed. Age limit for second class Boiler Attendant is 20 years and that for first class Boiler Attendant is 21 years. For second class Attendant, 3 years relevant experience or training are necessary. For first class Attendant, 2 years service as second class Attendant on a boiler of more than 46 m^2 heating surface is necessary.

Gujarat Smoke Nuisance Act, 1963 :

This Act No. 3 of 1964 was enacted on 26-1-1964. It has 10 sections. It defines furnace, flue or chimney (way of discharge of smoke and gases), Inspector, Commission, Occupier, Owner etc.

It provides for constitution of Gujarat Smoke Nuisances Control Commission, powers of inspectors, power to prohibit furnaces in notified areas, power to demolish unauthorised furnaces, penalty for excessive smoke (in more density or at lesser height or for a longer time), approval from Commission, rule making powers, cognisance of offence etc.

Gujarat Smoke Nuisance Rules, 1966 :

These rules came into force from 15-9-1966 and have 33 rules. They are made u/s 13 of the GSN Act 1963. They provide for meetings of the Commission (R. 3 to 17), power and duties of the Commission and Inspectors (R. 18 to 22), emission of smoke (R. 23 to 31 regarding determining density of smoke by Randleman's Smoke Gauge, emission limits restricted and prohibited, chimney height 30.5 meters, warning by inspector, numbering of chimneys) and procedure for plan approval (R. 32).

U/r 32(4) it is clarified that the flues and chimneys shall be air-tight and of substantial design and material and dampers, where required to be fitted, shall be of the same areas as the flue passages. Every flue shall have a minimum width of 280 mm and all bends should have well rounded corners to allow easy flow of gases.

Indian Boilers Regulations, 1950 (IBR) :

The Central Boilers Board u/s 28 of the Boilers Act, 1923 published on 15-9-1950, the *Indian Boiler Regulations Act 1950*. They have 15 chapters, 635 regulations, 14 forms and Appendices A to L. Its volume is many times more than the Boilers Act and Rules.

Definitions:

Definitions of accident, boiler, Chief Inspector, economiser, feed-pipe and owner are the same as given in the Act.

Competent Authority means as authority recognised by the Central Boilers Board to issue certificates to welders for the purposes of regulation 4(b)(ii) and 605.

Inspecting Authority means an authority recognised by the Board as competent to grant a certificate in Form II, IIA or IIB and specified in Appendix-C, which includes Chief Inspectors of boilers of various states of our country as well as foreign and many foreign companies.

Inspecting Officer means an officer appointed by the Inspecting authority or an officer acting on their behalf for the purposes of approval of drawings, stagewise inspection of manufacture, examination of repairs, signing and issue of certificates, material manufactured and boilers constructed.

Thus the central boilers board and authorities and officers recognised by them provide the backbone of boilers safety and checking from design to operation, maintenance and repair stages.

Subjects of Regulations in brief are as under :

Chapter-1 : General requirements, pressure part design as per IBR or codes or standards like BS, ASME, TEMA, TRD, cost and JIS, boiler and pressure vessel code, ISO boiler code, ISO (R - 831) etc., standard requirements of material, construction, modification of formula, registration of second -hand boilers and welding.

Chapter-2 : Materials of construction, process of manufacture, chemical analysis, freedom from defects, rolling margin, testing & inspection, test pieces, rivets, stay bars, plates, tubes, hydraulic test, tensile test, bend test, flattening test, flanging and drift expanding test, additional tests, transverse test, mechanical test, arc and gas welding etc.

Chapter-3 : Preparation of plates, heat treatment, normalising, minimum plate thickness (0.25 inch), shells, angle rings, buff straps etc., and plates, furnaces, stays, boiler and superheated tubes, heaters, mud boxes, standpipes, pads, manholes, mudholes, riveting etc.

Chapter-4 : Determination of working pressure, formula, strength of riveted joints, dished end plates, flat plates, stays, tube plates, furnaces, supports for combustion chamber and fire box crown etc.

Chapter-5 : Fusion welded and seamless forged drums for water tube boilers and super heaters, various tests, including hydraulic and NDT (Micro and Macro examination, radiographic examination, magnetic particle flaw detection, dye-penetrant flaw detection), heat treatment for stress relieving, determination of working pressure, permissible working stress, end plates, nozzles etc.

Chapter-6 : Valves, gauges and auxiliaries, two safety valves (minimum bore 19 mm), safety valve on super heater outlet header if auto control fails, manual control should work, automatic water level and firing controls, method of construction, requirements of safety valves (ordinary lift, high lift and full lift), discharge capacity, over pressure, pressure drop, mountings, high and low water alarm, stop valves, blow down cock, water gauges, self-closing (safety) device on the top and bottom arm of water gauge glass mounting, pressure gauges (red mark for maximum permissible working pressure), fusible plugs, feed check valves of non-return type. Formulae for discharge capacity of SV and spring working pressure are given in Reg. 293 and 309 respectively.

Chapter-7: Boiler and super heater tubes, headers and other parts.

Chapter-8: Steam-pipes and fittings, material, test, flanges, fittings and connections, PRV with SV on low pressure (user point) side to open if safe working pressure exceeds or an automatic valve to cut off the steam supply in that event, test pressures.

Chapter-9: Registration and Inspection of boilers and steam pipes, preparation for test, hydraulic test, steam test, SV test by Inspector by standard PG supplied by the CIB, if steam test pressure exceeds 10% of the maximum working pressure, the SV area should be increased, procedure for registration, Boiler rating as “square meters area of heating surface”, registration fee, Inspection and Registration Book (Form I) repairs, markings.

Chapter-9A: Safety of persons inside boilers - Effective disconnection by removal of stop valve or all connections with steam and hot water by blank flanges or by fitting a vent pipe (ID > 2 inch) to discharge leakage, method of disconnection should be approved by the CIB, use of hand lamp of 24 Volts with lamp guard, keyless socket, insulated handle and extension cord of approved type and if any electric equipment is to be used inside, its metallic portion should be effectively earthed.

Chapter-10: Electrode boilers for all voltages for any pressure and temperature less than 650 °F. They should be of steel and made by riveted, fusion welded or seamless shell joint only.

Chapter-11: Economisers and feed pipes. Maximum outlet water temperature of the economiser shall be 40°F below the temperature of saturated steam in the boiler drum.

Chapter-12: Shell type boilers of fusion welded construction (other than water tube or electrode boilers referred in Chap 5 & 10). After completion of all welding and before hydraulic test, heat treatment (stress relieving) is necessary if the plate is 20 mm thick or greater or carbon content of the steel exceeds 0.25% of the material. For carbon steel the part should be heated to at least 600° +20° C and then slowly cooled and held at temperature and in the manner specified in Reg. 562.

Classification of Boilers			
Classes	Limits of application	Minimum thickness	Constant C
I	No limit	0.25 Inch	32
II	(a) WP < 105 psi (b) WP in psi x ID < 5250 inches.	IF ID is upto 36” 5/16 inch.	27
III	(a) WP < 30 psi (b) WP in psi x ID < 3000 inches.	ID over 36”, 3/8 inch	23 if stress relieved 21 if stress not relieved

Working pressure of the cylindrical shell WP (psi) = $\frac{(t-2) SC}{D}$

D

Where

t	=	Min. plate thickness in 30 seconds of	an inch.
D	=	Max. ID in inches.	
S	=	Min. tensile strength in T/in ²	
C	=	Constant as given in above table	

In no case, the thickness should be less than that mentioned in above table or the factor of safety less than 4.

Chapter-13 : Tests, qualification and certification for welders. Age limit not below 21, theoretical subjects prescribed for Electric welder and Gas Welder, marks, fees for examination of welders (Rs.50), award of certificate, record of welding personnel, and penalty for contravention of these Regulations up to Rs. 100.

Chapter-14 : Miniature boilers for use in small establishments. Miniature boiler is defined u/ reg 619 as a boiler which does not exceed the limits- ID 16" length 42", heating surface 20 Ft² and MWP 30 psi. Their design, construction, inspection, testing, fittings and registration fee are prescribed.

Chapter-15 : Heat exchangers, Converters, Evaporators and similar vessels connected with steam pressure more than 1 kg/cm².

Form - 6 is the certificate for use of a boiler (reg. 389) with conditions. Appendix-J gives a long list of stages for inspection and testing by the Inspecting Authority. Appendix L provides for testing procedure for safety valve discharge efficiency.

Laws on Electrical Safety :

Indian Electricity Act, 1910 :

The Act came into force from 1-1-1911, has 4 parts, 58 sections and a Schedule. It provides law relating to supply and use of electrical energy.

Section-2 defines energy, street, works, supply line, service line, main, State Electricity Board etc. along with other words.

Sections 3 to 11 are pertaining to grant of license and its revocation, amendment, purchase etc.

Sections 12 to 19 are regarding 'Works' provide for opening and breaking up of streets, railways etc., notice of new works, alteration of pipes or wires, laying of supply lines near sewer, pipes or other supply lines etc., broken parts to be reinstated without delay, overhead lines and compensation for damage.

Sections 19-A to 27 are regarding 'Supply' between licensee and consumers, power to control distribution and consumption of energy, charges for energy, meters and supply outside the area. The meter should be 'correct' otherwise supply may be stopped through that meter.

Sections 28 to 30 relate to non-licensee, sanction from the State Government, control of transmission and use of energy. Section 28-A is a special provision inserted by and for Gujarat.

Sections 31 to 34 give Protective Clauses for protection of railways, aerodromes, canals, docks, telegraphic, telephonic and electric signalling lines, notice of accidents and prohibition to permit earth connection etc.

Section 33 regarding *Notice of Accidents & Inquiries* provides that an accident to any person or animal resulting or likely to result in death or any injury is to be reported to the Electrical Inspector and other authorities in a prescribed time and inquiry and report by the Electrical Inspector into the cause of accident affecting safety of the public and manner of compliance of statutory requirements.

Sections 35 to 38 are regarding Advisory Board, appointment of Electrical Inspector, Central Electricity Board and rule making powers.

Sections 39 to 50 are regarding penalties and procedure and sections 51 to 58 are supplementary provisions.

The Schedule provides for security and accounts of licensee, works and supply, charges, testing, inspection, plan of area of supply and notice to Electrical Inspector.

Indian Electricity Rules, 1956 :

Under section 37 of the Electricity Act, 1910, the Central Electricity Board, made these rules which were published and came into force from 26-6-1956.

It has 11 Chapters, 142 rules and 14 Annexures. From safety point of view following two chapters are more important.

Chapter	Rules	Title
IV	29-46	General Safety Require-ments.
X	109-132	Additional Precautions to be adopted in Mines & Oil-fields.

A short summary of the rules is given below. For full details, the statute book should be referred.

Rule 2 gives 55 definitions. '**Danger**' is defined as danger to life or body part from shock, burn, fire, explosion, injury to persons or property because of the electrical energy.

Flameproof enclosure means an enclosure for electrical machinery or apparatus to withstand internal explosion due to flammable gas or vapour entered inside and preventing this internal flammation to come out to the external flammable gas or vapour in which it is designed to be used.

Guarded means covered, shielded, fenced or otherwise protected by means of suitable casing, barrier, rails or metal screens to remove the possibility of dangerous contact or approach by persons or objects to a point of danger.

'Intrinsically safe' as applied to apparatus or associated circuits shall denote that any sparking that may occur in normal working is incapable to cause explosion of inflammable gas or vapour.

Voltage category is defined as low<250V, medium<650V, high<33KV, extra high> 33KV.

Rule 4 prescribes appointment and qualifications for Electrical Inspectors that degree in electrical engineering with at least 8 years practical experience. For assistant inspectors BE(E) + 3 years experience or DME + 6 years experience is prescribed. Rule 5 gives their powers of entry and inspection.

Chapter-3, rules 11 to 28 prescribes licensing procedure including maps, forms and conditions.

Chapter-4, rules 29 to 46, give following general safety provisions :

General Safety Provisions:

1. Electric supply lines and apparatus, shall be of sufficient ratings, mechanical strength and so constructed, installed, protected, worked and maintained to ensure safety of human being, animals and property. IS and National Electrical Code shall be followed (R.29).
2. Supplier and consumer, both, will take due precautions to avoid danger from service lines and apparatus on consumer's premises (R.30).
3. Suitable cut-outs (e.g. fuse) in fireproof receptacles shall be provided in every service line (other than earth lines) at consumer's premises (R.31).
4. Earth and neutral conductors shall be identified to distinguish from live conductor and position of switches and cut-out shall be safe (R.32).
5. Earth connection (terminal) shall be provided near the point of start of supply and the consumer shall take steps to protect it from mechanical damage (R.33).
6. Bare conductors should be inaccessible with readily accessible switches to cut off power supply (R.34).
7. Danger notice in Hindi, English or local language with a sign of skull and bones (IS-2551) and the words 'danger' and '___volts' is necessary near medium and higher voltage installation (i.e. above 250V). (R.35).
8. For the safety from supply lines and apparatus, earthing of lines, PPE to workers (gloves, rubber shoes, safety belts, ladders, earthing devices, helmets, line testers and hand lines, for protection from electrical and mechanical injury), and authorised working on live lines are necessary (R.36).
9. Voltage cut off switch (in one operation) is a must in every electric vehicle, crane, etc. and the metal rails, if any, should be electrically continuous and earthed (R.37).

10. Flexible cables to portable apparatus should be heavily insulated and well protected from mechanical damage. For single phase line the cable should be of 3 core and for 3 phase line, it should be of 4 core type with the distinguished ground connection. Metal covering, if any, should be earthed (R.38).
11. Insulating or protecting material of electric line should not be of such material that may produce noxious or flammable gases on excessive heating (R.39).
12. Street boxes should be free from influx of water or gas. They should be inspected regularly for that (R.40).
13. Different circuits should be distinguished from each other (R.41).
14. Voltage should not exceed the limits and AC-DC circuits should not come into contact with each other when live (R.42).
15. Fire extinguishers for electric fire, fire buckets with clean, dry sand, first-aid boxes, two or more gas masks to be used in the event of fire or smoke are necessary (R.43).
16. Notice of instructions to restore person from electric shock and an artificial respirator (resuscitation) necessary (R.44).
17. Fatal accident should be reported within 24 hours and non-fatal accident, in Annex-XIII, in 48 hours (R.44A).
18. Electric work shall be carried out by licensed electrical contractor under direct supervision of a competent person and a person holding permit by the State Government. Unauthorised work shall not be energised (R.45).
19. Inspection of installation at every 5 years by the Inspector. Annex-IXA is an inspection report Form (R.46).

Chapter-V (R.47 to 59) gives general conditions relating to supply and use of energy. Rule 51 for medium, high and extra high voltage installations should be referred.

Chapter-VI (R.60 to 62) for low and medium voltages (upto 650V) and Chapter-VII (R.63 to 73) for high and extra high voltage (more than 650V) provide for insulation resistance test, earth connection, ELCB, testing, operation and maintenance, condensers and supply to high voltage installation including X-ray unit, etc.

Chapter-VIII (R.74 to 93) gives important safety clearances (see Part 4.4 of Chapter-11) above ground and between conductors and provisions for material strength, stresses, joints, guarding, earthing, safety and protective devices (R.91 for safety of line when it breaks, unauthorised entry near overhead lines) etc.

Chapter-IX (R.94 to 108) is for electric traction, and provides for voltage supply to vehicle, insulation of lines, returns and sections, current density (less than 1.4 Amp/cm^2) in rails, height of trolley-wire (more than 5.2 m high) etc.

Chapter-X (R.109 to 132) is regarding safety precautions while working in mines and oil-fields. They include plans, notices, lighting, communications, fire precautions, earthing, protective equipment, voltage limits (Hand lamp or electric interlocking 30V, portable apparatus 125V, at surface or in open 250V), safety with gas supervision etc.

Chapter-XI (R.133 to 142) gives relaxation and penalty provisions.

Laws on Fire & Explosion Safety :

Explosives Act, 1884 :

This Act (4 of 1884) was enacted on 26-2-1884 and came into force from 1-7-1884 and extends to the whole of India. It has 18 sections.

Its object is to regulate the manufacture, possession, use, sale, transport, import and export of explosives.

Explosive as defined in Sec. 4(d) means gunpowder, nitro-glycerine, nitroglycol, guncotton, di-nitro-toluene, tri-nitro-toluene, picric acid, di-nitro-phenol, tri-nitro resorcinol (styphnic acid) cyclo trimethylene- tri-nitroamine, penta- erythritol tetranitrate, tetryl, nitro guanidine, lead azide, lead styphnate, fulminate of mercury or any other metal, diazol-di-nitro phenol, coloured fires and any other substance, whether a single compound or mixture, whether solid, liquid or gas used or manufactured with

a view to produce explosion or pyrotechnic effect and includes fog-signals, fire works, fuses, rockets, percussion-caps, detonators, cartridges, ammunition, adaptation or preparation of as an explosive defined in this clause.

Aircraft carriage and vessel are also defined in this section.

Main Provisions :

1. A person below the age of 18 years, offender of violence or moral turpitude, who is ordered to keep peace or good behaviour or whose licence is cancelled for any offence under this act, cannot manufacture, sell, transport, import or export, deliver or dispatch or possess any explosive defined or notified.
2. Licence can be granted, refused, varied, suspended, revoked and conditions can be imposed (sec. 6B to 6E). Appeal can be preferred as per sec. 6F.
3. The Central Government has power to make rules regarding inspection, search, seizure, detention and removal (sec. 7).
4. Notice of accident is required u/s 8 and its inquiry shall be conducted u/s 9. The Central Government can inquire into more serious accidents (sec. 9A).
5. Explosives with receptacles shall be forfeited by the court after conviction (sec. 10).
6. Any person found committing any offence punishable under this Act can be arrested without warrant, be removed from the place and conveyed before a magistrate (sec. 13).
7. The Central Government can delegate its power to State Government or an officer u/s 17A.

The Explosives Rules, 1983 :

Under section 18(1) of the Explosives Act, 1884, these rules were published on 2-3-1983. They have 10 chapters, 186 rules, 8 Schedules, 39 Forms under Schedule V and 7 specifications (guidelines) under schedule VII, Last schedule VIII gives safety distances. Exhaustive details are provided of which a short abstract is given below :

Definitions : Chief Controller of Explosive (CCE) is the main authority. He can recognise a competent person by giving him a certificate of competency. Prohibited explosives mean those u/s 6, authorised explosives mean those published by the Government and permitted explosives mean those permitted by the Director General of Mines Safety to be used in underground coal mines.

Detonator, safety cartridge and safety fuse are defined. Magazine means a building to store more than 5 kg of explosive and specially constructed as approved by the CCE. Protected works include a dwelling house, college, school, hospital, theatre, factory, storage of hazardous substances, public road, railway, waterways, dams, reservoirs, high tension power lines. Safety zone is a distance required between such protected work and a licensed factory, magazine or store-house.

Safety Distance Categories of Explosives : According to the risks, they are as under :

Catego ry	Explosives
X	Which have a fire or slight explosion risk or both but the effect is local.
Y	Which have a mass fire risk or a moderate explosion risk but not the risk of mass explosion.
Z	Which have mass explosion risk and major missile effect.
ZZ	Which have mass explosion risk and minor missile effect.

On any question of category, decision of the CCE shall be final.

General Provisions (Chap-II, Rule 5 to 20) :

1 Import, export, transport, manufacture, process, use or sell of unauthorised explosives is prohibited. Testing and trial are permitted in a licensed factory. (R.5).

2 Application for authorisation of explosives is necessary. Particulars are prescribed for submission. A sample shall be sent as per instruction from CC (R. 6).

3 *Tests prescribed* (R. 6 (6))

1. Physical properties including consistency, reaction, tendency to absorb moisture, segregation of the constituents, exudation, behaviour at low temperature, specific gravity etc.

2. Chemical composition- percentage and quality of ingredients.

3. Stability - effect of environmental conditions which would produce spontaneous ignition or variation in sensitiveness.

4. Ignition characteristics- ignition point, behaviour, liability to spontaneous ignition.

5. Mechanical sensitiveness to friction and impact.

6. Air gap sensitivity and transmission of detonation.

7. Velocity of detonating.

8. Strength determination.

9. Gases evolved upon explosion.

10. Such other tests specified by the CC.

4 Delivery & Dispatch under licence and not exceeding the quantity (R.7).

5 Packing as per Schedule II and after approval of the sample (R. 8).

6 Marking of packages should mention the word “explosives” (not required for fireworks and safety fuse), name of the authorised explosive, class number and division, safety distance category, names of manufacturer, consignor & consignee, net weight and letter ‘P’ for permitted explosive (R.9)

7 Weight of explosive shall not include the weight of the packing box (10.)

8 Competent person should be in-charge of operations (R.11)

9 Precautions in handling- Floor should be checked, cleaned and swept before and after use. The packages shall not be thrown, dropped, rolled or pulled but shall be passed from hand to hand and carefully deposited. A slung package should be prevented from fall (R. 12).

10 Handling between sunset and sunrise is restricted unless proper lighting and guarding is provided. (R. 13).

11 Within 15 mt. of an explosive storage or at its place of handling or transport, smoking, fires, lights and flammable substances or substances to cause fire or explosion such as acids, petroleum, calcium carbide, compressed gases shall not be allowed (R. 14) No person will carry matches, knives, fuses, iron or steel or wear shoes with iron nails (R. 15).

12 Split explosive shall be safely destroyed (R. 16).

13 Employment of children below 18 years, intoxicated persons and persons of unsound mind is prohibited (R. 17).

14 Precautions against danger from water (in compatible) or exposure to sun or heat are necessary (R. 18).

15 Special precautions against accident (fire or explosion), thefts, entry of unauthorised person near explosives are necessary. (R. 19).

16 Nitro-glycerine or Ethylene glycol nitrate or explosives of Class-5, unauthorised, deteriorated or damaged explosives shall not be transported without approval of CC, except within the licensed factory solely for the purpose of manufacture of explosives (R. 20).

Import & Export (Chapter-III, Rule 21 to 31) :

Licence necessary (R. 21). Rules for import and export by sea, land and air are prescribed.

Transport (Chapter-IV, R 32 to 86) :

Licence necessary (R. 32). Certain explosives cannot be transported together (R. 33). Safety certificate is required (R. 34). No transport of explosives with passengers (R. 35). Maximum weights as per R. 36. Loading and unloading procedure (R. 38 to 45.). Transport by water (R. 46 to 61) Transport by Rail (R. 62 to 74). Transport by Road (R. 75 to 86). Licence for road van necessary. Towing not allowed. Four wheel chocks to be carried all the time. In case of fire, traffic to be stopped 300 metres away. Accident to be reported. Two fire extinguishers of 2 kg or more capacity required with road van.

Manufacture (Chapter-V, Rule 87 to 112) :

Licence necessary (R.87) and not necessary (R. 88). Approval of CC required (R. 89) Factory should have a wall or fencing 2 mt. high to prevent unauthorised entry (R. 90). Interior should be free from grit, iron or steel and kept clean (R. 92) . Surrounding mound or blastwall as per approval by CC (R. 93). Oiled cotton, rags or waste not allowed to avoid spontaneous ignition (R. 94). Non-sparking tools made of wood, copper, brass or soft metal should be used (R. 95). Notice of maximum quantity of material and persons in a work room to be exhibited on process building (R. 96). Smoking prohibited (R. 97). Lighting conductor as per IS 2309, yearly checking of earth resistance and its notice are necessary (R.98). During thunder-storms work should be suspended and workers to be withdrawn to a safe place (R.99). Foreign matter in ingredients to be removed (R.100). Protection against fire. Cloths without pockets (R.101) Residues will be quickly removed (R.102). Before carrying out repairs to building, explosives shall be removed (R.103). Employment of competent person for process supervision (R.104). Every vehicle, trolley or receptacle to carry explosives shall be free from iron steel etc. and be covered or closed (R.106). Testing facilities as approved by CC (R.108). Safe disposal of waste explosives (R.109). Unsafe process to be stopped (R.110). Up to date records to be maintained for 2 years (R. 112).

Possession, Sale & Use (Chapter-VI, Rule 113 to 153) :

Licence necessary (R.113) and not necessary (R.114). Use of licensed premises only (R.115). Protection from lighting (R.116). Precautions during thunderstorm (R.117). Building to be kept clean (R.118). Maintenance of records (R.119). Hazardous articles not to be carried. Search for them and for cloths without pockets and suitable shoes (R.121). Premises to be kept locked (R.122). Security Guards for round the clock (R.123). Repackaging or opening at safe place and safe distance (R.124). Explosives not to be kept in damaged boxes (R.125) No storage exceeding licensed quantity (R.126). Magazine storage in mode A or B as specified in Sch. VII (R.129). Surrounded by mound (R.131) and on ground floor only (R.132). Store-house of sound construction (R.134). Special precautions to be observed for fire works (R.136). Safety distance 15 mt. or more from storage of explosives, flammable or hazardous materials (R.137).

Use of Explosives : Competent person to be employed (R.144). Restrictions on preparation of charges (R.145). Restriction to carry at the blasting site (R.146). Examination before use (R.147). Precautions at site (R. 148),. Warning procedure (R.149). Precautions while firing (R.150), against stray currents (R.151) fire, or accident (R.152).

Licences (Chapter VII, R 154 to 174).

Fees (Chapter VIII, R. 175 to 177).

Powers and Penalties (Chapter IX R. 178 to 181).

Accidents & Enquiries (Chap. X , R. 182 to 186).

Notice forthwith to the CCE, Nagpur, CE under jurisdiction and nearest police station (R.182). Procedure at courts of inquiry (R.183). Inquiry by a District Magistrate or a Police Commissioner (R. 184). Inquiry into more serious accidents (R. 185).

Schedule I (R. 3) Classes of Explosives :

Class 1	Gun-powder.
Class 2	Nitrate-mixture
Class 3	Nitro-compound
Class 4	Chlorate-mixture
Class 5	Fulminate

Class 6	Ammunition
Class 7	Fireworks
Class 8	Liquid Oxygen Explosives.

Detailed list of chemicals is given under each of these classes.

Schedule II (R. 8)	Packing of explosives
Schedule III (R. 21)	Methods of Testing
Schedule IV (R.155)	Licensing Authority
Schedule V	Forms 1 to 39
Schedule VI	Explosives permitted to be imported and transported by air
Schedule VII	Specifications as under -

<i>Specification No.</i>	<i>For</i>
1	Road Van to carry explosives
2	Motor truck together with compressor unit
3, 4 & 5	Metal cases for conveyance of explosives
6	Magazines (Storage), Mode A&B
7	Store-house
8	Safety distances

Static and Mobile (Unfired) Pressure Vessels Rules, 1981 :

Under sections 5 and 7 of the Explosives Act 1884, the Central Government notified these rules w.e.f. 4-2-1981. They have 8 chapters, 69 rules, 3 appendices, schedule of licence fee and 4 forms.

Chapter-1: Preliminary (R.1 to 11A) :

Definitions : Out of (a) to (z) definitions, majority are scientific and therefore they are reproduced below.

1. **“Competent person”** means a person or an organisation recognised by the Chief Controller, for such gases and for such period as may be specified as competent for carrying out test, examination, inspections and certification for installations and transport vehicles as stipulated in these rules, if such a person or organisation possesses the qualifications, experience and other requirements as set out in Appendix- II to these rules and is recognised as per procedure laid down in rule 11A:

Provided that the Chief Controller may relax the requirements of qualifications in respect of a competent person if such a person is exceptionally experienced and knowledgeable, but not the requirements in respect of the facilities at its command;

2. **“Compressed gas”** means any permanent gas, liquefiable gas or gas dissolved in liquid, under pressure or gas mixture, which in a closed pressure vessel exercises a pressure exceeding two atmosphere (gauge) at the maximum working temperature and includes Hydrogen Fluoride. In case of vessels without insulation or refrigeration, the maximum working temperature shall be considered as 55⁰C.

3. **“Corrosion”** means all forms of wastage and includes oxidation, scaling, mechanical abrasion and erosion;

4. **“Design”** includes drawings, calculation, specifications, models, codes and all other details necessary for the complete description of the pressure vessel and its construction;

5. **“Design pressure”** means the pressure used in the design calculations of a vessel for the purpose of determining the minimum thickness of the various component parts of the vessel;

6. **“Filling density”** means the ratio of weight of liquefiable gas allowed in a pressure vessel to the weight of water that the vessel will hold at 15⁰C;
 7. **“Flammability Range”** means the difference between the minimum and maximum percentage by volume of the gas in mixture with air that forms a flammable mixture at atmospheric pressure and ambient temperature;
 8. **“Flammable compressed Gas”** means gas 13 percent or less of which when mixed with air forms a flammable mixture or whose flammable range with air is greater than 12 percent;
 9. **“Gas Free”** in relation to a pressure vessel means the concentration of flammable or toxic gases or both if such pressure vessel is within the safe limits specified for persons to enter and carry out hot work in such vessels;
 10. **“Liquefiable Gas”** means any gas that may be liquefied by pressure above 0⁰C, but completely vaporised when in equilibrium with normal atmospheric pressure (760 mm HG) at 30⁰C;
 11. **“Permanent Gas”** means a gas whose critical temperature is lower than 10⁰C.
- For definition of ‘Critical Temperature’ see Part 2.12 following.
12. **“Pressure Vessel or Vessel”** means any closed metal container of whatever shape, intended for the storage and transport of any compressed gas which is subjected to internal pressure and whose water capacity exceeds one thousand litres and includes inter connecting parts and components thereof unto the first point of connection to the connected piping and fittings but does not include containers where in steam or other vapour is or is intended to be generated, or water or other liquid is or is intended to be heated by the application of fire or the product of combustion or by electrical means, heat exchangers, evaporators, air receivers, steam-type digesters, steam-type sterilises, autoclave, reactors, calorifiers, pressure piping components such as separators or strainers and vessels containing a liquid under a blanket of compressed inert gas.
 13. **“Safety relief device”** means an automatic pressure relieving device actuated by the pressure upstream of the valve and characterised by fully opened pop action, intended to prevent the rupture of a pressure vessel under certain conditions of exposure;
 14. **“Source of ignition”** means naked lights, fires, exposed incandescent materials, electric welding arcs, lamps other than those specially approved for use in flammable atmosphere, or a spark or flame produced by any means;
 15. **“Water Capacity”** means capacity in litres of the pressure vessel when completely filled with water at 15⁰C.

From the definitions of *compressed gas* and *pressure vessel* u/r 2(e)(t) and rule 3 for general exemptions, it becomes clear that these rules are applicable to a vessel means pressure vessel of more than 1000 Ltr. water capacity, intended for the storage and transport of any compressed gas exceeding 2 atmosphere (gauge) at the maximum working temperature (55 ⁰C if not insulated or refrigerated) and not containing steam or being heated directly or indirectly and which is not a part of a process plant i.e. a vessel to be used for a unit process or unit operation.

The vessel should be manufactured as per standard or code approved by the CC, otherwise it cannot be filled or transported. Any person seeking to manufacture such vessels should apply to the CC in Appendix. I with a scrutiny fee of Rs. 500 (R.4).

Storage, delivery and dispatch as per licence only (R.5). Repair after approval from CC and as per IS-2825 (R.6). Before using or refilling any vessel for flammable gases, purging by an inert gas or by the gas to be filled with safe venting is necessary (R.7). Prohibition of employing a person under 18 years or intoxication and smoking or allowing source of ignition or any flammable gas (R.8 & 9). These rules are to be compiled with and precautions to prevent accident are necessary (R.10)

Procedure for paying fees is given u/r 11 and that for applying recognition as competent person or Inspector in Appendix III to the CC is given u/r 11-A.

Chapter-II : Construction and Fitments of Pressure Vessels (R. 12 to 20):

Design code - For design, construction & testing IS:2825 or other code approved by CC. Test and Inspection certificate issued by the manufacturer and countersigned by an Inspector shall be sent to CC. (R. 12).

Design pressure should not exceed the vapour pressure at 55⁰C if liquefiable gas is to be stored or the developed pressure at 55⁰C if permanent gas (whose critical temp. is < 10⁰C) is to be stored. For an insulated vessel it may be reduced corresponding to the maximum temperature likely to be attained by the gas in the vessel (R. 13).

Design for low temperature should be as per code mentioned in R.12. Refrigeration capacity should be adequate to maintain the vapour pressure below the design pressure and the set-pressure of a safety valve. Insulation material should be approved by CC, cladding thickness more than 3 mm, water-tight and thermal conductance at 15⁰C should not exceed the limit prescribed by the CC (R. 14).

Filling capacity & pressure as per rule 15. The maximum quantity of liquefiable gas to be filled should not exceed the filling density (i.e. the ratio of the weight of the gas to the weight of water that the vessel will hold at 15⁰C) and the vessel should not become liquid-full due to expansion of the gas at 55⁰C if the vessel is uninsulated or at such highest temperature attainable in case of refrigerated or insulated vessel. A permanent gas shall not be filled in excess of design pressure of the vessel (R. 15).

Marking on Vessels should indicate (1) Manufacturer's name and identification (2) Standard or code (3) Official stamp of the Inspector (4) Design pressure (5) Date of tests (6) Hydrostatic test pressure (7) Water capacity (8) Gas capacity and (9) Name or chemical symbol of the gas. (R. 16.)

Painting with reflecting surface (R. 17)

Fittings should include PG, TG, SV, LI, and drains. Connections as per code in rule 12. There should be two (or more) pressure relief valves (SV) spring loaded type, set to start at a pressure below 110% of the design pressure and relieving capacity to keep the pressure inside the vessel less than 120% of the design pressure. Connections to these SV should be of sufficient size to allow the required rate of discharge. There should be shut off valve between SV and the vessel. For static (not mobile) vessels of more than 4500 lit. water capacity, out let of SV should extend 2 mt. above the top of the vessel and at least 3.5 mt. above the ground level. They should have loose fitting rain caps. SV should be tested once in a year by a competent person and record be kept.

All liquid and vapour connections on vessels (except SV, plugged openings and where diameter is less than 1.4 mm) should have shut-off (stop) valves as close to the vessel as practicable.

There should be an emergency shut off valve (for both liquid and vapour phase) such as an excess flow valve (not to allow or stop excess flow), automatically operated valve or a remotely controlled valve which can be operated from a safe place and which shall not fail. Such emergency shut off (stop) valve is not required if liquid connection is of less than 3 mm dia and vapour connection is of less than 8 mm dia. Excess flow rate should easily allow the normal flow rate (should not cause valve chatter) but should have closing rate below the rate of discharge from a fracture of the line it is protecting, calculated under the worst condition possible.

Liquid level gauge should show a ready amount of liquid at any time. One maximum level indicator should also be provided. Bleeding device (rotary tube, fixed tube, slip tube) cannot be completely withdrawn in normal gauging operations. (R. 18).

Hydraulic testing of all vessels by a competent person at a pressure marked on the vessel is necessary at 5 years intervals (2 years for corrosive or toxic gases.). Where water test is not possible or tolerable, CC may permit pneumatic testing alongwith NDT. Before each pressure test, the vessel shall be thoroughly cleaned and examined internally and externally for surface defects, corrosion, foreign matter and hazardous material (e.g. pyrophoric sludge). After test it shall be thoroughly dried internally and stamped with marks, figures and test date. A vessel failing to pass hydraulic test or found unsafe for use shall be destroyed or rendered unsuitable under intimation to the CC. The competent person shall give a test certificate in prescribed proforma. A record shall be kept of all such tests (R. 19, 20).

Chapter -III : Storage (R. 21 to 33) :

General : Compressed gas vessels shall be above-ground, first stage regulating equipment in open, vessels should not be one above the other, vessels in a group should have their longitudinal axes parallel, no location within petroleum or flammable liquid area, sufficient space between two vessels to permit fire fighting operations, two or more vessels in batteries should have their top surface on the same plane and vessels facing their dished ends should have screen wall in between them. (R. 21).

Minimum Safety Distances : They should be as specified in Table - 1 and 2 below. The CC can reduce them if extra safety measures are provided. The distances are to be measured between the nearest points on the periphery of the vessels or the property line.

Table - 1			
Minimum safety distances for flammable, corrosive and toxic gases			
<i>Sr. No.</i>	<i>Water capacity of vessel in Ltr.</i>	<i>Minimum distance between two vessels in mt.</i>	<i>Minimum distance between building or line of adjoining property in mt.</i>
1	< 2000	1	5
2	> 2000 < 10000	1	10
3	> 10000 < 20000	1.5	15
4	> 20000 < 40000	2	20
5	> 40000	2	30
Table - 2			
Minimum safety distances for non- toxic gases			
1	< 2000	1	3
2	> 2000 < 10000	1.5	5
3	> 10000 < 20000	2	10
4	> 20000	Diameter of larger vessel	15

Notes : If the aggregate water capacity of a multivessel installation (say in one group) is 40000 litres or more, distances at Sr. No. 5 of Table-1 shall apply. Number of vessels in one installation (group) shall not exceed 6. Distance between two such installations (groups) should be as per Table-1 (R. 22).

Foundations as prescribed in R. 23. Supports should be so anchored, weighed or at height to avoid flotation due to flood waters. Bottom supports upto 45 cm (max.) shall be encased in fire-resisting materials of adequate thickness.

Fencing of at least 2 mt. height with 2 exits opening out wards and not self locking. The fencing should enclose vessels, pumping equipment, vaporisers and loading/unloading facilities. (R.24).

Cleanliness An area of 3 mt. around the vessel shall be free from combustible material such as weeds and grass (R. 25).

Earthing Vessels and pipelines should be efficiently earthed and bonded (R. 26).

No smoking Notice with letters at least 5 cms size fixed on fence surface visible from outside where flammable or oxidising gases are stored (R. 27).

Fire Protection for the storage of flammable compressed gases should include sufficient supply of water, hydrants, hoses, mobile equipment, fixed monitors or automatic spray systems, control valves outside the danger area, jet & fog nozzles and at least 2 dry chemical powder type fire extinguishers of 9 kg each near each point of access to the installations (R. 28).

Loading and Unloading Facilities like pumps, compressors, transfer systems and hoses as prescribed in R.29. Remotely controlled shut-off valve for the vessel being filled or emptied. High level alarm interlocked with automatic shut off valve to prevent overfilling. The hoses should withstand more than 4 times the maximum operating flow pressure in them and should be mechanically and electrically continuous (R.29).

Transfer operation should follow the detailed instructions u/r 30. Supervision by a competent person for compliance of these rules is necessary. Precautions to check vessel before and after filling, condition of piping, valves, fittings, hoses, vehicle and its earthing, prevention of overfilling, removal of spillage etc.

Electrical wire should not pass over any storage vessel and all electrical wires installed within the safety zone or storage of flammable gases should be of approved insulated cables type, In a pump room for pumping flammable gases, all electric apparatus and fittings should be flameproof conforming to IS:2148 and frames shall be earthed. Lamps should have flameproof glass fittings conforming to IS:2206 (Part-I). Portable hand lamps should have been approved by the CC (R.31).

Lighting should be of approved type, other wise no operation to be carried out during night (R.32).

Safety Certificate in the prescribed proforma signed by a competent person should be furnished to the licensing authority (R.33).

Chapter - IV : Transport (R. 34 to 44) :

This chapter is applicable for the transport of compressed gas by vehicles (R.34). Drawings of the vehicle and its special fittings should be got approved by the CC (R.35). Design considerations are given in rule 36 to 39. Protection of valves, accessories, piping, fittings, pumps and vessel are suggested. Mechanical, electrical and general design safety requirements are prescribed. Product should be marked on the vessel (R.40). Fire protection includes prohibition of smoking or carrying matches, lighters or any flammable substance (R.41). Driver should be a trained one. While loading/unloading presence of a competent person is necessary. Safe parking during overnight stop (R.42). A safety certificate in prescribed proforma signed by a competent person shall be furnished to the licensing authority before using any vehicle for such transport (R.43). The vehicle shall be maintained in a fit condition and examined every 6 months by a competent person and certified in a prescribed proforma (R. 44).

Chapter-V (R. 45 to 64) is regarding Licences, chapter VI (R. 65) for exemption, Chapter VII (R. 66 to 68) for Accidents & Inquires and Chapter VIII (R. 69) for powers of CC and subordinate controllers, of District Magistrates, the Police Commissioners and their subordinates.

Accident should be reported to the CC (by Telegram and a letter within 24 hours) and forth with to the nearest police station.

Appendix-I	: Application to manufacture a vessel.
Appendix-II	: Qualification and Experience of Inspector and Competent person.
Appendix-III	: Application for recognition as competent person.

Gas Cylinders Rules, 1981 :

Chapter-1: Preliminary (R 1, 2) :

Under Sections 5 and 7 of the Explosives Act 1884, the Central Government notified these rules w.e.f. 24-2-1981. They have 10 chapters 78 rules, 5 schedules and forms A to F.

Definitions (R. 2) : Out of 34 definitions majority are scientific definitions. Therefore they are reproduced below.

1. **“Competent Person”** : means a person recognised by the Chief Controller to be a competent person, or a person who holds a certificate of competency for the job in respect of which competency is required from an institution recognised by the Chief Controller in this behalf.

2. **“Compressed Gas”** : means any permanent gas, liquefiable gas or gas dissolved in liquid under pressure or gas mixture which in a closed gas cylinder exercises a pressure either exceeding 2.5 kgf/cm^2 abs. (1.5 kgf/cm^2 gauge) at $+15^\circ \text{C}$ or a pressure exceeding 3 kgf/cm^2 abs. (2 Kgf/cm^2 gauge) at $+50^\circ \text{C}$ or both;

Explanation: Hydrogen fluoride falls within the scope of compressed gas although its vapour pressure at 50°C is 1.7 to 1.8 atmospheric gauge;

3. **“Critical Temperature”** : means the temperature above which gas cannot be liquefied by the application of pressure alone

4. **“Dissolved Acetylene Cylinder”** : means a cylinder having a valve and with or without safety devices, containing a porous mass, a solvent for the storage of dissolved acetylene and at least sufficient acetylene to saturate the solvent at atmospheric pressure and at a temperature of $+15^\circ \text{C}$.

Explanation : Acetone or any other solvent used shall not be capable of chemical reaction with the acetylene gas or with the porous mass or with the metal of the cylinder or valve.

5. **“Dissolved Gas”** : means a gas which under pressure is dissolved in a fluid solvent appropriate to the particular gas as for example, acetylene in acetone or ammonia in water.

6. **“Filling Pressure”** : means the maximum permissible gauge pressure, converted to $+15^\circ \text{C}$, at which a gas cylinder for permanent gas or gas dissolved under pressure can be filled.

7. **“Filling Ratio”** : means the ratio of the weight of a liquefiable gas introduced in the cylinder to the weight of the water the cylinders will hold at 15°C ;

8. **“Flammable Gas”** : means any gas which, if either a mixture of 13 percent or less (by volume) with air forms a flammable mixture or the flammability range with air is greater than 12 percent regardless of the lower limit and these limits shall be determined at atmospheric temperature and pressure.

Explanation : “Flammability range means the difference between the minimum and maximum percentages by volume of the gas in mixture with air that forms a flammable mixture;

9. **“Gas Cylinder” or “Cylinder”** : means any closed metal container intended for the storage and transport of compressed gas, designed not to be fitted to a special transport or under-carriage, and having a volume exceeding 500 ml. but not exceeding 1000 litres.

10. **“High Pressure Liquefiable Gas”** : means a liquefiable gas having a critical temperature between -10°C and $+70^\circ \text{C}$.

11. **“Hydrostatic Stretch Test”** : means subjecting the cylinder to hydrostatic pressure equal to the test pressure of the cylinder and recording the permanent stretch undergone by the cylinder;

12. **“Hydrostatic Test”** : means the test to which a cylinder is subject to a hydrostatic pressure equal to the test pressure of the cylinder;

13. **“Installation”** : means any premises wherein any place has been specially prepared for the manufacture (filling) or storage of compressed gas in cylinder.

14. **“Liquefiable Gas”** : means a gas that may be liquefied by pressure at -10°C but will be completely vaporised when in equilibrium with normal atmospheric pressure (760 mm. hg) at 30°C ;

15. **“Low Pressure Liquefiable Gas”** : means a liquefiable gas having critical temperature higher than $+70^\circ \text{C}$.

16. **“Manufacture of Gas”** : means filling of a cylinder with any compressed gas and also includes transfer of compressed gas from one cylinder to any other cylinder;

17. **“Permanent Gas”** : means a gas whose critical temperature is below -10°C that is to say a gas which cannot be liquefied under any pressure at a temperature above -10°C ;

18. **“Test Pressure”** : means the internal pressure required for the hydrostatic test or hydrostatic stretch test of the cylinder, as follows;

- 1 For permanent and high pressure liquefiable gases it should be calculated from the following :

$$\text{Ph.} = \frac{200 \text{ t. Re}}{(\text{Do}-t)}$$

Where

Ph. = Test pressure in Kgf/cm^2 .

Do = Outside diameter of the cylinder in mm.

t = Minimum calculated wall thickness of the cylinder shell in mm.

Re = Minimum specified yield strength of the material of cylinder in Kgf/mm^2 . It is limited to 75 percent of the minimum value of tensile strength in the case of normalised cylinder and 85 percent of the minimum value of the tensile strength for quenched and tempered cylinder, provided that the value of test pressure shall not exceed 80 percent of the yield strength.

- 2 For low pressure liquefiable gas one and a half times the saturated vapour pressure of the gas at 65°C or as specified in IS: 8867, whichever is higher.

19. **“Water Capacity”** : means the volume of water in litres, a cylinder will hold at 15°C .

20. **“Working Pressure for Low Pressure Liquefiable Gas”** : means the saturated vapour pressure at 65°C ;

Explanation: for the values of saturated vapour pressure of different gases see IS:3710.

21. **“Working Pressure for Permanent Gas”** : means the internal pressure of the gas in the cylinder at a temperature of 15°C ;

22. **“Yield Strength”** : means the stress corresponding to a permanent strain of 0.2 percent of the original gauge length in a tensile test. For practical purposes it may be taken as a stress at which elongation first occurs in the test piece without the increase of load in a tensile test.

Chapter-II : General Provisions (R. 3 to 27) :

1 *Cylinders* and valves should have been constructed as specified in Sch. I, test and inspection certificate should be available with information in Sch. II. Any person desiring to fabricate cylinders should apply in Sch. III (R.3).

2 *Valves* should be of the IS, type and design prescribed in R.4.

3 *Safety Relief Devices* fitted on cylinders should be as per IS 5903. Cylinders containing poisonous or obnoxious gases should not have such device (R.5).

4 *Marking on Cylinders* : as per rule 6.

5 *Marking on Valves* : as per R.7.

6 *Identification Colours* : as per IS:4379 for industrial cylinders and IS 3933 for medical cylinders. New gases and gas mixtures for which such colours are not provided in IS, shall be painted with following colours.

Type of Gas	Cylinder Shell	Band at neck
Non-flammable & non-Toxic	White	-
Non-flammable &	White	Yellow

Toxic		(IS 356)
Flammable & Non-toxic (other than LPG)	White	Red (IS 537)
Flammable & Toxic	White	Red & Yellow (IS 537 & 356)

Cylinders of gas mixtures should be marked “Gas mixture” or “mixed Gas” (R. 8).

7 *Labelling* on cylinder shall show the name of the gas and address of its filler. A warning notice should be attached to it with instructions that : (i) the colour of the cylinder will not be changed. (ii) No other gas will be filled in it. (iii) No flammable material should be stored in or near the room of the cylinder. (iv) No oil or lubricant should be applied on valves or fittings. (v) No cylinder should be accepted whose test date is over (R.9).

8 *Restriction* : No delivery or dispatch except to licence holder, defence forces, port or railway authorities (R.10). Restriction on filling to endanger serviceability (R.19).

9 *Repairing* : not allowed except as otherwise provided in R.11 & 12.

10 *Prohibition* of employment of a person below 18 years or intoxicated (R.13) and on smoking or allowing fires, lights, or flammable substances, except blow pipe flame for repairs (R. 14).

11 *General Precautions* are that the cylinders should be maintained in good condition, oil or lubricant not to be used on valves or fittings, no exposure to sun, high temperature of flammable/explosive material, security nut on a compressed gas cylinder and uncontrollable leaky cylinder to be removed in an open space and the filler be informed (R.15).

12 *Special precautions* are to avoid accident due to fire or explosion and to comply with these rules and licence conditions (R.16).

13 *Competent person* should supervise operations (R.17).

14 *Handling & Use* include proper support, adequate strength of trolley and cradle, careful handling to avoid shock, no sliding, dropping, knocking, rolling or playing with cylinders, liquefied gas cylinders to be kept upright and work places should not be shown as storage places for the purpose of licensing (R.18).

15 *Storage precautions* to be observed are :

1 To store in a dry, cool, under cover, well ventilated place and away from source of heat or ignition.

2 Room of fire resistant construction.

3 LPG and dissolved gas cylinders should be kept in upright position.,

4 Flammable and toxic gas cylinders should be kept separate by a partition wall.

5 Conditions to cause corrosion or fire should be avoided.

6 Filled and empty cylinders should be segregated (R.20).

16 *Electrical installation* should be flameproof conforming to IS and effectively earthed (R.21).

17 *Impurities* in gas to cause corrosion or explosion should be avoided. The gas should be dry, moisture less than 0.02 g/m² of gas, aqueous phase cannot be separated at 0°C and free from sulphurous impurities (R.22).

18 *Cylinder subjected to fire* shall not be reused except after proper repairs and testing. Such acetylene cylinders are to be condemned or destroyed safely (R.23).

19 *Charging* after prescribed periodical re-testing only (R.25).

20 *Owner* has to keep prescribed record (R.26).

Chapter - III : Importation of Cylinders (R. 28 to 33) :

Licence necessary (R.28). Importation by sea, land and air after permission from the Custom Collector, Central Government and Director General Civil Aviation only (R.29 to 33).

Chapter - IV : Transport of Cylinders (R, 34 to 38) :

No transport on a two- wheeler. No projections, no rough handling, excessive shocks or local stresses, no movement, striking each other or falling down and no transportation with highly flammable or corrosive article (R. 34).

Restriction to transport flammable gas cylinders alongwith any compressed gas cylinders [except as u/r 52 (c)] and to transport toxic or corrosive gas cylinders alongwith food-stuffs (R. 35).

In loading/unloading, lifting magnet shall not be used. While using crane or forklift, a proper cradle with chains or wire slings shall be used. (R.36).

Valves are to be protected against damage by a stout metal cap, metal cover, metal ring or a grill approved by the CC. Caps or covers of highly toxic gas cylinders like HCN, phosgene, cyanogen, cyanogen chloride, shall have vent to release pressure inside (R.37).

No person shall tender or transport any leaky cylinder. If a leak develops during transport, the cylinder (flammable or toxic) shall promptly be removed to an isolated open place away from any source of ignition and the filler or the consignor shall be contacted for advice (R.38).

Chapter - V : Examination & Testing (R. 39 to 44) :

Periodicity as per IS or approval by the CC, testing station should have facilities set forth in Sch. IV (R.39).

Safe emptying of the content, thoroughly cleaning by steam or approved solvents, blasting, rotary wire brushing or burn-out treatment (under 300 °C) for rust removal and visual examination for surface defect (R.41).

Then hydrostatic or hydrostatic stretch test as per IS : 5844 and stated in rule 42. After the test drying and stamping are necessary.

Any cylinder which fails to pass any test or examination or loses its tare weight by over 5% or found unsafe, shall be destroyed by flattening or cut into pieces so that it cannot be joined to form a cylinder. All markings shall be defaced and record be kept (R.43).

Particulars of full record to be kept at a testing station are given in R.44.

Chapter-VI is for dissolved Acetylene gas cylinders (R.45 to 50).

Chapter-VII is for filling, possession and their licence procedure (R.51 to 72), Chapter- VIII on power to exempt (R.73) Chapter-IX on Accidents and Inquires (R.74 to 76) and Chapter X on powers of Controller of Explosives (R.77 to 78).

The Explosive Substance Act, 1908 :

This Act (6 of 1908) was enacted on 8-6-1908 and it has seven sections only. It extends to the whole of India and applies also to the citizens of India outside India.

Explosive substance as defined in its Sec. 2, includes any materials for making any explosive substance, apparatus, machine, implement intended to be used to cause any explosion.

Permission of central government is necessary for trial for any offence under this Act (Sec. 7).

For causing an explosion unlawfully and maliciously to endanger life or to cause serious injury to property, whether any injury happens or not, the punishment is imprisonment for life or any shorter term to which fine may be added (Sec. 3).

For any act or conspiracy with intent to cause, unlawfully and maliciously an explosion in India of a nature likely to endanger life or to cause serious injury to property in India, whether any explosion does or does not take place, the penalty is imprisonment upto 20 years to which fine may be added (Sec. 4).

For making or keeping any explosive substance under suspicious circumstances for unlawful object, the penalty is imprisonment upto 14 years to which fine may be added. (Sec.5).

For helping i.e. supplying money, premises, material etc. or abetting the commission of any offence under this Act, the penalty is the same for that offence (Sec. 6).

Petroleum Act, 1934 :

This Act (No. 30 of 1934) came into force from 30-3-1937 (enacted on 16-9-1934) to consolidate and amend the law relating to import, transport storage, production, refining and blending of petroleum. It extends to the whole of India. It has 4 chapters and 31 sections. Its abstract is as under :

Definitions :

Petroleum means any liquid hydrocarbon or mixture of hydrocarbons and any inflammable mixture (liquid, viscous or solid) containing any liquid hydrocarbon.

Flashpoint of petroleum means the lowest temperature at which it yields a vapour which will give a momentary flash when ignited, determined in accordance with chapter - II and rules made there under :

Petroleum class	F.P. Range
A	< 23 ⁰ C
B	23 to <65 ⁰ C
C	65 to < 93 ⁰ C

Motor Conveyance means any vehicle running on land, water or air and in which petroleum is used to generate the motive power.

Control over Petroleum (Chap. I, Sec. 3 to 13) :

The Central Government may make rules for import, transport, production refining and blending of petroleum (Sec. 3 to 5).

On receptacles of class A petroleum the words “ Petrol” or “Motor Spirit” should be mentioned. This is not required where quantity is less than 10 litres or on a fuel tank attached with a motor conveyance or engine, a pipeline, underground tank or exempted by the Central Government (S. 6).

Licence is not required (i) for class petroleum if it is contained in a receptacle having less than 1000 litres capacity and total quantity at any one place does not exceed 2500 litres or (ii) for class C petroleum if total quantity at any one place does not exceed 45000 litres and stored or transported as per rules u/s 4 (S. 7).

No licence is necessary to keep less than 30 litres class A petroleum not intended for sale. Then it can be stored in metal container of maximum 25 litres capacity and non-metal container of maximum 1 ltr capacity (S. 8).

To use as a fuel in a motor conveyance, not more than 100 litres class A petroleum can be stored or conveyed (S. 9).

No licence is needed by Railway to carry petroleum (R.10). This chapter is not applicable to any petroleum having flash point above 93⁰C (S. 11).

Testing of Petroleum (Chap. II Sec. 14 to 22) :

The Central Government can make rules for taking samples for testing and authorise any officer for that purpose (S. 14 to 17) to give certificate of testing (S.19) or retesting (S. 20). The officer shall use a standard test apparatus (S.15, 16 & 18). The Central Government has rule making powers u/s 21 and 22.

Penalties & Procedure (Chapter III S. 23 to 28):

General penalty is upto Rs. 1000 or one month or both and enhanced (for repeated offence) penalty upto Rs. 5000 or 3 months or both (S. 23). Petroleum together with receptacles can be confiscated (S. 24). Notice of accident shall be given to the nearest magistrate, police station and to the Chief Controller of Explosives (S. 27). In case of death or serious accident, inquiry u/s 176 of the Cr. P. C., 1973 shall be held by a Magistrate or a Police Commissioner.

Supplemental (Chapter - IV S. 29 to 31) :

Rule making power and procedure and inclusion of rules to provide for protection of public from danger of petroleum (S. 29). The Central Government can limit or restrict the powers of any local authority (S. 31).

The Petroleum Rules, 1976 :

These rules were enacted u/s 29 of the Petroleum Act, 1934. They came into force on 1-8-1976. They have 12 chapters, 201, rules, 5 Schedules and 16 Forms under the 2nd Schedule. Its abstract is given below :

Chapter -I : Preliminary (R. 1 to 13) :

Definitions :

‘Adequate’ in relation to ventilation, means the flammable gas-air mixture below the lower explosive or inflammable limit (LEL) or in relation to fire fighting facilities, those as per recognised standards or codes of safety.

Competent person means a person recognised by the CCE or by an institution recognised by the CCE.

Container means a receptacle for petroleum of less than 1000 ltr. capacity.

Tank means a receptacle for petroleum of more than 1000 ltr. capacity.

Electric apparatus includes motors, starters, lamps, switches, junction boxes, fuses, cut-outs, or any other appliance, equipment or fitting which operates electricity.

Hot work means any work which involves welding, burning, soldering, brazing, blasting, chipping by spark producing tools, use of certain power driven tools, non-flame proof electrical equipment or equipment with internal combustion engines and including any other work which is likely to produce sufficient heat capable of igniting inflammable gases.

Protected area means the safety distance specified by the licence condition under these rules.

Protected Works include dwelling house, assemble, dock, fuel yard, furnace, kiln, chimney, petroleum storage, public road, railway siding for oil and overhead high tension power lines.

Inspector, Sampling officer and Testing officer are those authorised u/s 13, 14 and 17 respectively.

There are many other definitions also like installation, petroleum in bulk, service station, store shed, and some vehicles with tank (R.2).

General Provisions :

Delivery and despatch not possible without storage licence. Class B petroleum upto 15000 litres in air tight approved container can be despatched to a person not holding a storage licence for immediate disposal. Rule not applicable for despatch to the Defence Forces (R.3). Approval of CC is necessary for class A petroleum container of more than 1 litre capacity and class B & C petroleum container of more than 5 litre capacity (R.4). Minimum 5% and 3% air space are necessary for class B and C petroleum respectively (R.6). Containers for Class A petroleum should be of sound material and construction, approved type and of the following minimum thickness of iron or steel sheet -

Container capacity in litres, exclusive of 5% free Space	Minimum Thickness in mm
Up to 10	0.443 (27 BG)
Exceeding 10 and upto 25	0.63 (24 BG)
Exceeding 25 and upto 50	0.80 (22 BG)

Exceeding 50 and upto 200	1.25 (18 BG)
Exceeding 200 and upto 300	1.59 (16 BG)

The capacity of any container (Class A) shall not exceed 300 litres. Higher capacities for specified purposes need approval by CC. 5% air space necessary (R. 5).

Repairs or hot work after full cleaning of petroleum and its vapour or after certified by a competent person (R. 8).

Escape of petroleum to be prevented (R. 9). No person below the age of 18 or intoxicated shall be employed (R. 10). Smoking, fires, lights, matches etc. prohibited (R. 11). No person shall commit or allow other to commit any act which may lead to any accident (R. 12). Fees (R. 13).

Chapter -II : Importation of Petroleum (R. 14 to 27) :

Import licence necessary save as otherwise exempted. Rules for importation by sea specify 12 major parts, anchorage of ships, production of certificate and licence to the Collector of Customs, no landing without his permission, of barges or lighters and transshipment from one ship to another (R. 14 to 24.).

Rules by importation by land also specify fixed places, submission of declaration (Form-I) certificate of storage accommodation (Form-II) and the licence to the Collector of Customs and no unloading without his permission (R. 25 to 27).

Chapter - III :Transport of Petroleum (R.28 to 101) :

Part - I : General (R. 28 to 32) :

No leaky tank or container containing petroleum shall be tendered for transport (R. 28). Filled containers should be kept upward (R. 29). Petroleum in bulk should not be carried with passengers or combustible cargo (R. 30). Smoking, matches, lighters etc. prohibited (R. 31). Loading or unloading should not be done between the hours of sunset and sunrise unless adequate lighting and FFE are kept ready (R. 32).

Part - II : Transport by Water (R. 33 to 50) :

Licence from the licensing authority is necessary (R. 33). Vessel should be made of iron or steel and of ample dimension (R. 34). All tanks on ships should be fitted with manholes with screw cover and air light joints and filling and suction pipes and valves nearby to the bottom and filling and discharge through pipes and valves only. For class A petroleum, tanks should have vent or relief valve with wire mesh (more than 11 meshes per linear centimetre) and similar ventilators to all spaces around tank (R.35). Other provisions include exhaust outlet with spark arrestor, no petrodriven engine, quick action closing valve on fuel feed pipe, suitable ventilators, four or more, fire extinguishers, 0.02 m³ of dry sand, non-sparking hammer, red flag, life-boats, ventilation and cleaning of holds and tanks, responsibility of master of vessel, loading/unloading through armoured hose and metal pipes electrically continuous and free from leakage, prohibition of naked lights, fire, and smoking, FFE in ready condition etc. (R. 36 to 50).

Part-III : Coastwise Transport of Class A Petroleum not in bulk :

Rules 51 to 61 provide conditions and precautions for such transport.

Part-IV : Transport on Land by Vehicles (R. 62 to 86) :

Tank vehicles should be built, tested and maintained as provisions in 3rd schedule and of the type approved by the CC. Special safety fittings should be got approved (R.63). Class A and B petroleum can

be filled upto 97% and Class C petroleum upto 98% of the gross carrying tank capacity (R.64). Tank vehicle should not be used for other purpose or carry other articles except authorised by the CC (R.65, 69). Trailers (R.66). For every mechanically propelled vehicle used to carry petroleum otherwise than class B or C, the engine should be diesel engine or internal combustion engine, exhaust pipe should be in front of the tank or load and fitted with an approved spark arrester and silencer or muffler, the engine intake or air cleaner should have flame arrester, fire resisting shield between the cab and the tank or load (i.e. rear side), fuel tank with stout steel guard and lock in the filling caps (R.70).

Electrical installation should not exceed 24 volts, wiring should be heavily insulated and adequate for maximum load, should have over current protection (fuses or automatic circuit breakers) encased in covering, sealed junction boxes, heavy duty switch to cut off battery and generators, motors and switches of flameproof type if not installed within engine compartment (R.71).

Portable fire extinguisher necessary (R.72). Vehicle should be constantly attended by a person who knows these rules (R.73). No parking on a public road or in congested area or in 9 mt. of any source of fire (R.74). Licence to transport necessary (R.75). Loading, unloading in a licensed premises only (R.76). Leaky, defective or unlicensed tank vehicle should not be filled (R.77).

Precautions against static charges include earthing and electrical continuity of pipelines, earth boss with a flexible cable and clamping device, earthing of tank, filling pipe and chassis during loading, dip-rod should not be completely raised above the liquid level during or within one minute of the completion of loading. Filling rate should not exceed 1 mt./sec until the filling pipe is completely submerged and there after it may be gradually increased but shall not exceed 6 mt./sec at the delivery end. The CC can permit a faster loading rate in case of petroleum having higher conductivity rate (R.78).

Loading/unloading after stopping of the engine and battery isolated. Restart only after the tank and valves are securely closed (R.79). No movement of vehicle during loading/unloading (R.80). Product contamination to be avoided by selecting correct filling hose and refilling of tank of class A petroleum with any other petroleum only after draining of residual oil (R. 81). Except during loading/unloading, the filling pipe, discharge faucet and dip pipe shall be kept securely closed (R. 83). No loading/unloading during night hours except approved electric lights provided (R. 83). No fire, light, smoking or articles to cause fire allowed on vehicle (R. 84). No repair of tank unless certified by a competent responsible person (R. 85). No petroleum to be carried with passengers save as provided (R. 86).

Part -V :Transport by Pipelines (R.87 to 101) :

This part is applicable to petroleum pipe lines other than those in the area of operation of natural gas and/or oil or within refineries and installations (R.87).

It provides for right of way to be acquired (R.88), approval from the CC obtained (R.89), design as per standard code, made of suitable steel which is safe for conditions under which it is to be used, provision for expansion, contraction, prevention of excessive stresses, by pass relief valves, pressure limiting stations, automatic shut down equipment to prevent pressure rise more than 10% of the designed internal pressure, gate valves at different locations (R.90), laying criteria (underground as far as possible) (R.91), protection against corrosion (R.92), hydraulic test (at 1.1 times the design internal pressure and maintaining for 24 hours) at an interval of 12 months (R.93), shut down procedure (R.94), patrolling of pipeline, communication facilities at frequent intervals along the pipeline of length more than 2 km (R.95), checking of gauges at tanks or booster pump stations at least once a year (R.96), addition, alteration only after approval from the CC (R.97) and power of the CC to require relay or repair for public safety (R.99) and of inspection and examination (R.100). The fire or major leakage in a pipeline or connected facilities should be reported immediately by the person in-charge of the pipeline to the nearest magistrate or police station and by telegram to the CC, Nagpur (R.101).

Repair & maintenance of pipeline u/r 98 includes -

- Inspection by an experienced engineer for assessment of work.
- written work permit specifying precautions to be observed and procedure to be followed.
- The section of the pipeline shall be isolated, drained and purged with inert gas or steam or kept filled with water or treatment approved by the CC.
- Work of cutting or welding to be carried out by an experienced person in accordance with the permit.

- Only mechanical cutters shall be used for cutting the pipeline or any connection thereof unless it has been purged with an inert gas.
- Separation of pipeline or valve fitted to it only after providing electrical bond between the parts to be separated and the bond shall not be broken till the parts have been rejoined.
- Reuse of the repaired section only after hydrotest as stated in rule 93.

Chapter-IV : Electric Installation (R. 102 to 115) :

Electric wiring and apparatus to be used in any place where petroleum is refined, blended, stored, loaded or unloaded, should be in accordance with this chapter (R.102).

Classification of Hazardous Area (R. 103, 104) :

Hazardous area means where (i) Petroleum having FP below 65°C or any inflammable gas or vapour capable of ignition is likely to be present or (ii) Petroleum or any inflammable liquid having FP above 65°C is likely to be refined, blended, handled or stored at or above its FP. (R. 103).

It is classified as under :

Division	Condition
0	Where inflammable gases /vapours are likely to be continuously present.
1	Where they are likely to be present under normal operating conditions.
2	Where they are likely to be present only under abnormal operating conditions or failure or rupture of an equipment.

Thus zone 0 is more hazardous than zone 1 and zone 1 more hazardous than zone 2. On any question regarding applicability of these divisions, the decision of the CC shall be final (R.104).

Extent of hazardous area is laid down in the 4th Schedule. The CC can increase or reduce it based on special circumstances (R.105).

Fixed Electrical Apparatus (R.106) :

Division	Type of Apparatus
0	Intrinsically safe
1	(i) Intrinsically safe or a flameproof type, or (ii) Industrial type apparatus housed in enclosure or in a room made safe by purging or pressurising atmosphere and interlocked to stop electric supply automatically or to give warning to stop it in case of failure of the purging or pressurising system.
2	(i) Non sparking apparatus or (ii) Apparatus permitted in Div. 1.

Fixed Electric Wiring (R.107) :

It should be effectively sealed at all joints, mechanically protected, adequately supported and consisting of approved armoured cable or metal sheathed cable or insulated cables in a galvanised conduits with approved flame proof fitting or mineral insulated cable of approved type with flameproof glands at all joints and details mentioned in the rule.

Earthing & Bonding (R. 108) :

Electric systems and equipment should be earthed with resistance of 4 ohms or a value that ensures the safe operation of the protective device in the circuit whichever is lower.

All non-current carrying metallic parts of electric apparatus or other metallic objects should be earthed with resistance of 10 ohms.

All joints in pipelines, valves, plants, storage tanks, associated facilities and equipment for petroleum shall be electrically bonded with the resistance value between each joint not exceeding 1 ohm.

Other Provisions :

Cathodic protection as in rule 109. Electrified railway systems (overhead lines and live contact rails) are not allowed within a refinery or an installation. They should be terminated outside the area where tank wagons are loaded or unloaded. Both the rails of spur lines shall be insulated from a railway siding which is used for the loading or unloading of tank wagons (R.110). Portable electric apparatus or lamp of 25 volts, approved by the CC (Who can permit upto 55 volts) can be used in a hazardous area (R.111). Maintenance to retain characteristics (R.112). Repair and test after cutting off voltage. In Div. 1 area, after gas-testing and certified safe by a competent person (R.113). Certificate of electric installation by a competent person (R.114). Precautions against corrosion (R.115).

Chapter -V : Storage of Petroleum requiring licence (R.116 to 135):

Licence necessary (R.116). Precautions against fire (R.117). Experienced supervisor necessary (R.118). Cleanliness (R.119). Wall or fence of at least 1.8 mt. height to prevent unauthorised entry (R.121). Dyke or bund (enclosure) surrounding above-ground-tank with drain valve (to be opened only while draining water) out side the dyke with dyke floor at higher level than the surrounding floor (R.120), marking of capacity on tanks (R.123) and protection against corrosion by protective coating or cathodic protection etc. (R.125).

Tank should be of iron or steel or other suitable material as per IS or other code approved by the CC. It should be on firm foundation or support of non-combustible material. Its height (from bottom to top curb angles) shall not exceed 1.5 times its diameter or 20 mt. whichever is less. Air space of minimum 5% of the total capacity should be maintained (R.124).

Before use the tank should be tested by water pressure by a competent person. It shall not be passed through any pipe or pump ordinarily used for the conveyance of petroleum. Proforma of certificate of such testing is given u/r 126.

Tanks should be earthed by two separate connections placed at opposite extremities. The resistance to earth shall be less than 7 ohm and that of the earth plate shall be less than 2 ohm, (R.127.) Testing of earth connection necessary once in 1 year by a competent person. Its record should be maintained (R.128). No night working unless approved electric lights provided as per chapter - IV (R.129).

Certificate of Safety is required from a competent person by the licensing authority in a proforma given u/r 130.

Prior approval of specifications and plans of premises required u/r 131. Electric motor or internal combustion engine to drive pumps for pumping petroleum should be got approved by the CC (R.132). Licence number should be marked on premises (R.133). An extract of certain rules to be displayed (R.134).

Chapter - VI :Storage of Class - C Petroleum not requiring licence (R. 136 to 140) :

Provisions of previous chapter-V are not applicable to class-C petroleum to be stored without licence u/s 7 (R.136). It shall not be stored together with other class of petroleum except as permitted by licence (R.137). Bulk storage tank should be approved by the CC. Tanks of more than 5000 litres. capacity should have dyke or be placed inside a pit to contain at least the volume of the largest tank within it. A drainage pipe with valve fitted outside shall be provided and kept closed. A distance of more than 1.5 mt. shall be kept between the edge of dyke and any protected works (R. 138).

Class-C petroleum not in bulk, if exceeds at any one time 2500 litres be stored in a storage shed of which either the doors or openings are built up to a height 30 cm above the floor or the floor shall be sunk to a depth of 30 cm., (R.139).

Prior report to store class -C petroleum exceeding 5000 litres without licence shall be sent to the CC stating the location of the premises (R.140).

Chapter-VII of licences (R.141 to 162), Chap. IX of Tetraethyl lead mixtures (R.182 to 186), Chap. X of testing of petroleum (R.187 to 198 B), Chap. XI of notice of accident (R.199) and Chap. XII of exemption (R. 200, 201) are not discussed here. But abstract of chap. VIII is given below.

Chapter-VIII :Refining and Blending of Petroleum (R. 163 to 181) :

Project report with specifications and plans showing the arrangements of tanks, stills, furnaces, electric installations, pump houses, drainage, ETP, FFE, fencing, gates and all plants and buildings where it is proposed to refine, crack, reform or blend, petroleum (it is called refinery in this chapter) shall be sent to the CC in triplicate and a scrutiny fee of Rs. 200 (R.163). A copy each of the approved plans shall be kept at the refinery (R.164). Alterations are also to be approved (R. 165).

Fireproof materials should be used in buildings where petroleum is to be handled (R.166). Storage tanks should be more than 90 mt. away from any still, boiler or furnace (not applicable to class C fuel for a boiler the tank capacity not exceeding 24 hours stock) (R.167). Storage tanks of LPG or its filling facility should be more than 90 mt. away from any still, boiler or furnace or 30 mt. away from any storage tank, pump-house or facility for blending or filling of petroleum or from any protected work (R.168). Flare shall also be 90 mt. away from any tank, still, pump-house or any refinery activity or LPG (R.169).

Effluents and drainage should not cause any pollution or harmful effect on animal or vegetable life. Weekly samples shall be drawn and tested in the refinery laboratory for their oil content, acidity, alkalinity and record be maintained (for at least 6 months) and shown to an Inspector. The sewerage shall be independent of other drainage system. All drains shall have adequate capacity to prevent any flooding or backing up and of such construction to prevent leakage or be affected by the chemicals in contact. Trash racks (grills) to be fitted to prevent entry of rubbish to form a plug. Manholes, vents to release gases, fire-traps and gas traps on the upstream side of the oil interceptors and fitted with vents to liberate gas at a safer height are also to be provided (R.170).

No fire, source of heat or light capable of igniting inflammable vapours shall be allowed except in the firing spaces, stills or boilers. Smoking not permitted except in places specially approved by the CC (R.171).

Work permit from a competent person is necessary for maintenance and repair work and entry into confined spaces, closed drain or manhole. It shall be issued for a limited period during which known conditions will remain safe and after inspection and testing by the competent person, for gases and lead content will be carried out by suitable trained persons and with standard instrument (R. 172).

For fire control a well organised and trained fire fighting service with necessary materials and fixed, mobile and portable equipment is required. Adequate water supply should be available at all strategic points by means of an independent ring main or grid with isolating valves. The main shall be kept constantly pressurised by two or more boosting pumps of adequate capacity and working automatically when pressure drop occurs in the main. At least one boosting pump should be independent of power supply (e.g. diesel driven). All mains shall be fitted with hydrants at convenient places not more than 30 mt. apart. If mains water supply is likely to be interrupted, static water supply of adequate capacity shall be provided. Training for personnel necessary (R. 173).

All petroleum as it leaves the stills may be pumped back to services tanks for fuel or refinery storage tank and not be stored in the vicinity of stills and boilers (R. 174) Danger from static electricity shall be prevented (R. 175). Warning notices to be displayed (R. 176). All above ground pipelines and cables shall be identified by taping, stencilling, colouring etc. Pipelines, valves, route of underground cables and route of overhead pipelines and cables crossing roads shall be protected against damage (R. 177). All plants, instruments and equipment shall be inspected, tested and records maintained (R. 178). All operators shall be trained in safe operation. Written procedures shall be established to start up, shut down, gas free plants and emergency actions. Supervisors, shall ensure safe operation and safety facilities. (R. 179).

An occurrence of fire shall be reported immediately to the CC and to the nearest police station (R. 180). When refinery is closed down the area within the fence shall be cleared of all petroleum having FP < 95°C as soon as possible (R. 181).

Table 1 and Table 2 for *safety distance* are important for plant layout. Third schedule gives design and construction of 'Tank vehicles' for transporting petroleum in bulk.

Calcium Carbide Rules, 1987 :

Calcium Carbide Rules 1987 were made by the Central Govt. u/s 4 of the Petroleum Act, 1934. They came into force from 20-2-1987. They have 8 chapters, 50 rules, 2 Schedules and 4 Forms.

Definitions include Act (i.e. the Petroleum Act, 1934), Carbide, Controller of Explosives, district authority, Inspector, Sampling Officer etc., but the important definition from safety point of view is that of *prescribed receptacle* which means a receptacle made of steel or any other approved material but not containing copper, is hermetically closed except at the time of filling or withdrawing the contents and bears the warning "Calcium Carbide, Dangerous if not kept dry and the contents of this package are liable, if brought into contact with moisture, to give off a highly inflammable gas".

Chapter-II of general provisions (R.3 to 8) prescribes use of approved receptacles, need of a license for delivery or dispatch, precautions against contact with water, disposal of carbide by submerging in deep water or spreading out in open and preventing fire, prohibition of employment of a person below 18 years age or intoxicated and prohibition of smoking, fires and lights.

Chapter-III prescribes rules 9 to 18 for importation of carbide by Sea, Land and Air.

Chapter-IV (R.19 to 24) is on transportation of carbide. Carbide upto 5 kg. can be transported by packing in receptacles of not more than 1 kg (R.19). With the permission of CC more quantity can be transported by keeping receptacles of more than 100 kg in a licensed building. If receptacles are designed and tested to safely carry the load to prevent ingress of water, he can permit a packing of more than 100 kg. Such packing should be used for directly charging into an acetylene generator and not for repacking into any other receptacle (R.20). While transporting by rail it shall not be stored in any goods shed but in open under waterproof sheet (R.21). By passenger train it cannot be transported more than 250 kg by one train. It shall be put in a brake van which shall be well ventilated, watertight and without source of ignition (R.22).

To transport by water, Merchant Shipping Carriage of Dangerous Goods Rules 1978 and to transport by air rules of the Director General, Civil Aviation shall be followed (R.23, 24).

Chapter-V (R.25 to 29) is on storage of carbide. Carbide should be pure i.e. without any flammable impurity and as per IS:1040 (R.25). No storage without license for quantities more than 250 kg. For lesser quantities requirements are : Dry and well ventilated storage shed, partition with attached building, prevention of unauthorised entry and closed cover on receptacles (R.26).

Safety distance from the licensed storage and other premises should be as under :

Quantity (Kg)	Distance (mt)
200 - 500	3
500 - 5000	6
> 5000	9

Not more than 250 T carbide shall be stored in any one room and not more than 1000 T in any one building.

If carbide storage is attached to Acetylene plant, safety distance should be 15 mt.

Storage building should be surrounded by a wall (fence of at least 1.8 mt) (R.27).

Storage premises should be of non-flammable construction with floor height 30 cm from the surrounding level. Ventilator near ceiling and floor, both, necessary. They should have two layers of non-corroding wire mesh, without copper and mesh more than 11 per linear centimetre. Gangway space 60 cm around the stack. Required floor area 2 m²/tonne of carbide, provided statch height limited to 2 m. and shed height less than 3 m. (R.28).

Receptacles should be stacked on racks or trestles or on a raised platform of 30 cm, or more above the inner floor level (R.29).

Chapter-VI (R.30 to 48) is on Licenses. It provides for grant of license, application, plans, prior approval, amendment, renewal, refusal, suspension, cancellation, expiration, appeals, transfer, loss, demand, fees etc.

Chapter-VII provides for notice of accidents (R.49). Telegram following within 24 hours by a letter of particulars, to the CCE, Nagpur and to the nearest Magistrate or the Police Station. All wreckage and debris shall be left untouched except necessary to be removed for rescue.

Chapter-VIII (R.50) provides for repeal and savings. The Calcium Carbide Rules 1937 are repealed.

See also IS:6819 for Code of Safety for Calcium Carbide.

Laws on Atomic Energy & Radiation :

The Atomic Energy Act, 1962 :

The old Act (Atomic Energy Act, 1948) was repealed by passing of this Act. The Radiation Protection Rules, 1971 are the rules made under this Act. They control the mining, discovery, acquisition, production and use of radioactive substances like uranium, thorium, plutonium, provide for safety, disclosure of information, radiological safety officer and various types of precautions. Their short summary is given below :

This Act No. 33 of 1962 was passed on 15-9-1962. It has 32 sections. Its preamble says that it is an Act to provide for the development, control and use of atomic energy for the welfare of the people of India and for their peaceful purposes and for matters connected therewith. It extends to the whole of India.

Section 2 defines as under :

‘Atomic energy’ means energy released from process including the fission and fusion processes.

‘Radiation’ means Gamma rays, X-rays and rays consisting of alpha particles, beta particles, neutrons, protons and other nuclear and sub-atomic particles but not sound or radio waves or visible, infrared or ultraviolet light.

‘Radioactive substance or material’ means any substance or material which spontaneously emits radiation in excess of the levels prescribed by notification by the Central Government.

Outer radiation emission rate 0.1 microcurie (or inner 0.002 microcurie) per gram makes the material, legally, radioactive material.

The words fissile material, minerals, plant, prescribed equipment, prescribed substance etc. are also defined. Other provisions are as under :

1. The Central Government's powers to deal with, research into and dispose of atomic energy or radioactive substance, to declare as 'restricted information' or 'prohibited area', to provide safety measures to prevent radiation hazards, to produce and supply electricity from atomic energy and to do all things necessary for these powers.
2. Any person discovering or suspecting uranium or thorium at any place in India, has to report to the Govt.
3. The Central Government's power to direct any process to get uranium, under compliance or to prohibit him from doing so. Compensation may or may not be given.
4. The Central Government's power to obtain information regarding materials, plant or processes.
5. Authorised person from the Government has power to enter and inspect any mine, premises, land, plant, articles etc.
6. The Government has power to do work for discovering prescribed substances by giving a 28 days notice to the owner or occupier of the land. Compensation shall be given as per Section 21.
7. The Government's power of compulsory acquisition of rights to work minerals, of prescribed substances or equipment, plant, building, property etc. by giving notice and compensation (u/s 21) to the affected persons.
8. The Government's power to give notice to contracting parties and to transfer their rights and liabilities to the Government, of their business of mining, production or research of prescribed substances or use of atomic energy. Compensation shall be given to the parties.

9. Power of the Government to give, refuse or revoke license for mining, acquisition, production, possession, transfer, use, disposal, export or import of prescribed substances or equipment, plant for atomic energy or research. The Powers also include to make rules for the licence to follow conditions and criteria for safe location, installation or operation of the plant, for radiation protection, liability in respect of hurt to any person or property and to pay compensation for the damage, for working hours, leaves, medical examination of workers, security clearances etc., and for inspection, sealing, seizure, retention, disposal of article etc.

10. Powers of the Government to requisite any substance and to extract uranium, plutonium or any of their isotopes from it. The compensation shall be paid for it.

11. Powers to make rules for safety of the persons or property from radiation or by the ingestion of radioactive substance, to prescribe qualifications for employment, regulation of working hours, leaves, medical examination, for safety of transport workers, for powers of authority to enter, inspect etc., any premises, vehicle, vessel, aircraft etc. and providing measures for breach of the rule, including sealing of premises, vehicle, vessel etc., and the seizure of radioactive substances and contaminated equipment.

12. The Government can order to restrict the disclosure of information and no person shall disclose that restricted information pertaining to atomic energy.

13. Power of the Government to prohibit entry of any person, without permission, into a prohibited area and taking photograph, sketch, picture, drawing, map, document etc. from there.

14. No patents to be granted for inventions relating to the use of atomic energy, even for ensuring safety in atomic energy operations. Such invention shall be reported to the Government.

15. Procedure relating to payment of compensation for the acquisition of land, property etc.

16. Power of the Central Government to develop national policy in regard to generate electricity in atomic power stations, to regulate its supply, to fix rates, to enter into agreements with the Electricity Boards etc. and to comply with Electricity Act, 1910 and Electricity (Supply) Act, 1948.

17. The Factories Act, 1948 shall be applicable, through the Central Government, to any factory owned by the Central Government and engaged in carrying out the purposes of this Act.

18. Other provisions are relating to offences and penalties, cognisance of offences, delegation of powers to State Government or its officer etc. and rule making powers u/s 30.

The Radiation Protection Rules, 1971 :

The Central Government u/s 30 of the Atomic Energy Act, 1962, made these rules applicable from 30-10-1971, to the whole of India. A summary of these 56 rules is given below :

Section-2 defines adequate protection, competent authority, contamination, employer, radiation worker, operational limits, radiation installation, radiation surveillance, Radiological Safety Officer, sealed and unsealed source, source housing, useful beam etc.

Other provisions are as under :

1. Radioactive material is to be handled as per terms and conditions of a licence.
2. Luminous compounds on watches, instruments etc. are exempted.
3. No person below the age of 18 years can be employed as a radiation worker.
4. Licence can be issued on request under the Act, if the equipment, facilities and work practices afford adequate protection and if the in charge person has adequate qualification to direct the work.
The validity of licence is 3 years. It can be revoked, modified or withdrawn by the competent authority after giving a show cause notice and an opportunity to make a representation.
Radioactive material shall be used only for the purpose, location and quantities specified in the licence.
5. Radiological Safety Officer shall be designated by the employer (himself or an employee) with the approval of competent authority to perform following duties and functions (R. 13) :
 - Steps to ensure that operational limits are not exceeded.
 - To instruct the radiation workers about hazards of radiation and safety measures to minimise exposure to radiation and contamination.
 - To carry out leakage tests on sealed sources as specified in rule 34.
 - To regulate the safe movement of radioactive materials including waste.

- To investigate and suggest remedial measures in respect of any situation that could lead to radiation hazards.
 - To make available necessary reports and remedial measures to his employer.
 - To ensure the safe disposal of radioactive wastes in a manner approved by the competent authority.
6. Hazardous situation is to be reported to the competent authority.
 7. Radiation surveillance procedure notified by the competent authority is to be followed by the employer. This may include (R. 15) :
 - Design, construction, operation and use as per specifications and prior approval of the competent authority.
 - Working conditions, monitoring and personal protective equipment.
 - Personal monitoring of radiation workers.
 - Medical examinations of the radiation workers as per rule 19 or 20.
 - Records of radiation and radioactivity level measurements, personal monitoring and medical examinations stipulated by the competent authority.
 - Any other procedure specified by the competent authority.
 8. Prior approval before any modification to the plant or any change in working conditions.
 9. Radiation symbol to be displayed at workplaces and on containers containing radioactive materials. Its colour shall be as may be specified by the competent authority.
 10. History records of radiation workers to be maintained in a form specified by the competent authority.
 11. Pre and periodical yearly medical examinations of radiation workers, of blood, excreta, skin, hands, fingers, finger nails, eyes and chest (X-ray).
The frequency and types of above examinations may be modified by the competent authority where necessary (Rule 19 & 20).
Complete records of above examinations shall be maintained. Its excerpts shall be sent to the competent authority in the form specified by him. The competent authority shall preserve such records for the life time of the worker or for 20 years after he ceases to do work of radiation, whichever is shorter.
 12. The competent authority may specify steps to reduce the excessive exposure and the employer shall comply with them, and also provide the exposed worker an alternative work not involving radiation exposure. If such worker is declared fit to resume radiation work, his employer shall permit him to do that work. Then his work shall be planned by the competent authority.
 13. The competent authority or a person duly authorised by him has wide power to inspect new, modified or running radiation installation, work being conducted, protective device, transport etc. and make tests, measurements and other things to verify adequate protection.
Power includes power to seal or seize radioactive material or equipment and give directions for compliance.
 14. Registers of particulars of sealed and unsealed sources shall be maintained (Rule 33).
 15. In case of leakage of a sealed source, the Radiological Safety Officer shall place that leaking source in a properly shielded leak-proof container with care to prevent spread of contamination, act to safeguard the workers and others, vacate affected area, clean up contamination if any, and inform the employer.
 16. Lost or missed radioactive material shall be searched and the competent authority shall be informed immediately.
 17. Telegamma sources shall be covered with appropriate source housing. In case of power failure, the useful beam should be automatically cut off. Manual device to interrupt the useful beam is required (Rule 37 to 39).
 18. In medical institutions where radioactive material remains on or inside the body of the patient, separate rooms and wards for the treatment shall be provided.
 19. Where gamma radiography is done, the area shall be cordoned off to control entry into it of other persons.
 20. Sealed source devices such as static eliminators, thickness, density or level gauges, package monitors shall be provided with efficient cover plate, shutter or shield capable of being easily operate able to attenuate the useful beam.
 21. Interlock switches in radiation installations should be of the fail-safe type.
 22. Unsealed sources shall be kept in securely closed container and properly labelled.

Radiological Safety Officer has to take more precautions where unsealed sources are handled such as safe working methods, facilities to minimise radiation level and airborne contamination, forbidding wrong working habits (mouth operated devices, open wounds, smoking, eating, drinking, application of cosmetics etc.), appropriate protective clothing, safe use of PPE and checking contamination on it and safe collection of radioactive wastes (R.44 & 45).

23. Ventilating systems should be enclosed with ducts & filters to avoid spread of any airborne contamination.

24. In case of spillage, steps to arrange decontamination of affected personnel and areas, steps to prevent further spread of contamination and informing the employer.

25. Other provisions for experiments on animals, luminising compounds, approved procedure for mining, processing etc., disposal of animal carcasses, autopsies of cadavers, licence, personnel monitoring and power to exempt are given in rules 48 to 56.

Notes on Regulatory Aspects

Radioisotopes and radiation have found a variety of applications in industries, such as non-destructive testing, level indication system, thickness gauges, density gauges, etc. There are over 800 industrial institutions in India, employing radiation source, in one form or the other. It is a well known fact, that ionising radiation such as X-rays, gamma rays, beta rays, etc. are deleterious to health. It is therefore, essential to minimise radiation exposures to the user as well as to the public. If the use of these radiation sources are not adequately controlled, it is likely to result in unnecessary radiation exposures to individuals. However, if necessary safety precautions, as per the stipulated norms, are observed by the user, the ill-effects of radiation can be minimised, thus, rendering the application quite safe for the user. In order to have an effective control on the use of these radiation sources and also to ensure radiological safety of the user, as well as of the public, the Government of India has promulgated the Radiation Protection Rules, 1971, under Atomic Energy Act, 1962. The Atomic Energy Regulatory Board (AERB) is the Competent Authority for formulating rules and regulations for ensuring radiological safety.

In India, only those persons, who have been duly authorised by the Competent Authority are permitted to procure and handle radiation sources.

1. The prospective user first approaches the Competent Authority for obtaining permission to handle radiation sources. He must give the requisite details in the prescribed application form regarding the type of source, its activity, proposed use, name of the user, his qualification and experience in the handling of radiation sources, etc.

2. Upon receipt of the application for procurement of radiation sources from the prospective user (applicant), the Competent Authority scrutinises the applications for the radiation sources and evaluates the radiological safety status of the applicant's institution/organisation. Specific advice on radiation safety requirements is given to the applicant depending upon the intended use of the radiation source. The following are the essential requirements for the procurement and use of nucleonic gauges.

3. The location of proposed use of these level gauges should be approved by the Competent Authority from the radiation safety standpoint. Approval for installation of these gauges will be accorded only when (a) it poses least radiation hazard to those present around the proposed location of use. (b) the leakage radiation levels from the source housing, in the direction other than the primary beam direction, are well within the maximum permissible levels and (c) the source housing is provided with suitable arrangements such that, there is no chance for either unauthorised operation or tampering of the source and the integrity of the source is maintained even during accidents. A precommissioning inspection of the installation is properly done by members of Radiation Protection Services Division (RPSD), Bhabha Atomic Research Centre (BARC), Bombay-400 085, in order to confirm the above.

4. A separate storage enclosure should be available at the site for safe storage of the source housings, prior to their installation and also to store, spare source housings and decommissioned gauges awaiting ultimate disposal, if any. The source storage should be so chosen, that it would be free from potential fire hazard, flooding, water logging, pilferage etc. Advice on the nature of storage facility required may be obtained from the Competent Authority.

5. All the persons who are involved in the operation and maintenance of these gauges, should have adequate knowledge in the design, construction and principle of the gauges and they should have undergone appropriate training on the radiation safety aspects. Further, if deemed necessary, all those persons who are involved in the maintenance of radioisotope gauge may have to be monitored regularly, by the personal monitoring service, run by RPSD, in order to ensure that dose limits are not exceeded. The decision regarding the need for the persons to be monitored by the personnel monitoring service will be taken after the precommissioning inspection of the installation by members of RSPD.

6. A GM type radiation survey meter (model MR 121) manufactured by the Electronic Corporation of India Ltd. (ECIL), Hyderabad or its equivalent should be available with the user of the nucleonic gauges, for regular monitoring of radiation levels around the gauge installation and also for deciding the area to be cordoned off around the source, if an emergency arises.

7. The user should designate a Radiological Safety Officer, who possesses a certificate in radiation safety which is recognised by RPSD and who has received instructions in the Radiation Protection Rules 1971 and all notifications and orders issued thereunder, relevant to the proposed application of radiation and who has demonstrated competence in the handling of radiation exposure devices and related instruments and radiation survey meters, which would be used in the course of this assignment. Formal approval should be obtained by the user, from the Competent Authority, for the appointment of Radiological Safety Officer.

The requisite authorisation for the procurement of nucleonic gauges from any Indian manufacturer or the requisite 'No Objection Certificate' for the import of nucleonic gauges of specific type from abroad will be issued by the Competent Authority after the fulfilment of the above requirements by the applicant. All these regulatory controls have been evolved, in order to ensure safety to persons and property, during the use of these gauges.

Laws on Insecticides :

Insecticides Act, 1968 :

This Act (46 of 1968), enacted on 2-9-1968, came into force from 1-3-1971 (Sec. 4,7,8, & 36) and 1-8-1971 (remaining part) and extends to the whole of India. It has 38 sections and a schedule listing insecticides amended from time to time. Last insertion of Blasticidin 'S' on 3-1-1996.

It is an Act to regulate the import, manufacture, sale, transport, distribution and use of insecticides with a view to *prevent risk to human beings or animals* and matters connected therewith.

Provisions are made for the Central Insecticides Board, its committees, procedure and officers (S.4 to 8), Registration of insecticides, appeal and revision (S.9 to 11), Licensing (S.12 to 15), Central Insecticides Laboratory (S.16), Prohibition of import and manufacture (S.17), Sale, stock, distribute, transport, use etc. (S.18) Insecticide Analysis (S.19), Inspectors (S.20 to 23). Report of Insecticides Analyst (S.24), Confiscation of stock (S.25) Notice of poisoning (S.26), Prohibition of sale etc. for reasons of public safety (S.27), Cancellation of registration (S.28), Offences & punishment (S.29), Defences which may or may not be allowed (S.30), Cognisance & trial (S.31). Offences by companies (S.33), Power of Central Govt. and State Govt. to make rules (S.36 & 37) and Exemption (S.38).

By various notifications from 1989 to 1996, many insecticides are banned or restricted in India, e.g. DDT, chlorobenzilate, BBP, PCNB, Toxaphene, Aldrin, Chlordane Heptachlor, Tetradifon, Nitrofen, Benzene Hexachloride etc.

Insecticides Rules 1971 :

These rules came into force on 30-10-1971. They have 9 chapters, 46 rules, 2 schedules and 22 forms.

Chapter-I gives definitions. Here 'pests' means any insects, rodents, fungi, weeds and other forms of plant or animal life not useful to human beings [R. 2 (h)]

Chapter-II is regarding the Board and its functions (R.3 to 5), Chapter-III regarding registration of insecticides (R.6 to 8), Chapter-IV for grant of licences (R.9 to 15), Chapter-V for packing & labelling (R.16 to 20), Chapter-VI for insecticides analysis and Insecticides Inspectors (R.21 to 34), Chapter-VII

for transport & storage (R. 35 to 36), Chapter-VIII for protective clothing, equipment and other facilities for workers (R.37 to 44) and Chapter-IX miscellaneous (R.45 to 46).

The first schedule prescribes 22 forms of which the last one (for medical examination of workers) is reproduced in this part..

Packing & Labelling (R. 16 to 20) :

Every container package should be of the approved type. A leaflet should be put inside containing particulars about the plant disease for which it is to be applied, manner of application, symptoms of poisoning, safety measures and first-aid treatment necessary, antidote, decontamination or safe disposal procedure, storage and handling precautions, effect on skin-nose eye, throat etc. and common name of the insecticide (R. 18).

In labelling, warning, statements should be included.

- For category-I (Extremely toxic) insecticides, the symbol of a skull and cross-bones and the word '*poison*' should be printed in red. Statement "Keep out of the reach of children and if swallowed or if symptoms of poisoning occur call physician immediately" should be added.
- For category II (Highly toxic) insecticides, the word '*poison*' in red and statement "Keep out of the reach of children" should be printed.
- For category III (moderately toxic) the word '*Danger*' and statement "Keep out of the reach of children".
- For category IV (Slightly toxic) the word '*caution*' should be mentioned.

Category classification is as under -

Classification of insecticides	Oral route (acute toxicity) LD₅₀ mg /kg of test animal	Dermal route (derma toxicity LD₅₀ mg /kg of test animal.	Colour of band on the label.
Extremely toxic	1-50	1-200	Bright red
Highly toxic	51-500	201-2000	Bright yellow
Moderately toxic	501-5000	2001-20000	Bright blue
Slightly toxic	> 5000	> 20000	Bright Green.

See Schedule 1, given in Part 19 of Chapter-23 for comparison.

Transport & Storage (R. 35, 36) :

Packages for rail transport shall be packed as per Red Tariff rules by Railways. No transportation or storage in such a way that insecticides may come in contact with food stuffs or animal feeds. If it is mixed up due to any damage to packages during transport or storage, it shall be examined by competent authorities notified by the State Govt. and safely disposed. If any leak occurs, the transport agency or the storage owner shall take urgent measures to prevent poisoning and pollution of soil, water etc.

The packages of insecticides should be stored in separate rooms or almirahs under lock and key. Such rooms shall be well built, dry, well-lit and ventilated and of sufficient dimension.

Protective Equipment and other Facilities for Workers (R. 37 to 44) :

All persons engaged in handling, dealing or otherwise coming in contact with insecticides during manufacture/formulation or spraying shall be medically examined before employment and then periodically once in a quarter by a qualified doctor who is aware of risks of pesticides and report be kept

in Form XXII given below. For persons working with organophosphorous or carbamate compound, their blood cholinesterase level shall be measured monthly. The blood residue estimation shall be done yearly of persons working with organo-chlorine compound. Any person showing symptoms of poisoning shall be immediately examined and given proper treatment.

First-aid treatment shall always be given before the physician is called. IS 4015 part I and II shall be followed in addition to any other books on the subject. The workers shall be educated regarding effects of poisoning and the first-aid treatment to be given.

Protective clothing which shall be washable (to remove toxic exposure) and not allowing penetration by insecticide shall be given to workers. A complete suit shall consist (a) Protective outer garment/overalls/hood/hat. (b) rubber gloves extending half-way up to fore-arm (c) dust-proof goggles and (d) boots.

For preventing of inhalation of toxic dusts, vapours or gases, the workers shall use (a) chemical cartridge respirator. (b) supplied air respirator. (c) demand flow type respirator (d) full or half face gas mask with canister as per requirement. In no case the exposure in air should exceed the maximum permissible level.

Sufficient stocks of first-aid tools, equipment, antidotes, medicines etc. should be kept.

The workers shall be trained for safety precautions and use of safety equipment.

The packages and surplus materials shall be safely washed and disposed to prevent pollution. The packages shall not be left outside to prevent re-use. They shall be broken and buried away from habitation.

Aerial spraying precautions are given in rule 43.

Form XXII : Form of Medical Examination :

For the Year

Serial No.

Name Age.....

Father's/Husband's Name.....Full Address

Sex Identification mark

Date of appointment Occupation : (Please specify the nature of duty)

PAST HISTORY

1. PAST

2. PRESENT

Illness	Poisoning	Allergy	Exposure to Pesticides (Compound)	No. of years/ reasons	Remarks, if any
(1)	(2)	(3)	(4)	(5)	(6)

FAMILY HISTORY

Allergy	Psychological disorders	Gaemorrhagic disorder
(1)	(2)	(3)

PERSONAL HISTORY

Smoking	Alcohol	Other addiction
(1)	(2)	(3)

OBSERVATIONS

Medical	Pre-	End of	After	After 3rd	End of	Remarks
---------	------	--------	-------	-----------	--------	---------

Examination	employment examination	1st quarter i.e. after 3 months	2nd quarter after 6 months	quarter after 9 months	year	
(1)	(2)	(3)	(4)	(5)	(6)	(7)

I	GENERAL EXAMINATION					
	General body limit	Anaemia		Fatigability		
	Weight	Dadema		Sweating		
	Pules	Jaundice		Sleep		
	Blood pressure	Skin condition		Urination		
	Respiration	Temperature				
II	GASTRO INTESTINAL					
	Nausea	Taste		Liver		
	Vomiting	Pain in abdomen		Spleen		
	Appetite	Bowel movement				
III	CARDIO RESPIRATORY					
	Nasal discharge	Tightness of chest		Heart		
	Wheeze	Dyspnoea		Cyanosis		
	Cough	Palpitation		Tachycardia		
	Expectoration					
IV	NEURO MUSCULAR					
	Headache	Tremors		Unconsciousness		
	Dizziness	Convulsion		Deep reflexes		
	Irritability	Paranesthesia		Superficial reflexes		
	Pulse	Hallucination		Co-ordination		
	Twitchings					
V	EYE					
	Pupil		Double vision			
	Lachrymation		Clumped vision			
VI	PSYCHOLOGICAL					
	Temperament	Judgement		Nervousness		
VII	KIDNEY					
	Kidney condition					
VIII	INVESTIGATION					
	Blood Hb%	Serum Bilirubin		Urine microscopic		
	Blood B.C.	Urine routine examination		X-ray of chest.		
	*Serum cholinesterase					

*Serum cholinesterase level should be measured in monthly intervals in case of organophosphorus/carbamatic group of insecticides. General remarks of the Doctor in the light of the above examination;

Advice given to : (1) the Patent :
(2) the Employer :

Steps taken by the Employer as per Doctor's advice :

Signature/Thumb impression of :

1. Doctor :
2. Employees :
3. Employer/manufacturer :
4. Licensing officer at the time of inspection.

N.B. : In organochlorine group of insecticides the blood residue estimation should be done once a year.

Laws on Dock Safety :

Dock Workers (Safety, Health & Welfare) Act, 1986 :

This Act (No. 54 of 1986) was enacted on 7-12-1986 and came into force from 15-4-1987. It extends to the whole of India. It has 25 sections. It provides for the Safety, Health and Welfare of dock workers and for matters connected therewith.

Definitions (S.2) :

Appropriate Government means, in relation to any major port, the Central Govt., and, in relation to any other port, the State Govt.

Cargo includes anything carried or to be carried in a ship or other vessel.

Dock Work means any work in or within the vicinity of any port in connection with loading, unloading, movement or storage of cargoes and includes preparation of ship or other vessel and cleaning, painting, chipping of any hold, tank, structure or lifting machinery or any other storage area in board, ship or dock.

Dock Worker means a person employed or to be employed directly or through any agency, on dock work.

Regulation means a regulation made under this Act.

Inspectors and the Chief Inspector of Dock Safety (S. 3 to 8) :

The appropriate Govt. can appoint them. They can enter any ship, dock, warehouse to check any dock work, make examination of the ship, dock, lifting machinery, cargo, gear, staging, transport equipment, premises etc., require documents, take evidence, copies, photograph, sketch, sample etc., hold inquiry into any accident, issue show cause notice relating to safety, health and welfare provisions, prosecute or prohibit any dock work in dangerous condition until measures have been taken to remove that danger. Inspector will not disclose information or complaint received by them. Appeal to the Chief Inspector should be made within 15 days.

Other Provisions :

The appropriate Govt. may constitute an Advisory Committee for advice regarding administration of this Act and the regulations (S. 9). It can also appoint a competent person to inquire into any accident or

occupational disease to dock workers (S. 10). Dock workers will not misuse anything provided to secure health, safety and welfare of dock workers, will not do anything to endanger self or others and will not neglect to make use of anything provided as mentioned earlier. For offence the penalty is Rs. 100 or 3 months imprisonment or both (S. 11). Penalty for removing any fencing, gangway, gear, ladder, life-saving means or appliance, light, mark, stage etc. or not restoring after authorised removal, is 6 months imprisonment or Rs. 5000, or both (S. 14). In addition to any penalty the court can make order to comply within a specified period (S. 16). A metropolitan or the first class magistrate shall try the offence. Before prosecution, sanction of an Inspector is necessary. Time limit for filing prosecution is 6 months in case of offence punishable with fine and 12 months in case of offence punishable with imprisonment (S. 17). Magistrate can impose fine exceeding Rs. 5000/- notwithstanding anything contained in S. 29 of the Cr. P.C. (S. 18). The appropriate Govt. can make rules u/s 20 and regulations u/s 21 after previous publication and procedure u/s 22.

Subjects of Regulations (S. 21) :

Regulations may provide for safety of working place, approaches, lighting, ventilation, temperature, fire & explosion prevention and protection, safe means of access, opening and closing of hatches and protection of dangerous openings, safety from fall, lifting and cargo handling appliances, workers employed in terminals, fencing of machinery, live electrical conductors, steam pipes, hazardous openings, staging, rigging and derricks, testing of lifting m/c, ropes, slings etc., escape routes, safe methods of working and handling dangerous substances or working in harmful environment, employing persons for handling cargo or any work on ship, transport of dock workers, precautions against noise, vibration and air pollution at workplace, protective equipment and clothing, sanitary, washing and welfare facilities, medical supervision, ambulance room, first-aid and rescue facilities, safety and health organisation, training of dock workers, investigation of accidents, dangerous occurrences and diseases, forms of notices, authorities to be reported, submission of statement of accidents, man-days lost, volume of cargo handled and particulars of dock workers.

Other Acts, Rules & Regulations for Dock Workers :

The old Act i.e. the Indian Dock Labourers Act, 1934 (19 of 1934), the Dock Workers (Regulation of Employment) Act, 1948 (9 of 1948) and the Dock Workers (Safety, Health & Welfare) Scheme, 1961, framed under the later Act, *inter alia*, deal with the matters relating to the protection against accident of workers employed in loading and unloading ships, employment of dock workers and their safety, health and welfare.

The Indian Dock Labourers Act, 1934 is repealed by Section 24 of the Act, 1986, mentioned in previous Part 2.21, and as saved (clarified) u/s 25 of the later Act, the Indian Dock Labourers Regulations, 1948 and the Dock Workers (Safety, Health & Welfare) Scheme, 1961, made u/s 4 of the Dock Workers (Regulation of Employment) Act, 1948 (9 of 1948), are deemed to be the *regulations framed under the Act of 1986* (Part 2.21).

Main provisions of the above mentioned Act (of 1948) and rules thereunder are as follows :

(1) Dock Workers (Regulation of Employment) Act, 1948 :

This Act (9 of 1948) was passed on 4-3-1948 and amended in 1949, 1951, 1962, 1970, 1980, 1986 and 1988. It is for regulating the employment of dock workers. Its 9 sections are as under :

1. Short title and extent.
2. Definitions - Dock Labour Board, Cargo, dock worker (a worker employed on port for cargo work), employer, Government (Central or State) and Scheme.
- 3&4 Scheme for ensuring regular employment of workers. Making, Variation and Revocation of schemes.
5. Advisory Committee.
- 5A to Dock Labour Boards, their functions, accounts, audit & annual report.

- E
6. Inspectors
 - 6A to Power to order inquiry, or to suspend a Board or not to implement Proceedings of Board and Advisory Committee.
 - C
 7. Cognisance of offences.
 - 7A Offences by companies.
 - 8 & Power to make rules and laying before Parliament.
 - 8A
 9. Saving.

Dock Workers (Advisory Committee) Rules, 1962 :

These 13 rules effective from 9-6-1962, are pertaining to constitution, functions, term, headquarters, meetings and allowances of members of the Advisory Committee.

Dock Workers (Regulation of Employment) Rules, 1962

These 9 rules effective from 9-6-1962, are pertaining to constitution, term, membership, meetings, contracts and accounts of the Dock Labour Board.. Four forms are also prescribed.

Thus these rules contain little about safety.

Laws on Environmental Protection :

Water (Prevention and Control of Pollution) Act 1974 :

This Act (No. 6 of 1974) enacted by the Parliament on 23-3-1974 was applicable to the States from their dates of their adoption.

It has 8 chapters and 64 sections. It applies to certain States and the States who adopt it.

The Act intends to provide for the prevention and control of water pollution, maintaining or restoring of wholesomeness of water, Boards, its powers and functions for matters connected therewith.

Chapter-1 gives following definitions :

Board means the Central or a State Board.

Outlet includes any conduit pipe or channel, open or closed, carrying sewage or trade effluent or any other holding arrangement which causes or is likely to cause pollution.

Pollution means such contamination of water or such alteration of the physical, chemical or biological properties of water or such discharge of any sewage or trade effluent or of any other liquid, gaseous or solid substance into water (directly or indirectly) as may or is likely to create a nuisance or render such water harmful or injurious to public health or safety or to domestic, commercial, industrial, agricultural or other legitimate uses, or to the life and health of animals or plants or of aquatic organisms.

Central Board, State Board, Sewage effluent and Trade effluent are also defined and distinguished.

Stream includes river, water course, inland water, sub-terranean waters and sea or tidal waters to the extent notified.

Subjects of other chapters are as under :

Chapter II : Central & State Boards (S.3 to 12)

Chapter III : Joint Board (S. 13 to 15).

Chapter : Powers & functions of Boards (S. 16 to 18).

IV

Chapter V : Prevention and Control of water pollution (S. 19 to 33A)

Chapter : Funds, Accounts & Audit (S. 34 to 40)

VI

Chapter : Penalties & Procedure (S. 41 to 50)

VII

Chapter : Miscellaneous including rule making powers of the Central and State
VIII Govts. (S. 51 to 64).

Functions of the State Board given u/s 17 are more important.

Some provision of Chapter-V are explained below -

A State Board can require from any industry, operation, process, treatment or disposal system to furnish information regarding construction, installation or operation of such establishment (S.20), can take samples of effluents in a manner prescribed for analysis at the occupier's cost (S.21), shall send a copy of the report of analysis to the occupier (S.22), has power of entry and inspection of plant, record, register, document, material etc. (S. 23) and of prohibiting use of stream or well for disposal of polluting matter by prescribing standards and no person shall make water pollution (R. 24) or make any new outlets or new discharges without previous consent of the State Board, which will make inquiry and grant consent with conditions imposed (which shall be binding to the applicant) or refuse it with reasons recorded in writing. If the consent is not given or refused within 4 months, it should be deemed to have been granted unconditionally (R. 25 & 26).

An aggrieved person has right to appeal u/s 28. Revision is possible u/s 29.

Any accident, act or event causing water pollution should be forthwith intimated to the State Board (S. 31). The State Board can take steps to remove pollution or such discharges (S. 32) or apply to courts for restraining apprehended water pollution and the court can order the person to remove that pollution or authorise the Board to do it at the cost of that person (S. 33). The State Board has power to give directions to any person, officer or authority for closure, prohibition or regulation of any industry, operation or process or the stoppage or regulation of supply of electricity, water or any other service (S. 33A).

Water (Prevention and Control of Pollution) Rules 1975 :

The Central Government u/s 63 of the Water Act notified these rules w.e.f. 27-2-1975. They have 11 chapters, 35 rules, 4 schedules and 15 forms under schedule I. Their subject matter is as under.

- Chap-1 : Preliminary (R. 1,2)
- Chap-2 : Service conditions of member (R. 3 to 6)
- Chap-3 : Power & Duties of the Chairman and Member Secretary and appointments of officer and employees (R. 7 to 9)
- Chap-4 : Temporary association of persons with Central Board (R. 10)
- Chap-5 : Consulting Engineer (R. 11 to 16).
- Chap-6 : Budget of the Central Board (R. 17 to 23)
- Chap-7 : Annual Report of the Central Board (R. 24)
- Chap-8 : Account of the Central Board (R. 25)
- Chap-9 : Analyst of the Central Board (R. 26, 26A).
- Chap-10 : Central water laboratory (R. 27, 28)
- Chap-11 : Powers & functions of the Central Board in relation to Union territories (R. 29 to 35).

Some incidental Act and Rules are as under :

1. Central Board for the Prevention & Control of Water Pollution (Procedure for Transaction of Business) Rules, 1975.
2. Water (Prevention & Control of Pollution) Cess Act 1977.
3. Water (Prevention & Control of Pollution) Cess Rules, 1978.

Air (Prevention and Control of Pollution) Act, 1981,

This Act (No.14 of 1981) was enacted on 29-3-1981 and came into force from 16-5-1981. It extends to the whole of India. It has 7 chapters, and 54 sections.

In agreement with the UN Conference on Human Environment held at Stockholm in June 1972, India also decided to take appropriate steps for preservation of the natural resources of the earth, including the quality of air and control of air pollution. Therefore this Act was enacted to provide for the prevention, control and abatement of air pollution and establishing boards for matters connected therewith.

Chapter-1 gives following definitions :

Air pollutant means any solid, liquid or gaseous substance including noise present in the atmosphere in such concentration as to be injurious to human beings, other living creatures, plants, property or environment.

Air pollution means the presence of any air pollutant in the atmosphere.

Approved appliances means any equipment or gadget used for bringing of any combustible material or for generating or consuming any fume, gas or particulate matter and approved by the State Board for the purpose of this Act.

Chimney includes any structure with an opening or outlet from or through which any air pollutant may be emitted.

Control equipment means any apparatus, device, equipment or system to control the quality and manner of emission of any air pollutant and includes any device used for securing the efficient operation of any industrial plant.

Emission means any solid, liquid or gaseous substance coming out of any chimney, duct or flue or any other outlet.

Industrial plant means any plant used for any industrial or trade purposes and emitting any air pollutant into the atmosphere.

The words 'approved fuel' and 'automobile' are also defined. Other chapters are as under :

Chapter - II : Central & State Board (S.3 to 15)

Chapter - : Powers & functions of Boards (S.16 to 18)

III

Chapter - : Prevention & Control of Air pollution (S.19 to 31A)

IV

Chapter - V : Funds, Accounts & Audit (S.32 to 36).

Chapter - : Penalties & Procedure (S.37 to 46)

VI

Chapter - : Miscellaneous including rule making powers of the Central and State

VII

Govt. (S. 47 to 54).

Functions of the State Board given u/s 17 are more important.

Some provisions of Chapter-IV are explained below :

The State Government may after consultation with the State Board, notify any area as air pollution control area for the purposes of this Act, prohibit the use of any polluting fuel in any area, require use of an approved appliance, prohibit burning of any polluting material in any area (S.19) and instruct the motor vehicles authority to ensure compliance of the standards of automobiles emission laid down by the State Board (S.20).

No industrial plant shall be established or operated without the previous consent of the State Board. An application for consent should be in a prescribed form. The State Board can grant or refuse within 4 months, or cancel any existing consent or refuse further consent after expiry if the conditions are not fulfilled. Every person getting consent has to comply with the following conditions.

1 The control equipment approved by the State Board, should be installed and operated.

2 The existing control equipment shall be altered or replaced as per the directions of the State Board.

- 3 The control equipment should be maintained at all times in good running condition.
- 4 Chimney, approved by the State Board shall be erected or re-erected.
- 5 Such other conditions as the State Board may specify
- 6 The conditions should be fulfilled within a stipulated time.

Due to any technological improvement or otherwise the State Board can vary its conditions. If the consent is transferred to another person, the transferee will be responsible for compliance (S. 21).

Standards laid down by the State Board shall not be exceeded (S.22). The Board has power to approach the court for restraining persons from causing air pollution. The court can direct that person to stop pollution or authorise the Board to implement the direction at the cost of that person (S.22A).

An accident, unforeseen act or event of emission beyond the prescribed standard shall be forthwith intimated to the State Board and to the prescribed authorities, who shall take, as early as practicable, remedial measures to mitigate that emission at the cost of the person concerned (S.23).

Board officers have power of entry and inspection to check conditions, control equipment, industrial plant, record, register, document, material etc. (S.24) and can call for any information regarding types and level of emission and any compliance necessary (S.25), can take samples of air or emission in the manner prescribed and can send the sample to the laboratory for analysis (S.26). The Board analyst shall submit the report of analysis in triplicate to the Board, of which one copy will be sent to the occupier by the Board (S.27).

The State Government can establish one or more State Air Laboratories (S.28) and can appoint analysts (Govt. analysts). The Board can also appoint analysts (Board analysts) (S.29) whose report can be used as a evidence in any proceeding under this Act (S.30).

An aggrieved person can appeal within 30 days to the prescribed authority (S.31).

Central or State Board has power to give directions to any person, officer or authority who shall comply with such directions. Such power includes the power to direct closure, prohibition or regulation of any industry, operation or process or the stoppage or regulation of supply of electricity, water or any other service (S. 31A).

Air (Prevention and Control of Pollution) Rules, 1982 :

The Central Government u/s 53 of the Air Act made these rules w.e.f. 18-11-1982. They have 7 chapters, 17 rules, 3 schedules and 8 forms. The subject matter is as under :

Chapter - I	Preliminary (R.1,2)
Chapter - II	Procedure for the Board and its committees (R.3 to 11).
Chapter - III	Allowance to a committee member to attend the meeting (R.12).
Chapter - IV	Temporary association of persons with the Central Board (R.13, 14).
Chapter - V	Budget of the Central Board (R.15).
Chapter- VI	Annual Report of the Central Board (R.16).
Chapter - VII	Account of the Central Board (R.17).

Air (Prevention and Control of Pollution) (Union Territories) Rules, 1983 :

The Central Government, u/s 54 of the Air Act applied w.e.f. 21-12-1983 these rules to the Union Territories of Delhi, Pondicherry, Goa, Daman & Diu, Dadra & Nagar Haveli, Lakshadweep, Mizoram, Andaman & Nicobar Islands, Arunachal Pradesh and Chandigarh. It has 9 chapters, 21 rules and 9 forms.

Here Board means the Central Board u/s 3 of the Water Act 1974 and State Air Laboratory and Board Laboratory are belonging to the States. Chapter-II provides for 'Consultants' (R.3 to 7). Other provisions are similar to those mentioned earlier.

Environment (Protection) Act, 1986 :

This Act (29 of 1986) enacted on 23-5-1986 came into force from 19-11-1986 in the whole of India. It has 4 chapters and 26 sections.

In agreement with the UN Conference on Human Environment held at Stockholm in June, 1972, this Act was enacted to provide for the protection and improvement of environment and for matters connected therewith.

The **Statement of Objects and Reasons** of the Act identifies the need for a general legislation on environmental protection to enable co-ordination of activities of the various regulatory agencies, creation of an authority which will assume a lead role for studying, planning and implementing long-term requirements of environmental safety and give direction to and co-ordinate a system of speedy and adequate response to emergency situations threatening the environment.

Chapter - I : Preliminary (S. 1, 2) :

Environment includes water-air and land and the inter-relationship which exists among and between water, air and land and human beings, other living creatures, plants, micro-organism and property [S.2(a)].

Environmental pollutant means any solid, liquid or gaseous substance present in such concentration as to be injurious to environment, [S.2(b)].

Environmental pollution means the presence of any environmental pollutant in the environment, [S.2 (c)].

Handling in relation to any substance, means the manufacture, processing, treatment, package, storage, transportation, use, collection, destruction, conversion, offering for sale, transfer or the like of such substance [S.2(d)].

Hazardous Substance means any substance or preparation which by reason of its chemical or physio-chemical properties or handling is liable to cause harm to human beings, other living creatures, plant, micro-organism, property or the environment., [S. 2(e)].

Chapter - II : General Powers of the Central Government (S. 3 to 6) :

The Central Govt. has power to take all necessary measures to protect and improve the quality of environment and to prevent, control and abate environmental pollution, co-ordinate action by the State Govts, officers and other authorities and has power of planning and execution of a nation wide programme, laying down standards for the quality of environment, standards for emission of pollutants, procedures and safeguards for the prevention of accidents which may cause environmental pollution and for the handling of hazardous substances, examination of processes, materials and substances and empowering officers for that, carrying out research and investigation, establishing environmental laboratories, collection and dissemination of information, preparation of manuals, codes or guides for prevention, control and abatement of environment pollution and constituting authorities to carry out these functions (S.3).

The Central Govt. can appoint officers for above purposes (S.4), can give directions to any person, officer or authority including direction of closure, prohibition or regulation of any industry, operation or process or stoppage or regulation of supply of electricity, water or any other service (S.5). It has power to make rules (S.6, 25, 26) and power to delegate its powers and functions (S.23).

Chapter-III : Prevention, Control and Abatement of Pollution (S. 7 to 17) :

Environmental pollutants in excess of standard prescribed shall not be discharged (S. 7). While handling hazardous substance prescribed procedure and safeguards shall be followed (S. 8). Excess discharge shall be forthwith reported to the authorities and steps shall be taken to prevent or mitigate such accidental pollution. The authorities shall also take similar steps at the cost of the person concerned (S. 9).

Persons empowered by the Central Government have powers of entry and inspection, examination and testing of any equipment, industrial plant, record, register, document, material etc. (S. 10), to take samples of air, water, soil or other substance from any factory, premises or other place in a manner prescribed and to send them to the laboratory for analysis (S. 11). The Central Analysts (S. 13) whose report can be produced as an evidence in proceeding under this Act, (S. 14).

Provisions are made for penalty (S. 15) and offences by companies (S. 16) and Government Departments (S. 17).

Chapter - IV : Miscellaneous (S. 18 to 26) :

Provisions are also made for protection of action in good faith (S.18). Cognisance of offences by the authority as well as *any person* who has given notice of at least 60 days of the alleged offence and his intention to complain, to the authority concerned (S.19). Information, reports or returns (S.20) and No civil court has any jurisdiction in respect of anything done by the authority or the Central Government (S.22). This Act has overriding effect notwithstanding anything inconsistent with any other Act but if any offence is punishable under this Act and also under any other Act, then the offender shall be punished under the other Act and not under this Act (S.24).

2.29 Environment (Protection) Rules, 1986 :

The Central Government u/s 6 & 25 of the Environment (protection) Act made these rules w.e.f. 19-11-1986. They have 14 rules, 7 schedules, (No.2 omitted) 4 Annexures under schedule IV, 5 Forms under Annexure A and different Notifications dating from 21-2-1991 and onwards specifying guidelines, area categories, requiring environmental clearance from 29 listed projects (schedule) and forming the expert committees for environmental impact assessment. An abstract of provisions is as under:

Areas means all areas where the hazardous substances are handled.

Recipient system means the part of the environment such as soil, water, air or other which receives the pollutants.

Central Board means the Central Pollution Control Board u/s 3 of the Water Act and **State Board** means a State Pollution Control Board u/s 4 of the Water Act or u/s 5 of the Air Act,

Standards : The standards for emission or discharge of environmental pollutants are specified in schedule I to IV. The Central or State Board may specify more stringent standards. These standards shall be complied with by an industry, operation or process within a period of one year of being so specified. The board can reduce this period. Industries, operations, or processes not mentioned in Sch. I shall not exceed the general standards specified in Sch. VI. No emission or discharge shall exceed the relevant concentration set out in column (3) to (5) of Sch. VII of National Ambient Air Quality Standards (NAAQS) (R. 3).

See Parts (Tables) 10 to 14 of Chapter-32.

Others : All directions u/s 5 should be in writing and specify action to be taken and its time of compliance. Procedure is prescribed (R.4). Factors to be considered while prohibiting or restricting the location of industries are given in R.5. Procedure for taking samples (R.6), Notice in Form I to take sample (R.7), Procedure for submission of samples alongwith Form II and form of laboratory report in Form III (R.8), Functions of laboratories (R.9), Qualifications of Govt. Analyst (R.10), Manner of giving notice of alleged offence in Form IV (R. 11), Notice of accidental discharge to the authorities mentioned in R.12 and Sch. V, Factors to be considered while prohibiting or restricting the handling of hazardous substances (R.13) and submission of **Environmental Statement** for the financial year ending 31st March in Form V before the next 30th September every year to the Board (R.14) are prescribed.

Schedule-I (Rule-3) : gives industrywise pollutant parameters and their standards for 78 types of industries including stack height and test method for some parameters and also known as Minimum National Standards (MINAS) as per last insertion and substitution w.e.f. 3-4-1996.

Schedule-II (Rules-3) : was inserted on 12-9-1996 and omitted on 31-12-1993. thus now it does not exist.

Schedule-III (Rule-3) : gives ambient air quality standards for noise for 4 categories of area and time. Limits in dB vary from 40 to 75.

Schedule-IV (Rule-3) : specifies standards for vehicular emission, types of fuel and tests and exhaust gas values in Annexures I to IV. Parameters considered are CO, HC and NO.

Schedule-V (Rule-12) : gives authorities to be informed in case of excessive discharge. This includes authorities under the Atomic Energy Act, Factories Act, Mines and Minerals Act, Ports Act, Plantations Labour Act, Motor Vehicles Act and Merchant Shipping Act.

Schedule-VI (Rule-3A) : gives general standards for discharge of pollutants in five parts : (A) Effluents (B) Waste water generation (C) Load based standards for Oil Refinery and large Pulp & Paper mill (D) Emission standards based on concentration, equipment and load/mass (E) Noise standards for automobiles and domestic appliances and also gives guidelines in Annexure I & II.

See Table-14 in Chapter-32.

Schedule-VII (Rule-3B) : gives National Ambient Air Quality Standards (NAAQS) in terms of time weighted average concentration in ambient air (μg or mg/m^3) for six main pollutants - SO_2 , NO_2 , Pb, CO, SPM (Suspended particulate matter) and RPM (respirable particulate matter) with their method of measurement. This table may be useful in keeping work environment record (e.g. Form 37 GFR). See 2nd Sch. under the Factories Act for in plant exposure limits. It is given as Table-15 in Chapter-32

See Table-13 in Chapter-32.

Appendix -A prescribes Form I (R.7), II & III (R.8), IV (R.11) and V, Annual Environmental Statement (R.14).

Notifications give : (1) Recognition to Laboratories (2) Officers for taking cognisance of offences. (3) Officers empowered u/s 10(1) of the Environment (Protection) Act listing 60 types of Inspectors/Officers/Agencies, including factory inspector, boiler inspector, drug inspector, dock inspector, mines inspector, transport authority etc. (4) Officers empowered u/s 11 of the EP Act to take samples listing the same 60 officers mentioned earlier. (5) Prohibition of benzidine based dyes (also called as benzidine - azo dyes.) w.e.f. 30-1-1993 (6) List of 29 projects and application form requiring environmental clearance before starting, expanding or modernising them w.e.f. 27-1-1994 (7) Composition of the expert committees for Environmental Impact Assessment (EIA) and (8) Prohibiting or restricting some areas in the country for location of some industries and storage of some hazardous chemicals in one particular warehousing complex in Bombay.

Hazardous Wastes (Management and Handling) Rules, 1989 :

The Central Government u/s 6,8 & 25 of the Environment (Protection) Act made these rules effective from 28-7-1989. They have 12 rules, 1 schedule and 7 forms.

Application (R.2) : *These rules apply to hazardous wastes as specified in Schedule, but do not apply to -*

- (a) Waste water and exhaust gases as covered under the Water Act, Air Act and rules made thereunder.
- (b) Wastes arising out of operation from ships beyond 5 km as covered under the Merchant Shipping Act 1958 and rules made thereunder and
- (c) Radio-active wastes as covered under the Atomic Energy Act, 1962 and rules made thereunder.

Their abstract is as under -

Definitions (R. 3) :

Applicant means a person or organisation that applies in Form-1 for granting authorisation for handling of hazardous waste.

Authorisation means permission for collection, reception, treatment, transport, storage and disposal of hazardous wastes granted by the competent authority in Form-2.

Authorised person means who has authorisation as defined above.

Facility means a location wherein the processes incidental to the waste generation, collection, reception, treatment, storage and disposal are carried out.

Hazardous Wastes Site means a place duly approved by the competent authority for collection, reception, treatment, storage and disposal of hazardous wastes.

Operator of a facility means an owner or operator of the facility defined above.

The occupier generating hazardous wastes listed in column (2) of the Schedule, in quantities equal to or more than that mentioned in column (3) of the said Schedule, shall take all practical steps for safe disposal of the wastes either himself or through an operator of a facility. The occupier should supply specified (safety) information to the operator of a facility (R. 4).

Application for authorisation in Form-1 by the occupier or a facility operator and grant of such authorisation with conditions in Form-2 after satisfying that they possess appropriate facilities, technical capabilities and equipment to handle the wastes safely. Such authorisation lasts for 2 years unless sooner suspended or cancelled and then needs renewal in Form-1. It can be refused also (R. 5).

If the conditions are not fulfilled, the granted authorisation can be cancelled by the State Pollution Control Board or Committee after a show cause notice and subsequent instruction for the safe storage of the hazardous wastes (R. 6).

Packing, labelling and transport of such wastes should be in accordance with the Motor Vehicle Act and rules made there under and in a condition to withstand physical and climatic factors (R. 7).

Inventory of disposal sites shall be maintained by the State Govt. or a person authorised by it. Before identifying such site, environmental impact study shall be carried out. Data of location, description, amount, nature, toxicity etc. shall be kept associated with the site. (R.8).

The occupier generating waste and operator of a facility shall maintain records in Form-3 and shall send annual returns in Form-4. (R.9).

Any accident during transport or at the facility shall be reported immediately to the State Pollution Control Board or Committee in Form-5. (R.10).

Import of hazardous wastes is not permitted for dumping and disposal in India. It may be permitted for processing or re-use as raw material and after getting necessary information in Form-6 from the exporter and importer both and after examining each case on merit. The importer shall maintain records in Form-7 and allow inspection by the authority (R.11).

An appeal shall lie before the State or Central Government depending on order and as provided in R. 12.

Schedule of the Hazardous Wastes

Waste Category No.	Type of Wastes	Quantity kg/year
1	Cyanide wastes	1
2	Metal finishing wastes	10
3	Water soluble chemical compounds of lead, copper, zinc, chromium, nickel, selenium, barium and antimony.	10
4	Mercury, Arsenic, Thallium and Cadmium bearing wastes.	5
5	Non-halogenated hydrocarbons including solvents.	200
6	Halogenated hydrocarbons including solvents.	50
7	Wastes from paints, pigments, glue, varnish and printing ink.	250
8	Wastes from Dyes and Dye intermediates containing inorganic compounds	200

9	Wastes from Dyes and Dye intermediate containing organic compounds.	50
10	Waste oil and oil emulsions.	1000
11	Tarry wastes from refining and tar residues from distillation or pyrolytic treatment.	200
12	Sludge of heavy metals, toxic organics, oil emulsions and spent chemical and incineration ash.	-
13	Phenols	5
14	Asbestos.	200
15	Pesticides & herbicides	5
16	Acid/Alkaline slurry wastes	200
17	Off-specification and discarded products.	-
18	Discarded container and container liners of hazardous/toxic chemicals and wastes.	-

Notification (5.0 IOE) dated 8-1-1999 has published a Draft of *Hazardous Wastes (Management & Handling) Amendment Rules 1999* proposing major changes in the above mentioned rules. Instead of above schedule, four new schedules have been proposed (Sch.1 of 44 processes generating hazardous wastes, Sch.2 for waste substances with concentration limits, Sch.3 for list of waste for import and export and hazardous characteristics and Sch.4 for Authorities and their duties), 10 Forms including that of TREM Card for waste and many other changes. The whole structure of the Rules of 1989 have been changed. Therefore for the details of the Rules of 1999, the statute book should be referred.

Rule 68J of the Gujarat Factories Rules 1963 (Amendment 1995) :

The provisions of these *three* “ Rules” are similar.

For summary see Part-19 of Chapter-23.

The subject matter of MSIHC Rules, 1989 (as amended in 1994) is as under -

- R-1 - Short- title and commencement.
- R-2 - Definitions.
- R-3 - Duties of Authorities : To inspect the industrial activity at least once in a year and to perform duties mentioned in Sch. 5.
- R-4 - General responsibility of the occupier.
- R-5 - Notification of major accident.
- R-6 - Industrial activity to which rules 7 to 15 apply.
- R-7 - Notification of sites.
- R-8 - Updating of the site notification following changes in the threshold quantity.
- R-9 - Transitional provisions.
- R-10 - Safety reports.
- R-11 - Updating of reports u/r 10.
- R-12 - Requirement for further information to be sent to the authority.
- R-13 - Preparation of on site emergency plan by the occupier.
- R-14 - Preparation of off site emergency plan by the authority.
- R-15 - Information to be given to persons liable to be affected by a major accident.
- R-16 - Disclosure of information.

- 16
R- - Collection, Development and Dissemination of information.
17
R- - Import of hazardous chemicals.
18
R- - Improvement notices.
19
R- - Power of the Central Government to modify the schedules.
20

Then schedules as under -

- Sch.1 - Indicative criteria and list of chemicals.
Part-I Toxic, flammable & Explosive chemicals.
Part-II List of 434 hazardous chemicals.
Sch.2 - Isolated storage other than those covered by Sch. 4. Threshold quantities of 27 chemicals are given (addition in 1994).
Sch.3 - List of hazardous chemicals for application of R. 5 and 7 to 15. Part - I named chemicals, 179. Part - II classes of chemicals not named in Part - I
Sch.4 - Hazardous operations and processes.
Sch.5 - Authorities and their duties (addition).
Sch.6 - Notification of a major accident.
Sch.7 - Notification of sites. Part-I regarding site, Part-II regarding pipeline.
Sch.8 - A safety report.
Sch.9 - Safety data sheet (MSDS).
Sch.1 - Record of hazardous chemicals imported.
0
Sch.1 - Details of on - site emergency plan.
1
Sch.1 - Details of off-site emergency plan.
2

Vide Notification (5.0 25E) dated 21-1-1999, the Draft of MSIHC (Amendment) Rules, 1999 have been published, proposing change in definition of 'major accident', change in criteria for toxic, flammable and explosive chemicals in Schedule I and also proposing change in Sch. 2, 3 and 5 and other amendments. This change is incorporated in Part 19 of Chapter-23. For details the latest statute book should be referred.

Thus these rules impose greater duty on occupiers and authorities in identifying major accident hazard (MAH) installations and taking safety measures for them.

Rules for the Manufacture, Use, Import, Export and Storage of Hazardous Micro-organisms, Genetically engineered organisms or Cells:

The Central Government u/s 6, 8 and 25 of the Environment Protection Act 1986, notified these rules on 5-12-1989 and came in force from 1-10-1993 with a view to protect the environment, nature and health in connection with the application of gene technology and micro-organisms., It has 20 rules and a Schedule of Animal and Human pathogens. They apply to the whole of India.

Application (R. 2) :

These rules apply to :

- Manufacture, import and storage of micro-organisms and gene-technological products.

- Genetically engineered organisms, micro-organisms and cell and correspondingly to any substances and products and food stuffs etc. of which such cells, organisms or tissues hereof form part.
- New gene technologies apart from those mentioned in rule-3 and to organisms/micro-organisms and cells generated by the utilisation of such other gene technologies and to substances and products of which such organisms and cells form part.

The rules are applicable for sale, storage, handling, export, import production, processing, packaging, repackaging, drawing off such organisms and also to manufacture of drugs and pharmaceuticals, food-stuff, distilleries and tanneries etc. which make use of such organisms one way or the other.

Definitions (R. 3) :

Five scientific definitions are reproduced below :

1. **“Biotechnology”** means the application of scientific and engineering principles to the processing of materials by biological agents to produce goods and services.
2. **“Cell hybridisation”** means the formation of live cells with new combinations of genetic material through the fusion of two or more cells by means of methods which do not occur naturally.,
3. **“Gene Technology”** means the application of the gene technique called genetic engineering, include self cloning and deletion as well as cell hybridisation.
4. **“Genetic engineering”** means the technique by which heritable material which does not usually occur or will not occur naturally in the organisms or cell concerned, generated outside the organism or the cell and is inserted into said cell or organism. It shall also mean the formation of new combinations of genetic material by incorporation of a cell into a host cell, where they occur naturally (self cloning) as well as modification of an organism or in a cell by deletion and removal of parts of the heritable material.
5. **“Micro-organisms”** shall include all the bacteria, viruses, fungi, mycoplasma, cells lines, algae, protodones and nematodes indicated in the schedule and those that have not been presently known to exist in the country or not have been discovered so far.

Competent Authorities (R. 4) :

Six committees are specified to recommend safety regulations, to bring out manuals of guidelines to ensure environmental safety, to lay down procedures for restriction or prohibition, to prepare upto date on-site emergency plan, to approve or control the use of hazardous micro-organisms and experimental field trials, to inspect, investigate and take punitive action in case of violations, to review periodically the safety and control measures and to monitor safety regulations in installations at the district level as under

1. Recombinant DNA Advisory Committee (RDAC).
2. Review Committee on Genetic Manipulation (RCGM).
3. Institutional Bio Safety Committee (IBSC).
4. Genetic Engineering Approval Committee (GEAC).
5. State Bio-technology Co-ordination Committee (SBCC).
6. District Level Committee (DLC) in chairman ship of the District Collector. Other members are Factory Inspector, representative of Pollution Control Board, Chief Medical Officer or DHO as member (Convenor), Agriculture Officer, representative of Public Health Engineering Dept. District Microbiologist /Pathologist (technical expert) and Municipal Commissioner.

Classification : Micro organisms are classified in two major heads as animal pathogens and plant pests and subclassified as bacterial, fungal, parasitic, viral, Rickettsial and Chlamydial agents and special category as listed in the Schedule (R. 5, 6).

Approval, Prohibition etc. : For any dealing or production, approval of the GEAC is necessary. Deliberate or unintentional release is not allowed. For food stuffs, additives and other products, approval is necessary. Before obtaining such approval an on-site emergency plan and site examination are necessary. Approval may be granted with conditions for 4 years, renewable for 2 years at a time. The GEAC will supervise the conditions (R. 7 to 14).

Report of Accident is required at District and State level. Effective steps will be taken to minimise or prevent the harmful effects to environment, nature or health (R. 16).

Off-site Emergency Plan is to be prepared by DLC with the help of occupiers handling hazardous micro-organisms (R.17).

Other provisions are also made for inspection and information regarding penalties (R.15), finance (R.18), appeal (R.19) and exemption from R. 7 to 11 (R.20).

The Schedule gives classification and names of animal and human pathogens, and plant pests.

Chemical Accidents (Emergency Planning, Preparedness and Response) Rules, 1996 :

The Central Govt. u/s 6, 8 and 25 of the Environment (Protection) Act, 1986 made these rules. They were notified and came into force on 1-8-1996. They contain 13 rules and 8 schedules. Their abstract is as under :

Definitions (Rule - 2) :

Chemical accident means an accident involving a fortuitous or sudden or unintended occurrence while handling any hazardous chemicals resulting in continuous, intermittent or repeated exposure to death or injury to any person or damage to any property but does not include an accident by reason only of war or radio- activity. (Compare this definition with the definition of ‘accident’ u/s 2(a) of the Public Liability Insurance Act, 1991).

Industrial pocket means any industrial zone earmarked by the Industrial Development Corporation of the State Government or by the State Government.

Major Accident Hazards (MAH) Installation means isolated storage and industrial activity of a site, handling (including transport through carrier or pipeline) of hazardous chemicals equal to or more than the threshold quantities given in Sch. 2 & 3.

Off-site emergency plan means the plan prepared as per Sch. 12 u/r 14(1) of the MSIHC Rules. (similarly On-site emergency plan means that prepared as per Sch. 11 u/r 13(1) of the MSIHC Rules.).

Other definitions of hazardous chemicals, industrial activity, isolated storage, pipe line and site are the same as those given under MSIHC Rules. Definition of ‘major chemical accident’ in these rules is the same as that of ‘major accident’ under MSIHC Rules.

Different Crisis Groups : The constitution of the Central, State, District and Local Crisis Group shall be as specified in Sch. 5,6,7 & 8 respectively. The members of the Central, State and District Crisis Groups are empowered u/s 10(1) of the EP Act 1986 to enjoy those powers. The MAH installations shall aid, assist and facilitate the functioning of the District and Local Crisis Groups. Meeting of the Central, State, District and Local Crisis Group shall be held at 6 months, 3 months, 45 days and 30 days respectively. Functions of the Central, State, District and Local Crisis Groups given in Rule 5, 7, 9 and 10 respectively are summarised in the following Table.

Functions of the Crisis Groups (Rule 5, 7, 9 & 10) :

① Central Crisis Group (Rule 5)		② State Crisis Group (Rule 7)
1	Expert guidance.	Same as Functions No. 1 to 7 mentioned for Group ①

2	Monitoring of post accident situation and remedial measures to prevent recurrence.	8.	Assistance to the State Govt. in planning, preparedness and mitigation of major accidents
3	Post accident analysis and evaluation of responses.	9.	Quarterly report to the CCG.
4	Review of District off-site emergency plans and reports received.		
5	Respond to queries.		
6	Statewise list of experts.		
7	Financial and other help.		
8	Information to public.		
③ District Crisis Group (Rule 9)		④ Local Crisis Group (Rule 10)	
1	Expert guidance.	1.	Preparation of local emergency plan for the industrial pocket and dovetailing of this plan with the Dist. emergency plan.
2	Preparation of Dist. Off-site emergency plan.	2.	Training of persons and public.
3	Review of all on-site emergency plans of MAH units.	3.	Half-yearly mock drill and report to DCG.
4	Management of chemical accidents in the district.	4.	Respond to public inquiries.
5	Monitoring of every chemical accident.	5.	Information to public.
6	Continuous information to the CCG and SCG.	6.	Assistance to MAH units for informing persons likely to be affected.
7	Report of chemical accident within 15 days to SCG.		
8	Yearly mock drill and report to SCG.		

Information to the Public : The Central, State and Local Crisis Group shall provide information on request regarding chemical accident prevention, preparedness and mitigation to the public in their respective jurisdiction. The Local Crisis Group shall assist the MAH installations in taking appropriate steps to inform persons likely to be affected by a chemical accident (R. 13).

Crisis Alert system : The Central Govt. shall set up functional control room, information network with state and district control rooms, appoint staff and experts in control room, publish lists of (i) MAH installations (ii) Major chemical accidents in chronological order (iii) Members of the Central, State and District Groups and take measures to create awareness amongst the public to prevent chemical accidents (r. 4).

Schedules :

Sch. 1 to 4 - the same as Sch. 1 to 4 of the MSIHC Rules 1989 or R 68J, GFR 1963.

Sch. 5 to 8 - List of members for CCG, SCG, DCG and LCG respectively.

National Environment Appellate Authority Act, 1997 :

This Act (No. 22 of 1997) was enacted on 26-3-1997 and came into force on 30-1-1997 (retrospective effect) replacing the previous ordinance. Looking to the pronouncements by the Supreme Court in certain public interest litigation cases, it was considered necessary to set up an independent body for quick redressal of public grievances on environmental issues.

Preamble :

Therefore this Act was enacted to provide for the establishment of a National Environment Appellate Authority to hear appeals regarding *restriction of areas* in which any industries, operations or processes are not to be carried out or carried out with safeguards under the Environment (Protection) Act and for matters connected therewith.

It has 4 chapters and 23 sections. Its abstract is given below -

Establishment of Authority as the National Environment Appellate Authority (NEAA) with head office at Delhi (S. 3). Provisions are made for composition of members, their qualification, functions, term of office, resignation and removal, salaries, allowances, other terms, conditions of services and effect of vacancy etc. (S. 4 to 10).

Jurisdiction & Powers - Appeal within 30 days from the date of order in a form prescribed by any person as mentioned in S.11. Procedure and power of authority (S.12), financial and administrative powers of chairperson (S.13) and staff (S.14) are provided.

Miscellaneous provisions are made for bar of jurisdiction, judicial proceedings, members as public servants, protection of action in good faith, penalty, offences by companies, power to remove difficulties and to make rules and for repeal and saving (S.15 to 23).

Bio-Medical Waste (Management & Handling) Rules, 1998 :

Wastes generated from hospitals, medical & health institutions, R & D organisation, laboratories and slaughter houses etc., where biological organisms are involved, have become an important source of environmental and public health problems. Generally these wastes are being disposed in the Municipal dumps.

The public have become aware of this problem and the issue has been discussed in various forums. The major concern is proper disinfection, treatment and disposal of bio-medical wastes.

To evolve a proper system for regulation of treatment and disposal of medical wastes and in exercise of the powers conferred by Sections 6, 8 & 25 of the Environment (Protection) Act, 1986, the Ministry of Environment & Forests, Govt. of India has framed the rules, wide Notification No. S.O. 630 (E), dated 20th July, 1998. These rules are called as Bio-Medical Wastes (Management & Handling) Rules, 1998.

There are 13 Rules with 6 Schedules and 2 Forms. These Rules provide Duty of Occupier, Treatment & Disposal, Segregation, Packing, Transportation & Storage, Prescribed Authority, Authorisation, Advisory Committee, Annual Report, Maintenance of Records, Accident Reporting and Appeal.

The Schedules are as under :

Sch. No.	Title
I	Categories of Bio-Medical waste.
II	Colour coding and type of container for disposal of Bio-Medical waste.
III	Label for Bio-Medical waste container/ bags.

IV	Label for Transport of Bio-Medical waste container/ bags.
V	Standards for Treatment & Disposal of Bio-Medical waste
VI	Schedule for Waste Treatment facilities like Incineration/Auto Clave/ Microwave system.

The Forms are :

I	Application for Authorisation
II	Annual Report
III	Accident Reporting

Categories of Bio-Medical Waste :

“Bio-medical waste” means any waste which is generated during the diagnosis, treatment or immunisation of human beings or animals or in research activities pertaining thereto or in the production or testing of biologicals. There are ten categories of wastes and are listed in the Schedule-I, as given below.

Schedule-I : Categories of Bio-Medical

Waste : (See Rule 5)

Category No.	Waste Category	Treatment & Disposal
1	Human Anatomical Waste : (Human tissues, organs, body parts)	incineration@/deep burial*
2	Animal Waste : (animal tissues, organs, body parts carcasses, bleeding parts fluid, blood and experimental animals used in research, waste generated in veterinary hospitals, colleges, discharge from hospitals, animal houses)	incineration@/deep burial*
3	Microbiology & Biotechnology Waste : (waste from laboratory cultures, slacks or specimens of micro-organisms live or attenuated vaccines, human and animal cell culture used in research and infectious agents from research and industrial laboratories, waste from production of biologicals, toxins, dishes and devices used for transfer of cultures)	local autoclaving/ microwaving/incineration@
4	Waste Sharps : (needles, syringes, scalpels, blades, glass etc., that may cause puncture and cuts. This includes both used and unused sharps)	disinfection (chemical treatment@@/autoclaving/ microwaving & mutilation/ shredding*
5	Discarded Medicines and Cytotoxic Drugs : (waste comprising of outdated, contaminated and discarded medicines)	incineration@/ destruction and drug disposal in secured landfills
6	Solid Waste : (items contaminated with blood, and body fluids including cotton, dressings, soiled plaster casts, lines, bedding, other material contaminated with blood)	incineration@/ autoclaving/ microwaving
7	Solid Waste : (waste generated from disposable items other than the waste shapes such as tubing, catheters, intravenous sets etc.)	disinfection by chemical treatment@@/ autoclaving/ microwaving and mutilation/ shredding##
8	Liquid Waste : (waste generated from laboratory and washing, cleaning,	disinfection by chemical treatment@@ and discharge

	housekeeping and disinfecting activities)	into drains
9	Incineration Ash : (ash from incineration of any bio-medical waste)	disposal in municipal landfill
10	Chemical Waste : (chemicals used in production of biologicals, chemicals used in disinfection, as insecticides, etc.	chemical treatment@@ & discharge into drains for liquid and secured landfills for solids.
@@	Chemicals treatment using at least 1% hypochlorite solution or any other equivalent chemical reagent. It must be ensured that chemical treatment ensures disinfection.	
##	Mutilation/shredding must be such so as to prevent unauthorised reuse.	
@	There will be no chemical pre-treatment before incineration. Chlorinated plastics shall not be incinerated.	
*	Deep burial shall be option available only in towns with population less than five lakhs and in rural areas.	

Duty of Occupier :

It shall be the duty of every occupier of an institution generating bio-medical waste which includes a hospital, nursing home, clinic, dispensary, veterinary institution, animal house, pathological laboratory, blood bank by whatever name called to take all steps to ensure that such waste is handled without any adverse effect to human health and the environment.

Treatment and Disposal :

1. Bio-medical waste shall be treated and disposed off in accordance with Schedule-I, and in compliance with the standards prescribed in Schedule-V.
2. Every occupier, where required, shall set up in accordance with the time schedule in Schedule-VI, requisite bio-medical waste treatment facilities like incinerator, autoclave, microwave system for the treatment of waste, or ensure requisite treatment of waste at a common waste treatment facility or any other waste treatment facility.

Segregation, Packaging, Transportation and Storage :

Segregation of wastes at the source of its generation has been made mandatory for all institutions and organisations dealing with such waste as per Schedule-II. These rules also provide the scheme for types of containers to be used, colour coding, labelling, treatment and disposal options for different waste categories have also been provided.

Further, it is mandatory that the untreated bio-medical waste shall be transported only in such vehicle as may be authorised for the purpose by the competent authority as specified by the Govt.

No untreated bio-medical waste shall be kept beyond a period of 48 hours, if for any reasons it becomes necessary to store then permission should be taken from prescribed authority.

Prescribed Authority :

The agencies responsible for implementation of these rules have been identified by every State and The Union Territory.

Authorisation :

All persons handling the bio-medical waste are required to obtain authorisation from the prescribed authority by making an application alongwith the prescribed fee in Form-I provided in the Rule.

Advisory Committee :

The Government of every State/Union Territory shall constitute an advisory committee. The committee will include experts in the field of medical and health, animal husbandry and veterinary sciences, environment management, municipal administration, and any other related department or organisation including non governmental organisations. The State Pollution Control Board/Pollution Control Committee shall be represented. As and when required, the committee shall advise the Government of the

State/Union Territory and the prescribed authority about matters related to the implementation of these rules.

Annual Report :

Every occupier/operator shall submit an annual report to the prescribed authority in Form-II by 31st January every year, to include information about the categories and quantities of biomedical wastes handled during the preceding year. The prescribed authority shall send this information in a compiled form to the Central Pollution Control Board by 31st March, every year.

Maintenance of Records :

1. Every authorised person shall maintain record related to the generation, collection, reception, storage, transportation, treatment, disposal and /or any form of handling of bio-medical waste in accordance with these rules and any guidelines issued.
2. All records shall be subject to inspection and verification by the prescribed authority at any time.

Accident Reporting :

When any accident occurs at any institution or facility or any other site where bio-medical waste is handled or during transportation of such waste, the authorised person shall report the accident in Form-III to the prescribed authority forthwith.

Appeal :

Any person aggrieved by an order made by the prescribed authority under these rules may, within thirty days from the date on which the order is communicated to him, prefer an appeal to such authority as the Government of State - Union Territory may think fit to constitute :

Provided that the authority may entertain the appeal after the expiry of the said period of thirty days if it is satisfied that the appellant was prevented by sufficient cause from filing the appeal in time.

SC Judgement :

In WP(Civil) No. 286/94 between BL Wadhwa v/s Union of India, while monitoring its own judgement of 11-3-96, the Supreme Court went through 14 directions issued to various authorities and their compliance. Most of the Hospitals and Nursing homes in Delhi, agreed to provide *incinerators* or equally effective alternative for waste disposal.

Recycled Plastics Manufacture and Usage Rules, 1999.

These rules have come into force from 2-9-99 u/s 3 & 25 of the EP ACT 1986.

The definition of 'foodstuff' and 'vendor' (who sells foodstuffs in plastic carry bags and containers) are given.

Pollution Control Boards are prescribed authority for 'manufacture and recycling' processes and District Collector/Dy. Commissioner of the District for 'use, collection, segregation, transportation and disposal' provisions.

Rule 4 prohibits vendor to use carry bags or containers made of recycled plastics for storing, carrying, dispensing or packaging of foodstuffs.

Rule 5 gives two conditions to manufacture plastic bags/containers :

1. Virgin plastic should be used in natural shade or white.
2. Recycled plastic used for purposes other than storing and packaging foodstuff may be used with pigments and colourants as per IS:9833.

Rule 6 allows recycling of plastics strictly as per IS:14534 entitled 'The Guidelines for recycling of plastics'.

Marking or codification also as per above IS:14534. Percentage of recycled material is also to be marked (Rule 7).

Thickness of carry bags made of virgin or recycled plastics shall be more than 20 microns (Rule 8).

Legal Guidelines for Environmental Protection :

Such guidelines given by Shri Ashok K Mhaskar, a Public Health Engineer, in one seminar at Bharuch on 26-11-1999 are reproduced below. They are most useful to all managers and facility operators :

1. The consents, whether under the Water Act or under the Air Act, are normally issued for a fixed validity period. Please check whether the consent is valid. If the same is expiring, it is better to apply for a fresh renewal, at least thirty days prior to the last date.
2. The consent normally describes the items of manufactured products with quantity. One should see that, the described frame work is not overstepped. In case, there is any likelihood of such increase, it will be worthwhile to obtain permission for the same. At least a letter to that effect be posted to the relevant Board officer (and Acknowledgement obtained).
3. The consent lays down a condition as to the volume and rate of discharge of effluents both for domestic as well as industrial activity. By daily and hourly checks at the measuring devices, this may be ascertained. Please do not forget to immediately make a record in the daily log-book.
4. A condition laid down for the treatment and disposal is of extreme importance. For this purpose, effluent treatment plant (ETP) or emission control equipment (ECE) is provided by the industry. There should be a continuous performance evaluation of these gadgets, so as to always remain inside the tolerance limits. In case, you are exceeding the limits in certain parameters, it is better to bring it on your internal record. The exceedance be discussed with the consultants, your production group and well meaning Board authorities to seek guidance. Perhaps solution may be found in any or all of the following steps :
 - (a) Characterisation of raw effluent.
 - (b) Attempting in-plant controls.
 - (c) Operation, maintenance, repairs and replacement of the ETP.
5. Disposal is the last ditch battle. Disposal, dispersion, dilution, diversion has to be planned very methodically and operated efficiently. This is a place where more reliable staff is required to be deployed. Any untoward incidence be reported.
6. Please check that the storm waters and effluents do not get mixed. Keep the terminal manhole clean and always hospitable to facilitate taking of sample any time by the Board officials. Also check that no effluent is admitted in the channel down-stream of the terminal manhole, that means all the effluent finally should pass via the terminal manhole only.
7. Monitoring aspects are always very crucial. For operating the plant, certain parameters be constantly checked. However, it will be a good practice to check monthly all the parameters through standard and approved laboratories. The results so obtained be routinely informed to the Board offices. In case, there is a water body in the vicinity, it will be better to take sample from it periodically. This applies not merely to the surface water but also to the ground water. The findings will either give you a confident satisfaction or may give you a timely warning for improvement in the treatment and more so in the disposal system.
8. Although the environmental audit statement is required to be submitted on annual basis, it is better to keep the Board progressively informed every quarter about your efforts of pollution control and environmental protection.
9. The industry should devise their own format for a daily log-book recording of the running of their effluent treatment plant (ETP) or emission control equipment (ECE). If the format is found to be satisfactory by trial and error. It is better to finalise it and get printed. A printed format shows your conscious efforts towards the goal of pollution control, whenever any inspection takes place.
10. Please open an inspection book and make it a point that the visiting inspector, irrespective of their grades, give some remark in the inspection book. If the remarks are favourable it shows your diligence and gives you an encouragement. If some of the remarks are unsatisfactory, it at least gives you an early opportunity to improve. The remark, in any case, gives a frame-work for improvement. Do not take inspection visits as a burden and, indeed take it as an opportunity for improvement. The compliance of the

unsatisfactory remarks be shown during the next inspection. This is a better way to brighten your image. This diligence becomes helpful to you even in the court-case.

11. In case, there is an unfortunate accident, unforeseen act or event by which pollutants are excessively released into the environment, the same be brought immediately to the notice of the Board and other concerned agencies. This will enable you to get experienced timely help from them. Your burden gets shared. Synergistic effects can be predicted by an overview.

12. In case, you feel aggrieved by any conditions imposed in the consent, approach the Board immediately for discussion, or thereafter prefer an appeal timely. Therefore, read the consent carefully as soon as you receive the same.

13. The Water Cess Act, 1977, is applicable to certain specified industries. In case your industry is covered, the regular returns be submitted. Water meters be installed in any case, whether the industry is covered or not under the Cess Act. Please also check from time to time whether the class of your industry which may not be presently specified, has since got specified.

14. The Cess amount be paid timely as per assessment orders and record be so maintained.

15. In case you feel aggrieved by excessive cess assessment or non-sanction of rebate, the appeal be preferred in time, that is within thirty days and in case you are late in doing this, at least submit it with reasons for the delay.

16. The Government or Board while giving site clearance or consent, normally put a condition of plantation of trees. Otherwise also, planting trees within the compound gives a good demonstration of your plant performance. A better practice is to select about three varieties and a density be about 1000 trees per acre of the 33 percent of the available open land. The species selected be tough and tolerant for your type of environment.

17. An unsafe working and the environment pollution generally goes hand in hand. Therefore, the obligations under the Factories Act be scrupulously followed and record maintained.

18. There are certain responsibilities regarding the hazardous waste. These can be summarised as follows:

(a)
(1) Identification of quantity, constituents and compatibility of hazardous waste, being generated during your activity.

(2) Proper labelling and marking of containers which are used for store, transport or disposal of hazardous waste.

(3) Use of appropriate containers for storage and transport.

(4) Furnishing of information regarding the waste, its nature, its hazardous, antidotes, and non-compatibility etc., to the persons who either transport, treat, store or dispose of the waste.

(5) Use of authorised operator agency system to ensure the proper disposal of hazardous wastes and to streamline the treatment and disposal.

(6) Training of personnel for handling and proper storage of such categorised waste.

(7) Identify a transporter specialised in such wastes, and the practice of hexuplicate manifest (gate-pass) be followed.

(8) Submission of reports to MOEF and SPCB.

(9) To provide safety measures for handling of hazardous waste.

(b) In case of such unforeseen act or event in transit, the transporter should immediately report to the nearest police station about (1) The accident, and (2) The clean-up measures. He should also report to SPCB on the Form prescribed by the Hazardous Waste (Management and Handling) Rules, 1989 and the Annexure IX of the guidelines issued by the Central Government.

(c) A container be opened only for a short duration while receiving the hazardous waste in it and while removing out from it, or otherwise it must be always kept closed in storage yard.

(1) A container be opened or handled so carefully and slowly as not to rupture/damage the container.

(2) Always keep in spare some empty, clean and sturdy containers handy and immediately available.

(3) Inspect the filled and stored containers every day and if any found in bad condition transfer the contents to a good container immediately, carefully.

(4) Keep a daily record of your custody.

(d) Documentation is always a matter of evidentiary value. No job is complete unless paperwork is complete. Occupier/ generator should carefully note this, and following be developed.

- (1) Gate-pass when waste leaves the factory by a transport towards the treatment facility. Keep the receipts.
- (2) Receipt of material as signed by the Operator's facility as a manifested colour-coded copy be preserved for three years.
- (3) Analyse the outgoing waste and keep the results for three years from the date of despatch.
- (4) Daily record of waste generation be maintained :
 - Quantity and points of generation.
 - Physical state and chemical constituents.
 - Hazardous waste category as per EP Rules of 1989.
 - Hazardous waste class, per Motor Vehicle Rules, 1989.
 - Certify internally, the limit of 90 days & of 10 tonnes is not crossed.
 - Quarterly returns to State PCB, on prescribed format.
 - Annual returns to State PCB, on Form 4.
 - Accident returns to State PCB on Form 5.

19. Under the manufacture, Storage and Import of Hazardous Chemicals Rules, 1989, the immediate duties can be summarised as :

- (1) To forecast the possible situations of major accidents.
- (2) To design steps in advance to avoid accidents and its consequences including cascading effect.
- (3) To educate the related workers to stand to such occurrence.

The occupier should not merely do the above job, but also make a show of his work. Occupier is best advised to inform the concerned authorities and agencies, as to his preparing documents like risk analysis, emergency plans, safety training, avoidance of major accidents, health plan etc.

20. Under the Motor Vehicle Act, as amended in 1988, certain responsibilities are required to be fulfilled. The intending consigner is duty bound, by Rule 131, to supply the transport owner full information about the dangerous and hazardous chemicals being transported, to enable the owner and driver to :

- (1) Comply the requirements on classification, labelling, preventive precautions, updating emergency information panel, and proper reporting to the police.
- (2) Be himself aware about the risks created by the dangerous and hazardous goods being transported, to health and safety of persons and environment.

21. Under the Public Liability Insurance Act, 1991 the industrial manager is advised to check some important activities such as :

- (1) Owner should take out one or more insurance policies.
- (2) He should take out such policies before he starts handling any hazardous substances. If he has existing activities involving hazardous substances, he should take the cover early, and in any case before 1st April. (Please ensure, or else comply quickly).
- (3) The policies should always be kept renewed and alive.
- (4) The amount insured shall not be less than the paid capital. Check this from time to time by taking a review of your position (but shall not exceed Rs.50 Crores).
- (5) General Insurance Corporation or similar agencies may be able to throw more light, if approached.

Laws on Transportation Safety :

Motor Vehicles Act, 1988 :

This Act (59 of 1988 w.e.f. 1-7-1989 replacing the Act of 1939) was lastly amended by the Act of 1994. (54 of 1994) w.e.f. 14-11-1994. It extends to the whole of India. It has 14 Chapters, 217 sections and 2 schedules.

Statement of objects and Reasons :

The 1994 Act inter alia provides for -

- Definitions of new type of vehicles.
- Simplification of procedure to grant a driving licence.

- Restrictions on alteration of vehicles.
- Exemptions for non-polluting vehicles.
- Ceilings removed to curb benami holdings.
- States can appoint ST Appellate Tribunals.
- Punitive checks on substandard components and stocking/sale by the traders.
- Increase in compensation amount.
- Removal of time limit for filling claims.
- Certain punishments made stringent.
- New formula for compensation based on age income.
- The Law Commission's recommendation regarding claim jurisdiction incorporated.

Definitions : In 49 definitions, new definitions of 'manufacturer' (of motor vehicles) and local authority as ST undertaking are added. Heavy goods means more than 12 Tonnes weight. Light motor vehicle should not exceed 7.5 tonnes. Vehicle having less than 25 CC engine capacity is not a motor vehicle.

Licensing of Drivers (Chapter 2, Sec. 3 to 28) :

Without licence no person can drive a motor vehicle. Age limit require to drive a motor cycle of capacity less than 50 CC is 16 years, to drive a transport vehicle it is 20 years and in other cases it is 18 years. For breach the owner of the vehicle is responsible. The licence is non-transferrable. (S. 3 to 7).

Procedure for application and grant of licence is given u/s 8 to 11. Matters of licensing and regulation of driving schools are given in Sec. 12. Driving licence is effective throughout India (S. 13). Renewal procedure is given u/s 15, revocation on ground of disease or disability u/s 16 and appeals u/s 17. Grounds of disqualification (drunkard, addict, criminal, fraud, nuisance or danger to public) and revocation are given u/s 19.

Currency of licence u/s 4 is as under :

1	Learner's licence	6 months
2	Licence to drive transport vehicle	3 years.
3	Licence to drive transport vehicle carrying dangerous goods and renewal with condition to undergo 1 day refresher course of the prescribed syllabus.	1 year.
4	Any other case	20 years or age of 50 years whichever is earlier.
5	After the age of 50 years	5 years.
6	After the date of expiry of licence	1 month.

Other provisions are as under :

Power of Court to disqualify	Sec. 20
Suspension of driving licence	Sec. 21, 22
Effects of disqualification	Sec. 23
Endorsement and transfer	Sec. 24, 25
State Register of driving licences	Sec. 26
Rule making power of Central Govt.	Sec. 27
Rule making power of State Govt.	Sec. 28

Others :

Chapter-3	Licensing of Conductors.
Chapter-4	Registration of Motor vehicles.

Chapter-5	Control of Transport vehicles.
Chapter-6	ST undertakings.
Chapter-7	Construction, Equipment and Maintenance of motor vehicles.
Chapter-8	Control of Traffic.
Chapter-9	Vehicles temporarily leaving or visiting India.
Chapter-10	Liability without fault.
Chapter-11	Third party risk insurance
Chapter-12	Claims tribunals.
Chapter-13	Offences, penalties and procedure.
Chapter-14	Miscellaneous.
Schedule-1	Traffic signs.
Schedule-2	Compensation for third party claims.

Construction & Maintenance of Vehicles (Chap. 7) :

Control of the vehicle should remain effective. Right hand steering is required unless it is equipped with a mechanical or electrical signalling device of a prescribed nature (S. 109).

Central Government can make rules on the following matters -

1. Width, height, length, overhead of vehicles and loads to be carried.
2. Size, nature, price, and condition of tyres and marking of date of manufacture and maximum load carrying capacity.
3. Brakes and steering gear.
4. Safety glasses including prohibition of tinted safety glasses.
5. Signalling appliances, lamps & reflector.
6. Speed governors.
7. Emission of smoke, visible vapour, sparks, ashes, grit or oil.
8. Chassis number, engine number and date of manufacture.
9. Safety belts, handle bars of motor cycles, auto-dippers and other equipment essential for safety of drivers, passengers and other road users.
10. Standards of components used as in-built safety devices.
11. Transport of dangerous goods.
12. Standard for emission of air pollutants.
13. Installation of catalytic converters.
14. Placement of audio-visual or radio or tape recorder etc. in public vehicles.
15. Warranty after sale and norms therefor.

Exemption can be given subject to conditions (S. 110).

State Governments can make rules on the above matters and on the following matters also-

1. Seating arrangements in public service vehicles and protection from weather.
2. Prohibiting or restricting the use of audible signals at certain times or in certain places.
3. Prohibiting the carrying of appliances to cause annoyance or danger.
4. Periodical testing and inspection and fees to be charged.
5. Use of trailers with motor vehicles.
6. Particulars to be exhibited.

Control of Traffic (Chap. 8) :

Following provisions are made -

1. Limits of speed, maximum & minimum (S. 112).
2. Limits of weight and use (S. 113).
3. Requiring the vehicle to be weighed. (S. 114).
4. Restriction on use of vehicles (S. 115).
5. Requiring erection of traffic signs (S. 116).
6. Parking places and halting stations (S. 117).
7. Driving regulations (S. 118).
8. Duty to obey traffic signs (S. 119).
9. No left hand driving in public place (S. 120).
10. Signals and signalling devices (S. 121).
11. Leaving vehicle in dangerous position (S. 122).
12. Not to travel on running board, top bonnet or body of the vehicle (S. 123).
13. Prohibition to travel without pass or ticket (S. 124).
14. Obstruction of driver (S. 125).
15. Stationary vehicles (S. 126).
16. Removal of vehicles abandoned or left unattended on a public place (S. 127).
17. Safety measures for drivers and pillion riders. No driver will carry more than one person on a two-wheeler. (S. 128).
18. Wearing helmet conforming to IS, while driving motor cycle. A Sikh's turban is exempted. (S. 129).
19. Duty to produce licence and certificate of registration. Police Officer in uniform can demand a driving licence. RTO can demand insurance certificate, fitness certificate, permit and a conductor's licence (S. 130).
20. Precautions at unguarded railway level crossings. Ensure that no train or trolley is approaching from either side (S. 131).
21. Duty to stop in certain cases like accident to a person, vehicle, property or animal (means horse, cattle, elephant, camel, ass, mule, sheep or goat) (S. 132).
22. Duty of owner to give information regarding driver to a police officer (S. 133).
23. Duty of driver in case of accident and injury to a person. He will carry unless it is not practicable due to mob fury, the injured person to the nearest doctor or hospital who will immediately attend without waiting for any procedural formalities unless the injured person desires otherwise. He will also give information to a police officer and the insurer (S. 134).
24. The State Government can make schemes for investigation of accident cases and wayside amenities (S. 135).
25. Inspection of vehicle involved in accident (S. 136).
26. Rule making power of the Central Govt. (S. 137).
27. Rule making power of the State Govt. (S. 138).

2.42 Central Motor Vehicles Rules, to Transport of Hazardous

1989 (including Rules pertaining Goods) :

Under the Motor Vehicles Act, 1988, these Central Motor Vehicles Rules, 1989 were notified on 2-6-1989 and came into force from 1-7-1989 save as otherwise provided in rule 1(3). They were amended in 1993, for transportation of hazardous materials vide Notification dated 26-3-1993, New Delhi..

In Chapter-5 (Construction, Equipment and Maintenance of Motor Vehicles) *Rule No. 91, 92 and 129 to 137 are pertaining to transport of dangerous or hazardous goods and their abstract is given below.*

Definitions (R. 91) :

'Dangerous or hazardous goods' means the goods of dangerous or hazardous nature to human life specified in Table I, II and III to Rule 137.

Consignor means the owner of hazardous goods.

Emergency information penal means the penal specified in rule 134.

Primary risk is the most potent risk and *subsidiary risk* is in addition to that.

General (R. 92) :

A motor vehicle shall be used or allowed to be used in a public place in compliance with this chapter. If the vehicle does not remain under effective control it shall not be used except by towing.

Class Labels, Safety Equipment & Tachograph (R. 129) :

Every owner shall display on goods carriage and on every package mark of class label specified in Table I to Rule 137. If the package represents two hazards given in Table III to rule 137, two labels shall be displayed on the package. The label on the package should be appropriate to the type of hazardous goods as specified in Table to Rule 137. Such goods carriage shall carry safety equipment to prevent fire, explosion or escape of hazardous goods and shall be fitted with *tachograph* conforming to IS, to record the lapse of running time of the motor vehicle, time speeds maintained, acceleration, deceleration etc.

Spark Arrester (Rule 129A) :

Goods carriage carrying dangerous or hazardous goods to human life, shall be fitted with a spark arrester.

Manner of Display of Class labels (R. 130) :

Size of class label on a goods package (e.g. box, drum etc.) should be more than 25 mm² and display angle 45°. Adhesive material should be waterproof. It should not obscure any other markings necessary. On front and rear both the sides it should be displayed.

Consignor's duty (R. 131) :

Every consignor shall supply to the owner of the goods carriage accurate and sufficient information about the hazardous goods so as to enable such owner and his driver to comply with Rules 129 to 137 and be aware of the risk to the health or safety of any person.

Valid registration to carry hazardous goods listed in Table-III, first aid, safety equipment, antidotes, training to driver to control transport emergency are also necessary.

Carriage Owner & Driver's duty (R. 132) :

They will satisfy themselves about the information given to them by the consignor. The driver will be given relevant information in Annexure-V which will be kept in the driver's cabin and available during transportation.

Valid registration to carry hazardous goods, first aid, safety equipment, tool box, antidotes, fixing of trip route and valid driving licence are also necessary.

Driver to take precautions (R. 133) :

Driver shall observe at all times all the precautions to prevent fire, explosion or escape of hazardous goods, shall ensure parking in a safe place and under control and supervision of himself or some other competent person above the age of 18 years. The driver will keep a TREMCARD and information u/r 132(3) in his cabin.

Emergency Information Penal (R. 134) :

Such panel (marked on goods carriage i.e. vehicle) shall contain -

- The correct technical name of the hazardous goods in letters bigger than 50 mm size.
- Class label of more than 260 mm² size.

- Telephone number of emergency services to be contacted in case of fire or any accident with letters and numbers of more than 50 mm size and also the name and telephone number of the consignor or other person to receive advice on emergency measures.
- A sticker on vehicle showing goods being carried on in that trip.

Driver to be instructed (R. 135) :

The owner of goods carriage shall ensure the satisfaction of the consignor that the driver has received adequate instructions and training to understand -

- Nature of the goods.
- Nature of the risks, therefrom.
- Precautions while driving or parking.
- Action to be taken in case of emergency.

Report of Accident (R. 136) :

The driver transporting any hazardous goods shall forthwith report any accident involving such goods to the nearest police station and also the owner of the goods carriage or the transportor.

Table - I : Eight Classes of Hazardous Goods :

Classification of hazardous goods and their class labels are as under :

Class No.	Type of Goods	Class Label		
		Symbol	Colour of Symbol	Colour of Background
1	Explosives	Exploding bomb	Black	Orange
1.1	“			
1.2	“			
1.3	“			
1.4	“	Figure 1.4	Black	“
1.5	“	Figure 1.5	figures	
2	Non-flammable gases	Gas Cylinder	Black or White	Green
	Flammable gases	Flame	Black or White	Red
	Poison (Toxic) gases	Skull & Crossbones	Black	White
3	Flammable liquids	Flame	Black or White	Red
4	Flammable Solids	Flame	Black	White with vertical red strips
4.1				
4.2	Substances liable to spontaneous combustion	Flame	Black	Upper half white, lower half red
4.3	Substances which, in contact with water, emit flammable gases	Flame	Black or White	Blue
5	Oxidising substances	Flame over Circle	Black	Yellow
5.1				
5.2	Organic Peroxides	“	“	“

6				
6.1	Poisonous (toxic) substances	Skull and Crossbones with word 'POISON'	Black	White
	OR			
	Poisonous (toxic) substances, harmful, stow away from foodstuffs	St. Andrew's Cross over an ear of Wheat	"	"
6.2	Infectious substances	Three crescents superimposed on a circle and inscription	"	"
7	Radioactive substances	Trefoil or Three segments of a circle	Black	Top half Yellow, bottom half White
8	Corrosives	Liquids spilling from two glass vessels and attacking a hand and a metal	Black	Upper half White, lower half Black with white border

Table - II : Indicative Criteria :

(a) Toxic chemicals :

- Oral in rats $LD_{50} \geq 5$ to 200 mg/kg.
- Cutaneous in rats or rabbits $LD_{50} = 10$ to 400 mg/kg.
- Inhalation (4 hrs) in rats $LC_{50} = 0.1$ to 2% mg/l

(b) Flammable chemicals :

- Flammable Gases $BP \leq 20^{\circ}C$ at normal pressure.
- Highly flammable liquids - $BP > 20^{\circ}C$ at normal pressure and $FP < 21^{\circ}C$.
- Flammable liquids - $FP < 55^{\circ}C$ and which remain liquid under pressure.

(c) Explosives - Chemicals which may explode under the effect of flame or which are more sensitive to shocks or friction than dinitrobenzene.

Table - III : List of Hazardous & Toxic Chemicals :

Chemicals are listed and classified as -

C = corrosive, E = Explosive, F = Flammable, O = Oxidising, R = Reactive and T = Toxic

For the details the list should be referred.

IS:1446 gives classification of dangerous goods and classifies risks, subrisks, chemical substances and dangerous goods.

2.43 Railways Red Tariff Rules, 1960 :

Under the Indian Railways Act, 1890, the Railways Red Tariff Rules, 1960 lay down procedure and conditions for the carriage by rail of dangerous goods except explosives for Defence Services. Their salient features are as under :

1. Dangerous goods are classified in 7 groups -
 - (1)Explosives.
 - (2)Gases-compressed, liquefied or dissolved under pressure.
 - (3)Petroleum and other inflammable liquids.
 - (4)Inflammable solids.
 - (5)Oxidising substances.
 - (6)Acids and other corrosives.
 - (7)Toxic (poisonous) substances.
2. Rules are framed for acceptance, handling carriage, storage, delivery etc. and classification of rating, packing, markings, labelling, storage and carriage for each group.
3. Prohibition to accept for transport the hazardous goods not listed in the rules.
4. Precautions in handling and storing.
5. Quantities for all groups of dangerous goods are prescribed.
6. Loading and unloading of all dangerous goods have to be done by the consignees.

7. Immediate removal of dangerous goods from the railway premises is insisted, otherwise the goods can be disposed.
8. Advance confirmation of readiness to accept goods necessary for acceptance of petroleum goods for transport.
9. In case of explosives, advance notice is always sent to the receiving station by the despatching station.
10. Accidents are usually reported by the in-charge person to the nearest police station, the Chief Controller of Explosives and the departmental officer concerned

See Part 16.1.2(2) of Chapter-18 also. See Part 2.16 of this chapter for transportation of Calcium carbide.

Laws on Child Safety :

2.44 Child Labour (Prohibition and Regulation) Act 1986 :

This Act (No.61 of 1986) was enacted on 23-5-1986 and came into force from the same day except part -III which came into force from 26-5-1993. The Act has 4 parts, 26 sections and Schedule of occupations and processes in which child employment is prohibited.

Statement of Objects and Reasons states the intention of the Bill (Act) as to (i) Ban the employment of children (i.e. those who have not completed their 14th year) in specified occupations and processes (ii) Lay down a procedure to decide modifications to the Schedule of banned occupations or processes (iii) Regulate the conditions of work of children in employment where they are not prohibited from working (iv) Lay down enhanced penalties and (v) To obtain uniformity in the definition of *child* in the related laws.

The abstract of the Act is as under :

Definitions (S. 2) :

Child means a person who has not completed his 14th year of age.

Establishment includes a shop, commercial establishment, workshop, farm, residential hotel, restaurant, eating house, theatre or other place of public amusement or entertainment.

Workshop means any premises wherein any industrial process is carried on, but does not include any premises to which Sec. 67 of the Factories Act applies.

Part - II : Prohibition of Child Employment

No child shall be employed or permitted to work in any occupation set forth in part A or in any process (workshop) set forth in part - B of the Schedule. This is not applicable to a process carried out by a family or to any school established by or receiving assistance or recognition from Government (S. 3). The Central Govt. has power to amend the Schedule (S. 4) and to constitute the Child Labour Technical Advisory Committee (S. 5).

Part-III : Regulation of Child Employment

This part is applicable to an establishment where none of the activities mentioned in the Schedule is carried on (S.6). Working hours shall be prescribed. A recess of at least 1 hour should be given after 3 hours work. Spread-over including recess shall not exceed 6 hours. No overtime work and no work between 7 pm to 8 am. No double employment on the same day (S.7). Weekly holiday should be given which shall not be altered more than once in 3 months (S.8). Notice of employment should be given within 30 days to the Inspector (S.9). Sections 7, 8, 9, do not apply to a work carried out by a family or a school run, assisted or recognised by Govt. (S.9).

Dispute of age should be referred to the prescribed medical authority (S.10). A prescribed register containing name, birth date, nature of work, working hours etc. shall be maintained (S.11). Notice containing abstract of Sec. 3 & 14 shall be displayed (S.12).

Health & Safety (S. 13) : The Central or State Government may notify rules for the health and safety of children providing for -

Cleanliness.
Disposal of wastes.
Ventilation & Temp.
Dust & Fume.
Humidification.
Lighting.
Drinking & Water.
Latrines, Urinals & Spittoons.
Machine guarding.
Work on dangerous machine.
Training & supervision to work on dangerous machine.
Power cutting device.
Self acting machines.
Casing of new machine.
Floors, stairs and means of access.
Work near moving machine.
Pits, sumps, floor openings etc.
Excessive weights.
Protection of eyes.
Explosive or inflammable dust, gas, etc.
Fire precaution.
Building maintenance.
Safety of building & machinery.

Part - IV : Miscellaneous

Offence of prohibitory section-3 is punishable with minimum Rs. 10,000 or 3 months or both and enhanced penalty for repeated offence is compulsory imprisonment of 6 months to 2 years. For other offences the penalty is a fine upto Rs. 10000, or 1 month or both (S. 14).

In case of offences under the Factories Act, (S.67) Mines Act, (Sec. 40), Merchant Shipping Act. (Sec.109), and Motor Transport Workers Act (S.21), the

penalty mentioned above (S.14 of this Act) is applicable and not the penalty mentioned under those Acts. (S.15).

Any person, Police Officer or Inspector can file a complaint before the First Class Magistrate (S. 16).

Govt. may appoint Inspectors (S.17) and make rules (S. 18, 19). Provisions of other Acts are applicable (not barred) (S. 20).

The Schedule

(Prohibited occupations/processes u/s 3).

Part - A : Occupations :

Railway transport, cinder, picking, ash pit cleaning or building operation in railway premises, catering in railway, work at port, abattoirs or slaughter house and work with crackers and fireworks in shops with temporary licence.

Part - B : Processes :

Bidi making, carpet weaving, cement, cloth printing, dyeing and weaving, matches, explosives and fireworks, mica-cutting and splitting, shellac, soap, tanning, wool cleaning, building and construction, slate pencils, agate, toxic metals and substances, cashew and cashew-nut descaling and processing, soldering and hazardous processes under the Factories, Act.

This Schedule highlights harmful occupations for tender age of children.

Child Labour (Prohibition and Regulation) Rules, 1988 :

The Central Govt. u/s 18 of the Child Act made these rules. They came into force on 10-8-1988. They have 17 rules and 2 forms. Their abstract is as under -

Constitution and functioning of the CLTA Committee u/s 5 of the Act (R. 3 to 15).

Register u/s 11 shall be in Form A and retained for 3 years (R. 16). The age certificate shall be in Form B and should be signed by a Govt. medical doctor or an ESIC regular doctor (R.17).

Laws on Public Safety :

Public Liability Insurance Act, 1991 :

This Act (No.6 of 1991) was enacted on 22-1-1991 and came into force from 23-1-1991. As mentioned in its preamble, the Act provides for public liability insurance for immediate relief to persons affected by accident occurring while handling any hazardous substance and for matters connected therewith. The Act has 23 sections.

The statement of objects and Reasons in drafting the bill is reproduced below :

The growth of hazardous industries, processes and operations in India has been accompanied by the growing risks from accidents not only to the workmen employed in such undertakings, but also innocent members of the public who may be in the vicinity. Such accidents lead to death and injury to human beings and other living beings and damage private and public properties. Very often, the majority of the people affected are from the economically weaker sections and suffer great hardships because of delayed relief and compensation. While workers and employees

of hazardous installations are protected under separate laws, members of the public are not assured of any relief except through long legal processes. Industrial units seldom have the willingness to readily compensate the victims of accidents and the only remedy now available for the victims is to go through prolonged litigation in a Court of Law. Some units may not have the financial resources to provide even minimum relief.

It is felt essential, therefore, to provide for mandatory public liability insurance for installations handling hazardous substances to provide minimum relief to the victims. Such an insurance apart from safeguarding the interests of the victims of accidents would also provide cover and enable the industry to discharge its liability to settle large claims arising out of major accidents. If the objective of providing immediate relief is to be achieved, the mandatory public liability insurance should be on the principle of “no fault” liability as it is limited to only relief on a limited scale. However, availability of immediate relief would not prevent the victims to go to courts for claiming larger compensation.

The Bill seeks to achieve the above objectives.

Definitions (S. 2) :

Accident means an accident involving a fortuitous or sudden or unintended occurrence while handling any hazardous substance resulting in continuous or intermittent or repeated exposure to death of, or injury to, any person or damage to any property but does not include an accident by reason only of war or radioactivity.

Handling of hazardous substance means the manufacture, processing, treatment, package, storage, transportation by vehicle, use, collection, destruction conversion, offering for sale, transfer or the like of such hazardous substance. (*vehicle* means any mode of surface transport excluding railways).

See also S. 2(d) of the EP Act.

Hazardous substance means any substance or preparation which is defined u/s 2 (e) of the EP Act and exceeding such quantity notified by the Central Govt.

Liability of Owner :

Every owner shall take, before he starts handling of any hazardous substance, one or more insurance policies to ensure himself against liability to give *relief* as specified in the *schedule* given below to any person (other than a workmen, as defined in WC Act) who suffered injury, death or property damage due to any accident. The policy shall be kept renewed. It shall be for an amount more than the paid-up capital or the market value of all assets and stocks, but not exceeding 50 crore rupees. In addition to this, the owner shall also pay to the insurer, together with the amount of premium, further amount, not exceeding the premium and as may be prescribed to be credited to the Relief Fund u/s 7-A. The insurer shall remit this amount to the authority in S. 7-A within a prescribed time.

The Schedule of Relief

1. Reimbursement of medical expenses upto Rs. 12,500 in each case.
2. For fatal accident Rs. 25,000 per person in addition to (1) above.
3. For permanent disability, injury or sickness, reimbursement of medical expenses upto Rs. 12,500 and cash relief based on percentage disablement certified by an authorised doctor, the relief for total permanent disability being Rs. 25,000.

4. For loss of wages due to disability Rs. 1000 per month upto 3 months provided the victim is above 16 years and hospitalised for at least 3 days. (S. 3 & 4).

Relief Procedure :

The Collector shall verify the occurrence of an accident in his jurisdiction and cause publicity for inviting relief applications (S. 5). Application (in Form I) shall be made to the Collector within 5 years of the accident. The Collector shall hold inquiry and give award of relief within 3 months of the receipt of relief application. The insurer or/and owner shall deposit the amount as directed by the Collector, within 30 days of the award. The Collector shall arrange to pay from the Environment Relief Fund established by notification of the Central Govt. In addition to relief under this Act, right to get compensation under any other law is also maintainable but in that case the owner has right to reduce (deduct) the amount paid as relief under this Act (S. 5 to 8).

Other provisions :

The Central Govt. can authorise any person to ascertain requirements of this Act and that person shall have a right of entry and inspection, search and seizure, removing hazardous substance at the cost of its owner (S. 9 to 11), the Central Govt. has power to give directions to any person, officer, authority, agency etc. including the direction to prohibit or regulate the handling of hazardous substance or to stop or regulate electricity, water or any other service (s. 12), the Central Govt. or the authorised person can apply to Court for restraining owner from handling hazardous substance and in that case the Court may direct the owner to desist from such handling or authorise the applicant to implement the direction at the cost of the owner (S. 13).

Provisions are also made for offences by companies (S.16), offences by Govt. Departments (S.17), cognisance of offence by the authority or by any person who gives notice of at least 60 days of his intention to complain about the alleged offence, before the authority (S.18), power to delegate (S.19), protection of action in good faith (S.20), advisory committee (S.21), this Act has effect despite anything inconsistent therewith (S.22) and rule making power of the Central Govt. (S.23).

Public Liability Insurance Rules 1991 :

The Central Govt. u/s 23 of the Public Liability Insurance Act made these rules which came into force on 1-5-1991. They have 11 rules and 2 Forms. Their abstract is as under :

A relief application shall be made to the Collector in Form-I (R.3) accompanying the relevant documents such as disability/illness certificate from an authorised physician, death and/or post-mortem certificate, birth or age certificate, proof of hospitalisation for more than 3 days, employers certificate for loss of wages, medical bills and receipts, repairing or replacement cost certificate regarding damaged property etc. (R.4).

The Collector has all the powers as prescribed in Rule 5 and shall maintain a register of claim applications, awards and payment made, shall keep it open for public and give copy on request (R.7).

All directions u/s 12 shall be in writing, the objections may or may not be invited and the proposed action may be confirmed, modified or withdrawn and the notice may be served as prescribed (R.8).

For cognisance of offence u/s 18, notice in Form-II shall be sent to the authorities mentioned in R.9.

Maximum liability of the insurer to pay relief is Rs. 5 crores (to several claimants) in case of one accident and Rs. 15 crores in case of more accidents during one year or the period of policy whichever is less. If the award amount exceeds this limit, it shall be met with from the relief fund and in case it still falls short, the balance amount shall be payable by the owner. (R. 10).

Owner's contribution to the Environmental Relief Fund shall be *equal to the premium* payable to the insurer and it shall be paid alongwith the premium to the insurer. The contribution so received shall be remitted as per the scheme u/s 7-A.

Form - I : Application for compensation (claim).

Form - II : Notice for cognisance of offence.

2.48 National Environment Tribunal Act, 1995 :

The *introductory words* explaining the need of this Act are as under :

The protection and improvement of the Human Environment is a major issue which affects the well-being of people and economic development throughout the world; it is the urgent desire of the people of the whole world and the duty of all governments. There is growing evidence of man-made harm in many regions of the earth; dangerous levels of pollution in air, water, earth and living beings thereon, major and undesirable disturbances to the ecological balance of the biosphere; destruction and depletion of irreplaceable resources; and gross deficiencies harmful to the physical, mental and social wealth of man, in the man-made environment, particularly in the living and working environment.

Statement of Objects & Reasons in passing this Act is reproduced below :

The principle of strict civil liability in accident cases arising from the activities involving hazardous substances has been highlighted in a case by the Supreme Court of India. An enterprise engaged in activities with potential threat to the health and safety of the persons residing in the surrounding areas of the factory owes an absolute duty to the community to ensure that no harm is caused to any one on account of hazardous and inherently dangerous nature of such activities. Cases seeking compensation for damages to human health, property and the environment, particularly contamination of sub-surface water, are increasing. There is also an increasing trend in the number of industrial disasters.

The United Nations Conference on Environment and Development held at Rio de Janeiro in June, 1992, in which India participated, has also called upon the States to develop National laws regarding liability and compensation for the victims of pollution and other environmental damage.

It is deemed expedient to develop and codify the principle of strict civil liability in respect of all such cases where damage is caused while handling hazardous substances. It is proposed to establish a National Environment Tribunal for effective and expeditious disposal of cases arising from certain industrial accidents and disasters with a view to providing effective and expeditious relief and compensation for damages to human health, property and the environment.

The Bill seeks to achieve the aforesaid objects.

The Bill introduced in 1992 was passed by both the Houses of the Parliament in 1995, and received the assent of the President on 17th June, 1995 and became an

Act of Parliament under the short title “The National Environment Tribunal Act, 1995 (29 of 1995)”.

Preamble of the Act provides for strict liability for damages arising out of any accident occurring while handling any hazardous substance and for the establishment of a National Environment Tribunal for effective and expeditious disposal of cases arising from such accident, with a view to giving relief and compensation for damages to persons, property and the environment and for matters connected therewith or incidental thereto.

The Act has 5 chapters, 31 sections and a Schedule..

The words ‘accident’, ‘handling’ and ‘hazardous substance’ are defined as the same as defined u/s 2 of the Public Liability Insurance Act, 1991 (see Part 2.24) and the word ‘environment’ is defined as the same as defined u/s 2 of the Environment (Protection) Act 1986 (see Part 2.28).

‘Tribunal’ means the National Environment Tribunal established u/s 8 by the Central Govt.

Liability to Pay (S.3) :

The *Schedule* u/s 3(1) gives following heads under which compensation can be claimed by *any person (other than a workman)* for death, injury or damage to property or environment and the owner has to pay.

- Death;
- Permanent, temporary, total or partial disability or other injury or sickness;
- Loss of wages due to total or partial disability or permanent or temporary disability,
- Medical expenses incurred for treatment of injuries or sickness;
- Damages to private property;
- Expenses incurred by the Government of any local authority in providing relief, aid and rehabilitation to the affected persons;
- Expenses incurred by the Government for any administrative or legal action or to cope with any harm or damage, including compensation of environmental degradation and restoration of the quality of environment;
- Loss to Government or local authority arising out of, or connected with the activity causing any damage;
- Claims on account of any harm, damage or destruction to the fauna including milch and draught animals and aquatic fauna;
- Claims on account of any harm, damage or destruction to flora including aquatic flora, crops, vegetables, trees and orchards;
- Claims including cost of restoration on account of any harm or damage to environment including pollution of soil, air, water, land and eco-systems;
- Loss and destruction of any property other than private property;
- Loss of business of employment or both;
- Any other claim arising out of, or connected with, any activity of handling of hazardous substance.

In claiming above compensation, the claimant need not to prove any wrongful act, neglect or default of any person.

If the injury is due to several activities, operations and processes, the Tribunal may apportion the liability for compensation amongst those responsible for such activities on an equitable basis.

Application for Claim (S.4) :

The person who has sustained the injury, the owner whose property is damaged, legal representative of the deceased, duly authorised agent, any organisation recognised by the Central Govt., a local authority, State Govt. or the Central Govt. can make an application for compensation.

The Tribunal may take up the cases *suo motu*. The claimant can ask relief under the Public Liability Insurance Act, 1991.

Fees to be paid with the application is Rs. 1000 and time limit 5 years.

Powers (S.5 to 7) :

Procedure and powers of the Tribunal are mentioned in S.5 to 7 and in Chapter-4 (S. 19 to 24). The Tribunal can make interim orders and deduct the amount of relief or compensation paid in any other law from the compensation to be paid under this Act. Amount payable for damage to environment shall be credited to the Environmental Relief Fund under the Public Liability Insurance Act. The order of the Tribunal shall be executable as a decree of civil court. The amount shall be recoverable from the owner as arrears of land revenue or of public demand.

Appeal shall lie to the Supreme Court and shall be preferred within 90 days.

Establishment of Tribunal (S.8 to 18) :

The Central Govt. shall by notification, establish it. It shall have Chairperson, Vice-Chairpersons, Judicial Members and Technical Members. A Bench shall consist of one judicial and one technical member. Their qualifications are prescribed in S. 10. Age of retirement for Member, Vice-Chairperson and Chairperson are 62, 65 and 70 respectively. Provisions are made for their salaries, allowances, powers and staff etc.

Penalty : Imprisonment upto 3 years or fine upto Rs. 10 lakh or both, for not complying an order by the Tribunal.

Section 31 gives rule making powers to the Central Government.

Laws on Construction Safety :

2.49 Building and other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 :

The Building and other Construction Workers (Regulation of Employment and Conditions of Service) Ordinance No. 14 of 1995 was promulgated by the President of India on 3-11-1995. As its bill could not be passed, second Ordinance No. 3 of 1996 was promulgated on 5-1-1996 giving effect from 1-3-1996. Then the bill was passed and it became the Act, 1996 (N0. 27 of 1996 on 19-8-1996), has retrospective effect from 1-3-1996. It was published in the Gazette on 20-8-1996. It extends to the whole of India,. The Act has 11 chapters and 64 sections.

Preamble : It states that this Act is to regulate the employment and conditions of service of building and other construction workers and to provide for their safety, health and welfare measures and for other matters connected therewith or incidental thereto.

Amenability : The Act applies to every establishment (an individual, firm, association, company, contractor, Government etc.) which employs or had employed on any day of past one year ten or more building workers in any building or other construction work.

It does not apply to an individual who constructs his own residence costing less than Rs. 10 lakhs.

Definitions : Section 2 defines appropriate government (means Central or State Govt), Board, building or other construction work, building worker, Chief Inspector, Director-General, employer (Govt authority, contractor), establishment, fund, wages etc.

Scope : The Act has chapters on advisory and expert committees, registration of establishments and building workers as beneficiaries, welfare boards, working hours, welfare and other conditions, safety and health measures, inspecting staff, special provisions, penalties (max. Rs. 2000 or 3 months or both) and procedure and miscellaneous.

Welfare : Powers are given to the States to constitute a Welfare Board and the Central/State Government can make rules for prescribing working hours, intervals, rest day, double wages if worked on rest day, overtime wages at twice the ordinary wages, records & registers, latrines & urinals for more than 50 workers, temporary living accommodation (free of charge) which shall be removed or demolished after the work is over, first aid and canteen facilities for employing more than 250 workers.

The Act prohibits to employ person who is deaf or has a defective vision or a tendency to giddiness to avoid accident.

The Act provides for drinking water points situated 6 mt. away from any washing place, urinal or latrine, and crèche rooms for more than 50 female workers for their children under the age of six years.

Safety and Health Measures (Chapter 7, Sec. 38-41) :

- 1 For 500 or more workers, Safety Committee is necessary.
- 2 For 500 or more workers qualified Safety Officer is necessary.
- 3 Notice of accident is required for disablement of more than 48 hours. If 5 or more persons die, inquiry within one month is required.
- 4 Central/State Government has power to make rules pertaining to -

- Scaffolding at various stages, means of support and safe means of access.
- Precautions while demolition, shoring etc.
- Competent person to control hazards of explosion or flying material.
- Competent persons to drive or operate transport equipment such as locomotives, trucks, wagons, cranes, trailers, etc.

- Hoists, lifts, lifting gear, their testing, heat treatment and precautions while raising or lowering loads etc. and requirement of competent persons.
- Sufficient and suitable lighting.
- Adequate ventilation at work place, confined space and prevention of dust, fumes, gases, vapours etc.
- Precautions while stacking, unstacking, stowing, unstowing and handling of materials or goods.
- Safeguarding of machinery.
- Safe handling and use of pneumatic tools, equipment. etc.
- Fire precautions.
- Maximum weight to be lifted or moved.
- Safety of workers while transporting them by water and their rescue from drowning.
- Safety of workers from live electric wires, overhead wires and electrical machinery, apparatus and tools.
- Safety nets, safety sheets and safety belts as per need.
- Standards of compliance with regard to scaffolding, ladders, stairs, lifting appliances, ropes, chains, & accessories, earth moving equipment and floating operational equipment.
- Precautions while pile driving, concrete work, work with hot asphalt, tar etc. insulation work, demolition, excavation, underground construction and handling materials.
- Safety policy.
- Information of Bureau of Indian Standards under the Bureau of Indian Standards Act, 1986, (63 of 1986). regarding use of any articles or process covered under that Act.
- Medical facilities for building workers.
- Any matter concerning the safety and health of building/construction workers.

5 The Central Government may frame model rules in respect of matters stated above which shall be followed by the State while making their rules.

Inspection Staff (Chapter-8, S.42,43) : The Central Govt. may appoint the Director-General of Inspection and the State Govt. may appoint the Chief Inspector of Inspection of Building and Construction and both the Governments may appoint necessary Inspectors for local limits. All such Inspectors are public servants u/s 21 of the IPC. Any document or information shall be produced to the Inspector u/s 175 & 176 of the IPC, and Sec. 94 of the Cr. P. C. is also applicable for the power of search & seizure. Wide powers are prescribed u/s 43 for the Inspectors.

Special Provisions (Chapter-9, S.44 to 46) : An employer is responsible to provide constant and adequate supervision to prevent accidents and to comply safety provisions under this Act (S.44), to pay wages and compensation to building workers (S.45) and to give notice of commencement of building or other construction work at least 30 days before to the Inspector concerned (S.46).

Next Chapter-10 (S.47 to 51) provides for penalties and procedure and Chapter-11 (S.56 to 64) provides for delegation of powers, returns, protection of action taken in good faith and power of Central Government to give directions, to remove difficulties and to make rules.

The Building and other Construction Workers' Welfare Cess Act, 1996 (No. 28 of 1996), received the assent of the President on 19-8-1996 and came into force from 3-11-1995. An employer is required to pay cess more than 1% but less than 2% of the cost of construction for the purposes of the Act No. 27 of 1996. The local authority or the State Government can collect the cess in advance while giving approval of a building or construction and shall pay to the Board after deducting the cost of collection not exceeding 1% of the amount collected. Late payment interest is 2% per month on the unpaid amount and a penalty not exceeding the amount of cess is also chargeable after giving opportunity to be heard.

2.50 Building and other Construction Workers (Regulation of Employment and Conditions of Service) Central Rules, 1998 :

Under Sec. 62 and Sec. 40 of the Act No. 27 of 1996 (mentioned in foregoing Part 2.46), the Central Government made these rules. They came into force on 19-11-1998 the date of their publication in the Official Gazette.

They apply to the work under the jurisdiction of the *Central Government*. They have 5 parts, 30 chapters, 252 rules, 12 schedules and 26 forms. Section-2 gives 74 definitions most of which are technical terms. Thus these rules are very exhaustive and contain many technical details.

Partwise subject division is as under :

Part I	Preliminary, Chap I, II, R. 1 to 9.
Part II	Central Advisory Committee, Registration of Establishments, Chap III to V, R. 10 to 33.
Part III	Safety & Health, Chap VI to XXV, R. 34 to 233.
Part IV	Hours of work, Welfare, Payment of Wages, Registers & Records etc., Chap XXVI to XXIX, R. 234 to 249.
Part V	Miscellaneous provisions, Chap XXX, R. 250 to 252.

Thus out of 252 rules, 200 are pertaining to Safety & Health and mostly require engineering skill.

Chapter wise subject matter is as under :

Chapter-I Preliminary (R. 1 to 4) :

Short title, application, commencement, definitions, interpretation of words not defined and savings.

Chapter-II Responsibilities and Duties of Employers, Architects, Project engineers & Designers, Building workers etc. (R. 5 to 9) :

Rule 5 pertaining to duties of employer and Rule 8 regarding duties of workers are important. They have to comply with the provisions of these rules, maintain lifting appliance, transport equipment and all safety devices conforming to safety standards, testing etc., discover and report defects if any, not to remove or interfere with fencing, gangway, gear, ladder, life saving appliances etc., to use only safe means of access

and to keep latrines, urinals, washing facilities and canteen in clean and hygienic condition.

Chapter-III Central Advisory Committee (R. 10 to 22) :

Constitution of the Committee, terms of office, membership, staff, meetings, quorum etc. are prescribed.

Chapter-IV Registration of Establishment (R. 23 to 27) :

Application for registration in triplicate in Form-I, with fees (by DD) to the Registering Officer, grant of certificate of registration (Form-II), Register of Registration (Form-III), and conditions of registration. Fees as under :

Building workers upto 100	-	Rs. 100
101 to 500	-	Rs. 500
501 and more	-	Rs. 1000

Chapter-V Appeals, Copies of Orders, Payment of Fees, etc. (R. 28 to 33) :

Appeal and hearing procedure is prescribed. All fees are to be paid by a crossed DD.

Chapter-VI Safety & Health, General Provisions (R. 34 to 54) :

Noise level within limits (Sch. VI), fire protection, emergency action plan for site employing more than 500 workers, fencing of machinery, manual lifting within limits (adult man 55 kg, adult woman or adolescent male 30 kg and adolescent female 20 kg), Health & Safety policy for employing 50 or more workers, Carbon monoxide below 50 ppm and removal of hazardous dust, gas, fumes and oxygen deficiency from any confined space, overhead protection for a building under construction of 15 mt or more in height, the width of protection should be more than 2 mt and height less than 5 mt above the base of the building, protection against slipping, tripping, cutting, drowning and falling hazards, safety net and other adequate equipment to prevent fall, PPE for protection of eye, head and safety from corrosive chemicals, control of electrical hazards, vehicular traffic, stability of structures, illumination of passageways, stacking of materials, disposal of debris, numbering and marking of floors and use of safety helmets and shoes conforming to IS.

Chapter-VII Lifting Appliances and Gear (R. 55 to 81) :

All lifting appliances including their parts and working gear, whether fixed or movable should be of sound construction, sound material, adequate strength and maintained in good repair and working condition (R. 55). Provisions for test and examination by a *competent person* at every 5 years in the manner specified in Sch. I, automatic safe load indicators, safe installation, winches, buckets, safe working load, loading safely and within SWL, operator's cabin, operating instructions, hoists, fencing, rigging of derricks, securing of derrick foot, yearly examination of lifting gears, ropes, heat treatment, register of testing (Form V to X and XXVI), vacuum and

magnetic lifting gear, knotting of chains & wire ropes, carrying of persons, attachment of loads, tower cranes and qualification of operator are also prescribed.

Chapter-VIII Runways and Ramps (R. 82 to 85) :

Runways or ramps to be used by building workers should have width more than 43 cm, plank thickness 2.5 cm or more, open sides above 3 mt should have guard rail of 1 mt height and sufficient strength. Runway or ramp to be used by transport equipment should have a width more than 3.7 mt with timber curbs of 20 cm x 20 cm in width and placed parallel to and secured to the sides of such runway or ramp, Slop of ramps less than 1 in 4, continuous rise less than 3.7 mt and no more rise without broken by horizontal landing of length 1.2 mt or more. Runway or ramp to be used for wheel-barrows, hand carts or hand trucks should have width more than a metre with plank thickness more than 5 cm.

Chapter-IX Work on or adjacent to Water (R. 86, 87) :

Water transport vessel with responsible person, life buoys on deck, prevention from drowning by fencing and suitable rescue equipment etc. are prescribed.

Chapter-X Transport and Earth moving equipment (R. 88 to 95) :

They should be of sound construction and sufficiently strong for the purpose, of sufficient size, duly certified, inspected weekly and safe carrying capacity marked. Power trucks and tractors with effective brakes, head lights, tail lamps, tie chains etc.

Power shovels and excavators, bulldozers, scrappers, mobile asphalt layers and finishers, pavers and road rollers should have silencers, tail lights, power and hand brakes, reversing alarm and search light for forward and backward movement. Pavers should have guards to prevent workers walking under their skip. While moving downhill the engine should be in gear. Open light is not permitted to see level of asphalt. Load bearing capacity of the ground should be examined before using a road roller.

Chapter-XI Concrete Work (R. 96 to 107) :

In addition to general provisions regarding use of concrete, specific safety and health provisions are prescribed for preparation and pouring, erection of concrete structures, buckets, pipes & pumps, mixing and pouring of concrete, panels & slabs, stressed and tensioned elements, vibrators, inspection & supervision, beams, floors and roofs, stripping and reshoring.

Chapter-XII Demolition (R. 108 to 118) :

Provisions are made for preparation before demolition, protection of adjacent structures, demolition of walls, partitions etc., method of operation, access to floor, demolition of structural steel, storage of material, floor openings, inspection, warning signs, barricades and mechanical methods of demolition (i.e. by swinging weight, clamshell bucket, power shovel, bulldozer etc.).

Chapter-XIII Evacuation and Tunnelling Works (R. 119 to 168) :

Subjects prescribed are notification of intention to carry out such work, project engineer, responsible person, warning signs and notices, register of employment, illumination, stability of structure; piling, shoring & bracing, safe access, trenches, depth of trenches, positioning and use of machinery, breathing apparatus, safety measures for tunnelling operation, pneumatic tools, shafts, lift for shaft, means of communication, signals, clearances, shelters, use of internal combustion engine, inflammable oils, coupling and hoses, hose installation, fire resistant hoses, flameproof equipment, storing of oil and fuel underground, use of gases underground, water for fire fighting, flooding, steel curtains, rest shelters, permissible limit of exposure of chemicals (Sch. XII), ventilation, air supply intake point, emergency generators, air mains, bulk head and air-locks, diaphragms, portable electric hand tools (upto 24 volts), circuit breaker, transformer, live wires, welding sets, quality and quantity of air (more than 0.3 m³/min/person), working temperature (less than 29⁰C), man-locks and working in compressed air environment, safety instruction and medical lock.

Chapter-XIV Steep Roof (R. 169 to 171) :

Safety measures are prescribed for work on steep roofs, construction and installation of roofing brackets and crawling boards.

Chapter-XV Ladders & Step-ladders (R. 172 to 174) :

Provisions are made for their construction and safe use, rungs and materials.

Chapter-XVI Catch platform and Hoarding, Chutes, Safety belts & Nets (R. 175 to 180) :

Provisions are made for catch platforms (minimum width 2 mt, inclined height 1.5 mt and open end with fencing of 1 mt height), hoarding for protection of workers, chutes and its use, safety belts, nets, their use and storage.

Chapter-XVII Structural Frame & Frame work (R. 181 to 185) :

Provisions are made for trained workers for erection of structural frame and framework, formwork, false work, shoring and deshoring, erection and dismantling of steel and prefabricated structure.

Chapter-XVIII Stacking & Unstacking (R. 186, 187) :

This should be in a safe way, on firm foundation, not against weak partition or wall, safe means of access for a height above 1.5 mt, under supervision, 10 cement (lime etc.) bags in a pile and adequate support for more height, storing of cement or lime in dry place, bricks, tiles or blocks on firm ground, steel according to its shape, size and length and at the lowest level, pipe should not fall by rolling, angle of repose (See Table-22 of Chapter-32) of loose materials to be maintained and dust mask for handling of dust laden material.

Chapter-XIX Scaffold (R. 188 to 205) :

Provisions are made for scaffold construction (bamboo or metal), supervision by a responsible person, maintenance, standards, ledger, putlogs, working platform, board, plank and decking, repair of damaged scaffold, opening, guardrails, scaffold used by building workers of different employers, protection against electric power line, screening net and wirenets, tower scaffold, gear for suspension of scaffold, trestle scaffold and cantilever scaffold, scaffold supported by building, use of winches and climbers for suspended scaffold and safety devices for suspended scaffold.

Chapter-XX Cofferdams and Caissons (R. 206, 207) :

These should be of good construction, sound material, of adequate strength and inspected by a responsible person. Safe means of access, work under supervision and work in compressed air as per standard laid down procedure. Pressure plant and equipment should be examined by a competent person and maintained in good repairs and working condition. Safety valve, pressure gauge (dial range within 1.5 to 2 times the maximum working pressure) and stop or isolation valve are also necessary.

Chapter-XXI Safety Organisation (R. 208 to 211) :

Safety Committee is necessary where 500 or more building workers work. Equal number of members from employer and employees. Meeting monthly. Senior person having overall control over the affairs of the construction site should be the chairman. Main function prescribed. Agenda and minutes should be circulated and shown to the Inspector on demand.

Safety Officer is necessary where 500 or more building workers work. Their number, qualification, condition of service (including status and scale), duties and facilities are prescribed in Sch. VIII. Qualification required is B.E., B. Tech or B. Arch with 2 years experience or Diploma holder with 5 years experience and *a degree or diploma in industrial safety with an elective subject of construction safety*. Other experience is also prescribed. Their duties are reproduced below from Sch. VIII.

- (i) to advise the building workers in planning and organising measures necessary for effective control of personal injuries;
- (ii) to advise on safety aspects in a building or other construction work and to carry out detailed safety studies of selected activities;
- (iii) to check and evaluate the effectiveness of action taken or proposed to be taken to prevent personal injuries;
- (iv) to advise purchasing and ensuring quality of personal protective equipment conforming to national standards;
- (v) to carry out safety inspections of building or other construction work in order to observe the physical conditions of work and the work practices and procedures followed by building workers and to render advice on measures to be adopted for removing unsafe physical conditions and preventing unsafe actions by building workers;
- (vi) to investigate all fatal and other selected accidents;
- (vii) to investigate the cases of occupational diseases contracted and reportable dangerous occurrences;
- (viii) to advise on the maintenance of such records as are necessary with regard to accidents, dangerous occurrence and occupational diseases;

- (ix) to promote the working of safety committees and to act as an advisor to such committees;
- (x) to organise, in association with concerned departments, campaigns, competitions, contents and other activities which will develop and maintain the interest of building workers in establishing and maintaining safe conditions of work and procedures;
- (xi) to design and conduct, either independently or in collaboration with other agencies, suitable training and educational programmes for prevention of accidents to building workers;
- (xii) to frame safe rules and safe working practices in consultation with senior officials of the establishment;
- (xiii) supervise and guide safety precautions to be taken in building and other construction work of the establishment.

Fatal accident shall be reported - within 4 hours and non-fatal - causing disability of more than 48 hours - accident shall be reported within 72 hours to the Regional Labour Commissioner (Central), Board, Director General and the near relative of the deceased. It should be in the Form No. XIV.

Procedure for enquiry into cases of accident or dangerous occurrence is also prescribed u/r 211.

Chapter-XXII Explosives (R. 212, 213) :

All explosives at construction site should be used, stored or handled as per MSDS and provisions of the Explosives Act and Rules. Prohibition of smoking and sources of ignition, safe distance and use of non-sparking tools while opening packing, prior warning and danger signals before use, avoiding injury and use under supervision are all necessary.

Chapter-XXIII Piling (R. 214 to 222) :

Provisions are made for good design, construction, operation, inspection and maintenance of pile driving equipment, considering ergonomic principles, electrical safety, air or steam hammer, stability of adjacent structure, protection of operator, instruction and supervision, entry of unauthorised person, working platform on piling frames and pile testing.

Chapter-XXIV Medical Facilities (R. 223 to 232) :

Provisions are made for pre and periodical medical examination of workers as per Sch-VII, by the doctors and hospitals approved by the Central Government, certificate of medical examination in Form No. XI, record in Form No. XII, duties of construction medical officers, occupational health centre for hazardous processes mentioned in Sch. IX with services and facilities laid down in Sch. X and qualification of a Construction Medical Officer in Sch. XI, ambulance room equipped with the articles specified in Sch. IV with necessary staff and records, ambulance van specified in Sch. V, stretchers, occupational health services, notice of poisoning or occupational diseases specified in Sch. II and notice in Form No. XIII, first-aid boxes with articles specified in Sch. III and emergency care services or treatment with essential life saving aids and appliances as mentioned in R. 232.

Chapter-XXV Information to Bureau of Indian Standards (R. 233) :

Details regarding performance, deviation or short-comings of the building materials, articles or processes against IS prescribed shall be furnished to the Bureau of Indian Standards. In case of no IS prescribed, suggestions for improvement shall be given to the Bureau to consider and form necessary standards.

Chapter-XXVI Hours of work, Rest intervals and Weekly off etc. (R. 234 to 237) :

Provisions are made for 9 hours a day or 48 hours a week, rest interval of at least half an hour before more than 5 hours work, spread-over 12 hours on any day, double wages for overtime work or working on rest day, weekly rest day with its previous intimation notice, substituted holiday on one of the five days immediately before or after such rest day and to be given before ten days continuous working.

Chapter-XXVII Notices, Registers, Records and Collection of Statistics (R. 238 to 242) :

Notices of rates of wages, hours of work, wage period, date of payment of wages, names and addresses of the concerned Inspectors and date of payment of unpaid wages in English, Hindi and local language with a copy to the concerned Inspector are required.

Notice of commencement and completion of work in Form No. IV before 30 days and notice of change in this notice within 2 days of the change are also necessary.

Following registers are required :

Register	Form No.
Register of workers	XV
Muster roll	XVI
Register of wages	XVII
Wage-cum-muster roll where a wage period is 15 days or less	XVIII
Register of deductions for damage or loss	XIX
Register of fines	XX
Register of advances	XXI
Register of overtime	XXII
Wage book (for a wage period one week or more)	XXIII
Service certificate	XXIV

Registers under PW Act, MW Act and Contract Labour Act shall be deemed to be the respective registers. A combined or alternative form in lieu of above Forms, shall require prior approval of the Central Government. All registers/records should be maintained uptodate, kept at the workplace, preserved for 3 years and produced on demand before the authority.

An annual return in Form No. XXV shall be sent before 15th February to the registering authority with a copy to the Inspector concerned.

Chapter-XXVIII Welfare (R. 243 to 247) :

Separate latrines or urinals (as required u/s 33 of the Act) for male and female workers, canteen for more than 250 workers at a distance 15.2 mt away from any latrine, urinal or source of dust, smoke or obnoxious fumes. Tea and snacks shall be served at a workplace 200 mt from the canteen.

Chapter-XXIX Wages (R. 248, 249) :

Wages shall be paid before 7th day (workers<1000) or 10th day (workers>1000) of the wage period concerned. In case of termination it shall be paid before the expiry of the second working day from the date of termination. A notice of wage period, date, time and place of payment shall be displayed in English, Hindi and the local language.

Chapter-XXX Powers of Director General and Inspectors (R. 250 to 252) :

Powers to engage experts and agencies and powers of Inspectors including prohibition order are prescribed.