

MANUFACTURE, STORAGE AND IMPORT OF HAZARDOUS CHEMICALS RULES, 1989

[Notification No. SO 966(E), dated 27-11-1989]¹

In exercise of the powers conferred by sections 6, 8 and 25 of the Environment (Protection) Act, 1986 (29 of 1986), the Central Government hereby makes the following rules, namely:—

1. Short title and commencement

(1) These rules may be called the Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989.

(2) They shall come into force on the date of their publication in the Official Gazette.

2. Definitions

In these rules, unless the context otherwise requires—

- (a) "Act" means the Environment (Protection) Act, 1986 (29 of 1986);
- (b) "Authority" means an authority mentioned in column 2 of Schedule 5;
- (c) "export" with its grammatical variations and cognate expression, means taking out of India to a place outside India;
- (d) "exporter" means any person under the jurisdiction of the exporting country and includes the exporting country, who exports hazardous chemicals;
- (e) "hazardous chemical" means—
- (i) any chemical which satisfies any of the criteria laid down in Part I of ²[Schedule I or] listed in column 2 of Part II of this Schedule;
 - (ii) any chemical listed in column 2 of Schedule 2;
 - (iii) any chemical listed in column 2 of Schedule 3;
- (f) "import", with its grammatical variations and cognate expression, means bringing into India from a place outside India;
- (g) "importer" means an occupier or any person who imports hazardous chemicals;
- (h) "industrial activity" means—
- (i) an operation or process carried out in an industrial installation referred to in Schedule 4 involving or likely to involve one or more hazardous chemicals and includes on-site storage or on-site transport which is associated with that operation or process, as the case may be; or

- (ii) isolated storage; or
 - (iii) pipeline;
- (i) "isolated storage" means storage of a hazardous chemical, other than storage associated with an installation on the same site specified in Schedule 4 where that storage involves at least the quantities of that chemical set out in Schedule 2;

(i) "major accident" means an incident involving loss of life inside or outside the installation, or ten or more injuries inside and/or one or more injuries outside or release of toxic chemicals or explosion or fire or spillage of hazardous chemicals resulting in on-site or off-site emergencies or damage to equipment leading to stoppage of process or adverse affects to the environment;

(ja) "major accident hazards (MAH) installations" means isolated storage and industrial activity at a site handling (including transport through carrier or pipeline) of hazardous chemicals equal to or, in excess of the threshold quantities specified in column 3 of Schedules 2 and 3 respectively;

(k) "pipeline" means a pipe (together with any apparatus and works associated therewith) or system of pipes (together with any apparatus and works associated therewith) for the conveyance of a hazardous chemical other than a flammable gas as set out in column 2 of Part II of Schedule 3 at a pressure of less than eight bars absolute; the pipeline also includes inter-State pipelines;

(l) "Schedule" means Schedule appended to these rules;

(m) "site" means any location where hazardous chemicals are manufactured or processed, stored, handled, used, disposed of and includes the whole of an area under the control of an occupier and includes pier, jetty or similar structure whether floating or not;

(n) "threshold quantity" means—

- (i) in the case of a hazardous chemical specified in column 2 of Schedule 2, the quantity of that chemical specified in the corresponding entry in columns 3 and 4;
- (ii) in the case of a hazardous chemical specified in column 2 of Part I of Schedule 3, the quantity of that chemical specified in the corresponding entry in columns 3 and 4 of that Part;
- (iii) in the case of substances of a class specified in column 2 of Part II of Schedule 3, the total quantity of all substances of that class specified in the corresponding entry in columns 3 and 4 of that Part.

²3. Duties of authorities

The concerned authority shall—

- (a) inspect the industrial activity at least once in a calendar year;
- (b) except where such authority is the Ministry of Environment and Forests, annually report on the compliance of the rules by the occupiers to the Ministry of Environment and Forests through appropriate channel;

¹ Published in Gazette of India, Extraordinary, dt. 27-11-1989, Pt. II, s.3(i).

² Substituted for "Schedule I and is" by SO 57(E), dt. 19-1-2000, w.e.f. 20-1-2000.

¹ Substituted by SO 57(E), dt. 19-1-2000, w.e.f. 20-1-2000.

² Substituted by CSK 2862, w.e.f. 22-10-1994.

(c) subject to the other provisions of these rules, perform the duties specified in column 3 of Schedule 5.]

4. General responsibility of the occupier during industrial activity

(1) These rules shall apply to—

(a) an industrial activity in which a hazardous chemical, which satisfies any of the criteria laid down in Part I of Schedule 1 [or is listed] in column 2 of Part II of this Schedule is, or may be, involved; and

²[(b) isolated stage of a hazardous chemical listed in Schedule 2 in a quantity equal to or more than the threshold quantity specified in column 3, thereof.]

(2) An occupier who has control of an industrial activity in terms of sub-rule (1) shall provide evidence to show that he has—

(a) identified the major accident hazards; and

(b) taken adequate steps to—

(i) prevent such major accidents and to limit their consequences to persons and the environment;

(ii) provide to the persons working on the site with the information, training and equipment including antidotes necessary to ensure their safety.

5. Notification of major accident

(1) Where a major accident occurs on a site or in a pipeline, the occupier shall [within 48 hours notify] the concerned authority as identified in Schedule 5 of that accident, and furnish thereafter to the concerned authority a report relating to the accidents in instalments, if necessary, in Schedule 6.

(2) The concerned authority shall on receipt of the report in accordance with sub-rule (1) of this rule, shall undertake a full analysis of the major accident and send the [requisite information within 90 days to the Ministry] of Environment and Forests through appropriate channel.

³[(3) An occupier shall notify to the concerned authority, steps taken to avoid any repetition of such occurrence on a site.]

⁴[(4) The concerned authority shall compile information regarding major accidents and make available a copy of the same to the Ministry of Environment and Forest through appropriate channel.

(5) The concerned authority shall in writing inform the occupier, of any lacunae which in its opinion needs to be rectified to avoid major accidents.]

6. Industrial activity to which rules 7 to 15 apply

(1) Rules 7 to 15 shall apply to—

(a) an industrial activity in which there is involved a quantity of a hazardous chemical listed in column 2 of Schedule 3 which is equal to or more than the quantity specified in the entry for that chemical in columns 3 and 4 (rules 10-12 only for column 4); and

(b) isolated storage in which there is involved a quantity of a hazardous chemical listed in column 2 of Schedule 2 which is equal to or more than the quantity specified in the entry for that chemical in [column 3 and 4 (rules 10-12 only for column 4)].

(2) For the purposes of rules 7 to 15—

(a) "new industrial activity" means an industrial activity which—

(i) commences after the date of coming into operation of these rules; or

(ii) if commenced before that date, is an industrial activity in which a modification has been made which is likely to cover major accident hazards, and that activity shall be deemed to have commenced on the date on which the modification was made;

(b) an "existing industrial activity" means an industrial activity which is not a new industrial activity.

7. [Approval and Notification of sites]

(1) An occupier shall not undertake any industrial activity ³[unless he has been granted an approval for undertaking such an activity and has submitted] a written report to the concerned authority containing the particulars specified in Schedule 7 at least 3 months before commencing that activity or before such shorter time as the concerned authority may agree and for the purpose of this paragraph, an activity in which subsequently there is or is liable to be a threshold quantity or more of an additional hazardous chemical shall be deemed to be a different activity and shall be notified accordingly.

³[(2) The concerned authority within 60 days from the date of receipt of the report, shall approve the report submitted and on consideration of the report if it is of the opinion that contravention of the provisions of the Act or the rules made thereunder has taken place, it shall issue notice under rule 19.]

8. Updating of the site notification following changes in the threshold quantity

Where an activity has been reported in accordance with rule 7(1) and the occupier makes a change in it (including an increase or decrease in the maximum threshold quantity of a hazardous chemical to which this rule applies which is or is liable to be at the site or in the pipeline or at the cessation of the activity) which affects the particulars specified in that report or any subsequent report made under this rule, the occupier shall forthwith furnish a further report to the concerned authority.

9. Transitional provisions

Where—

(a) at the date of coming into operation of these rules, an occupier is in control of an existing industrial activity which is required to be reported under rule 7(1), or

(b) within six months after that date, an occupier commences any such new industrial activity,

it shall be a sufficient compliance with that rule if he reports to the concerned authority as per the particulars in Schedule 7 within 3 months after the date of coming into

1 Substituted for "and is listed" by SO 57(E), dt. 19-1-2000, w.e.f. 20-1-2000.

2 Substituted by SO 57(E), dt. 19-1-2000, w.e.f. 20-1-2000.

3 Substituted by MSJHC (Amendment) Rules, 1994, w.e.f. 22-10-1994.

4 Inserted by MSJHC (Amendment) Rules, 1994, w.e.f. 22-10-1994.

1 Substituted for "column 4" by SO 57(E), dt. 19-1-2000, w.e.f. 20-1-2000.

2 Substituted for "Notification of sites" by SO 57(E), dt. 19-1-2000, w.e.f. 20-1-2000.

3 Substituted by MSJHC (Amendment) Rules, 1994, w.e.f. 22-10-1994.

operation of these rules or within such longer time as the concerned authority may agree in writing.

10. ¹Safety reports and safety audit reports]

(1) Subject to the following paragraphs of this rule, an occupier shall not undertake any industrial activity to which this rule applies, unless he has prepared a safety report on that industrial activity containing the information specified in Schedule 8 and has sent a copy of that report to the concerned authority at least ninety days before commencing that activity.

(2) In the case of a new industrial activity which an occupier commences, or by virtue of sub-rule (2)(a)(ii) or rule 6 is deemed to commence, within 6 months after coming into operation of these rules, it shall be a sufficient compliance with sub-rule (1) of this rule if the occupier sends to the concerned authority a copy of the report required in accordance with that sub-rule within ninety days after the date of coming into operation of these rules.

²[(3) In case of an existing industrial activity, the occupier shall prepare a safety report in consultation with the concerned authority and submit the same within one year from the date of commencement of the Manufacture, Storage and Import of Hazardous Chemicals (Amendment) Rules, 1994, to the concerned authority.]

³[(4) After the commencement of the Manufacture, Storage and Import of Hazardous Chemicals (Amendment) Rules, 1994, the occupiers of both the new and the existing industrial activities shall carry out an independent safety audit of the respective industrial activities with the help of an expert, not associated with such industrial activities.

(5) The occupier shall forward a copy of the auditor's report along with his comments, to the concerned authority within 30 days after the completion of such audit.

(6) The occupier shall update the safety audit report once a year by conducting a fresh safety audit and forward a copy of it with his comments thereon within 30 days to the concerned authority.

(7) The concerned authority may, if it deems fit, issue improvement notice under rule 19 within 45 days of the submission of the said report.]

11. Updating of reports under rule 10

(1) Where an occupier has made a safety report in accordance with sub-rule (1) of rule 10 he shall not make any modification to the industrial activity to which that safety report relates which could materially affect the particulars in that report, unless he has made a further report to take account of those modifications and has sent a copy of that report to the concerned authority at least 90 days before making those modifications.

(2) Where an occupier has made a report in accordance with rule 10 and sub-rule (1) of this rule and that industrial activity is continuing, the occupier shall within three years of the date of the last such report, make a further report which shall have regard in particular to new technical knowledge which has affected the particulars in the previous report relating to safety and hazard assessment, and shall within 30 days ⁴ send a copy of the report to the concerned authority.

1 Substituted for "Safety reports" by SO 57(E), dt. 19-1-2000, w.e.f. 20-1-2000.

2 Substituted by MSIHIC (Amendment) Rules, 1994, w.e.f. 22-10-1994.

3 Inserted by MSIHIC (Amendment) Rules, 1994, w.e.f. 22-10-1994.

4 Omitted by MSIHIC (Amendment) Rules, 1994, w.e.f. 22-10-1994.

12. Requirement for further information to be sent to the authority

Where in accordance with rule 10, an occupier has sent a safety report and the safety audit report relating to an industrial activity to the concerned authority, the concerned authority may, by a notice served on the occupier, require him to provide such additional information as may be specified in the notice and the occupier shall send that information to the concerned authority within 90 days.]

13. Preparation of on-site emergency plan by the occupier

(1) An occupier shall prepare and keep up-to-date ¹[an on-site emergency plan containing details specified in Schedule II and detailing] how major accidents will be dealt with on the site on which the industrial activity is carried on and that plan shall include the name of the person who is responsible for safety on the site and the names of those who are authorised to take action in accordance with the plan in case of an emergency.

(2) The occupier shall ensure that the emergency plan prepared in accordance with sub-rule (1) takes into account any modification made in the industrial activity and that every person on the site who is affected by the plan is informed of its relevant provisions.

(3) The occupier shall prepare the emergency plan required under sub-rule (1)—

(a) in the case of a new industrial activity, before that activity is commenced;

(b) in the case of an existing industrial activity within 90 days of coming into operation of these rules.

²[(4) The occupier shall ensure that a mock drill of the on-site emergency plan is conducted every six months;

(5) A detailed report of the mock drill conducted under sub-rule (4) shall be made immediately available to the concerned authority.]

14. Preparation of off-site emergency plans by the authority

(1) It shall be the duty of the concerned authority as identified in column 2 of Schedule 5 to prepare and keep up-to-date ¹[an adequate off-site emergency plan containing particulars specified in Schedule 12 and detailing] how emergencies relating to a possible major accident on that site will be dealt with and in preparing that plan the concerned authority shall consult the occupier and such other persons as it may deem necessary.

(2) For the purpose of enabling the concerned authority to prepare the emergency plan required under sub-rule (1), the occupier shall provide the concerned authority with such information relating to the industrial activity under his control as the concerned authority may require, including the nature, extent and likely effects off-site of possible major accidents and the authority shall provide the occupier with any information from the off-site emergency plan which relates to his duties under rule 13.

(3) The concerned authority shall prepare its emergency plan required under sub-rule (1)—

(a) in the case of a new industrial activity, before that activity is commenced;

(b) in the case of an existing industrial activity, within six months of coming into operation of these rules.

1 Substituted by MSIHIC (Amendment) Rules, 1994, w.e.f. 22-10-1994.

2 Inserted by MSIHIC (Amendment) Rules, 1994, w.e.f. 22-10-1994.

¹[(4) The concerned authority shall ensure that a rehearsal of the off-site emergency plan is conducted at least once in a calendar year.]

15. Information to be given to persons liable to be affected by a major accident

(1) The occupier shall take appropriate steps to inform persons outside the site either directly or through District Emergency Authority who are likely to be in an area which may be affected by a major accident about—

- (a) the nature of the major accident hazard; and
- (b) the safety measures and the "Dos" and "Don'ts" which should be adopted in the event of a major accident.

(2) The occupier shall take the steps required under sub-rule (1) to inform persons about an industrial activity, before that activity is commenced, except in the case of an existing industrial activity in which case the occupier shall comply with the requirements of sub-rule (1) within 90 days of coming into operation of these rules.

16. Disclosure of information

Where for the purpose of evaluating information notified under rule 5 or 7 to 15, the concerned authority discloses that information to some other person, that other person shall not use that information for any purpose except for the purpose of the concerned authority disclosing it, and before disclosing the information the concerned authority shall inform that other person of his obligations under these paragraphs.

17. Collection, development and dissemination of information

(1) This rule shall apply to an industrial activity in which a hazardous chemical which satisfies any of the criteria laid down in Part I of Schedule 1² [or is listed] in column 2 of Part II of this Schedule is or may be involved.

(2) An occupier, who has control of an industrial activity in terms of sub-rule (1) of this rule, shall arrange to obtain or develop information in the form of safety data-sheet as specified in Schedule 9. The information shall be accessible upon request for reference.

(3) The occupier while obtaining or developing a safety data-sheet as specified in Schedule 9 in respect of a hazardous chemical handled by him shall ensure that the information is recorded accurately and reflects the scientific evidence used in making the hazard determination. In case any significant information regarding hazard of a chemical is available, it shall be added to the material safety data-sheet as specified in Schedule 9 as soon as practicable.

(4) Every container of a hazardous chemical shall be clearly labelled or marked to identify—

- (a) the contents of the container;
- (b) the name and address of the manufacturer or importer of the hazardous chemical;
- (c) the physical, chemical and toxicological data as per the criteria given at Part I of Schedule 1.

(5) In terms of sub-rule (4) of this rule, where it is impracticable to label a chemical in view of the size of the container or the nature of the package, provision should be made for other effective means like tagging or accompanying documents.

1 Inserted by MSIHIC (Amendment) Rules, 1994, w.e.f. 22-10-1994.

2 Substituted for "and is listed" by SO 57(E), dt. 19-1-2000, w.e.f. 20-1-2000.

18. Import of hazardous chemicals

(1) This rule shall apply to a chemical which satisfies any of the criteria laid down in Part I of Schedule I [or is listed] in column 2 of Part II of this Schedule.

(2) Any person responsible for importing hazardous chemicals in India shall provide ²[before 30 days or as reasonably possible but not later than] the date of import to the concerned authorities as identified in column 2 of Schedule 5 the information pertaining to—

- (i) the name and address of the person receiving the consignment in India;
- (ii) the port of entry in India;
- (iii) mode of transport from the exporting country to India;
- (iv) the quantity of chemical(s) being imported; and
- (v) complete product safety information.

²[(3) If the concerned authority of the State is satisfied that the chemical being imported is likely to cause major accidents, it may direct the importer to take such safety measures as the concerned authority of the State may deem appropriate.]

³[(3A) In case the concerned authority of the State is of the opinion that the chemical should not be imported on safety or on environmental considerations, such authority may direct stoppage of such import.]

(4) The concerned authority at the State shall simultaneously inform the concerned port authority to take appropriate steps regarding safe handling and storage of hazardous chemicals while off-loading the consignment within the port premises.

(5) Any person importing hazardous chemicals shall maintain the records of the hazardous chemicals imported as specified in Schedule 10 and the records so maintained shall be open for inspection by the concerned authority at the State or the Ministry of Environment and Forests or any officer appointed by them in this behalf.

(6) The importer of the hazardous chemical or a person working on his behalf shall ensure that transport of hazardous chemicals from port of entry to the ultimate destination is in accordance with the Central Motor Vehicles Rules, 1989 framed under the provisions of the Motor Vehicles Act, 1988.

19. Improvement notices

(1) If the concerned authority is of the opinion that a person has contravened the provisions of these rules, the concerned authority shall serve on him a notice (in this para referred to as "an improvement notice") requiring that person to remedy the contravention or, as the case may be, [the matters occasioning it within 45 days].

(2) A notice served under sub-rule (1) shall clearly specify the measures to be taken by the occupier in remedying the said contraventions.

20. Power of the Central Government to modify the Schedules

The Central Government may, at any time, by notification in the Official Gazette, make suitable changes in the Schedules.

1 Substituted for "and is listed" by SO 57(E), dt. 19-1-2000, w.e.f. 20-1-2000.

2 Substituted by MSIHIC (Amendment) Rules, 1994, w.e.f. 22-10-1994.

3 Inserted by MSIHIC (Amendment) Rules, 1994, w.e.f. 22-10-1994.

SCHEDULE 1

[See rule 2e(i), 4(1)(a), 4(2), 17 & 18]

PART I

(a) Toxic Chemicals

Chemicals having the following values of acute toxicity and which owing to their physical and chemical properties, are capable of producing major accident hazards :

Sl. No.	Toxicity	Oral toxicity LD 50 (mg/kg)	Dermal toxicity LD 50 (mg/kg)	Inhalation toxicity LC50 (mg/l)
1.	Extremely toxic	> 5	< 40	< 0.5
2.	Highly toxic	> 5 - 50	> 40 - 200	< 0.5 - 2.0
3.	Toxic	> 50 - 200	> 200-1000	> 2 - 10

(b) Flammable Chemicals :

(i) flammable gases : Gases which at 20°C and at standard pressure of 101.3 KPa are :

- (a) ignitable when in a mixture of 13 percent or less by volume with air, or
- (b) have a flammable range with air of at least 12 percentage points regardless of the lower flammable limits.

Note: The flammability shall be determined by tests or by calculation in accordance with methods adopted by International Standards Organization ISO Number 10156 of 1990 or by Bureau of Indian Standards ISI Number 1446 of 1985.

- (ii) extremely flammable liquids : chemicals which have flash point lower than or equal to 23°C and initial boiling point less than 35°C
- (iii) very highly flammable liquids : chemicals which have a flash point lower than or equal to 23°C and initial boiling point higher than 35°C.
- (iv) highly flammable liquids : chemicals which have a flash point lower than or equal to 60°C but higher than 23°C.
- (v) flammable liquids : chemicals which have a flash point higher than 60°C but lower than 90°C.

(c) Explosives :

Explosives means a solid or liquid or pyrotechnic substance (or a mixture of substances) or an article.

- (a) which is in itself capable by chemical reaction of producing gas at such a temperature and pressure and at such a speed as to cause damage to the surroundings;
- (b) which is designed to produce an effect by heat, light, sound, gas or smoke or a combination of these as the result of non-detonative self sustaining exothermic chemical reaction.

PART II

LIST OF HAZARDOUS CHEMICALS

Names of the Hazardous chemical	
1. Acetaldehyde	2. Acetic acid

3. Acetic anhydride	4. Acetone
5. Acetone cyanohydrin	6. Acetone thiosmicarbazide
7. Acetonitrile	8. Acekylene
9. Acetylene tetra chloride	10. Acrolein
11. Acrylamide	12. Acrylonitrile
13. Adiponitrile	14. Aldicarb
15. Aldrin	16. Allyl alcohol
17. Allyl amine	18. Allyl chloride
19. Aluminium (powder)	20. Aluminium azide
21. Aluminium borohydride	22. Aluminium chloride
23. Aluminium fluoride	24. Aluminium phosphide
25. Amino diphenyl	26. Amino pyridine
27. Aminophenol-2	28. Aminopterin
29. Amiton	30. Amiton dialate
31. Ammonia	32. Ammonium chloro platinate
33. Ammonium nitrate	34. Ammonium nitrite
35. Ammonium picrate	36. Anabasin
37. Aniline	38. Aniline 2, 4, 6-Trimethyl
39. Anthraquinone	40. Antimony pentafluoride
41. Antimycin A	42. ANTU
43. Arsenic pentoxide	44. Arsenic trioxide
45. Arsenous trichloride	46. Arsine
47. Asphalt	48. Azinpho-ethyl
49. Azinphos methyl	50. Bacitracin
51. Barium azide	52. Barium nitrate
53. Barium nitride	54. Benzal chloride
55. Benzenamine, 3-Trifluoromethyl	56. Benzene
57. Benzene sulfonyl chloride	58. Benzene, 1-(chloromethyl)-4-Nitro
59. Benzene arsenic acid	60. Benzidine
61. Benzidine salts	62. Benzimidazole, 4, 5-Dishloro-2 (Trifluoromethyl)

63. Benzoquinone-P	64. Benzotrichloride
65. Benzoyl chloride	66. Benzoyl peroxide
67. Benzyl chloride	68. Beryllium (powder)
69. Bicyclo (2, 2, 1) Heptane-2-carbonitrile	70. Biphenyl
71. Bis (2-chloroethyl) sulphide	72. Bis (Chloromethyl) Ketone
73. Bis (Tert-butyl peroxy) cyclohexane	74. Bis (Terbutyl peroxy) butane
75. Bis (2, 4, 6-Trinitrophenylamine)	76. Bis(Chloromethyl) Ether
77. Bismuth and compounds	78. Bisphenol-A
79. Bitoscanate	80. Boron Powder
81. Boron trichloride	82. Boron trifluoride
83. Boron trifluoride comp. with methyl ether, 1:1	84. Bromine
85. Bromine pentafluoride	86. Bromo chloro methane
87. Bromodialone	88. Butadiene
89. Butane	90. Butanone-2
91. Butyl amine tert	92. Butyl glycidial ether
93. Butyl isovalarate	94. Butyl peroxy maleate tert
95. Butyl vinyl ether	96. Butyl-n-mercaptan
97. C.I. Basic green	98. Cadmium oxide
99. Cadmium stearate	100. Calcium arsenate
101. Calcium carbide	102. Calcium cyanide
103. Camphechlor (Toxaphene)	104. Cantharidin
105. Captan	106. Carbachol chloride
107. Carbaryl	108. Carbofuran (Furadan)
109. Carbon tetrachloride	110. Carbon disulphide
111. Carbon monoxide	112. Carbophenothion
113. Carvone	114. Cellulose nitrate
115. Chloroacetic acid	116. Chloridane
117. Chlorofenvinphos	118. Chlorinated benzene
119. Chlorine	120. Chlorine oxide
121. Chlorine trifluoride	122. Chlorine phosphos

123. Chloromequat chloride	124. Chloroacetal chloride
125. Chloroacetaldehyde	126. Chloroaniline-2
127. Chloroaniline-4	128. Chlorobenzene
129. Chloroethyl chloroformate	130. Chloroform
131. Chloroformyl morpholine	132. Chloromethane
133. Chloromethyl methyl ether	134. Chloronitrobenzene
135. Chlorophacinone	136. Chlorosulphonic acid
137. Chlorothitophos	138. Chloroxuron
139. Chromic acid	140. Chromic chloride
141. Chromium powder	142. Cobalt carbonyl
143. Cobalt Nitrilmethylidene compound	144. Cobalt (powder)
145. Colchicine	146. Copper and compounds
147. Copperoxychloride	148. Coumafuryl
149. Coumaphos	150. Coumatertrayl
151. Crimidine	152. Crotenaldehyde
153. Crotonaldehyde	154. Cumene
155. Cyanogen bromide	156. Cyanogen iodide
157. Cyanophos	158. Cyanthoate
159. Cyanuric fluoride	160. Cyclo hexylamine
161. Cyclohexane	162. Cyclohexanone
163. Cycloheximide	164. Cyclopentadiene
165. Cyclopentane	166. Cyclo tetramethyl lentetramine
167. Cyclo trimethyl lenetriminramine	168. Cypermethrin
169. DDT	170. Decaborane (1 : 4)
171. Demeton	172. Demeton S-Methyl
173. Di-n-propyl peroxydicarbonate (Conc. ≥ 80%)	174. Dialifos
175. Diazodintropheno	176. Dibenzyl peroxydicarbonate (Conc. ≥ 90%)
177. Diborane	178. Dichloroacetylene
179. Dichlorobenzalkonium chloride	180. Dichloroethyl ether
181. Dichloromethyl phenylsilane	182. Dichlorophenol-2, 6

183. Dichlorophenol-2,4	184. Dichlorophenoxy acetic acid
185. Dichloropropane-2,2	186. Dichlorosalicylic acid-3, 5
187. Dichlorvos (DDVP)	188. Dicrotophos
189. Dieldrin	190. Diepoxy butane
191. Diethyl carbamazine citrate	192. Diethyl chlorophosphate
193. Diethyl ethanalamine	194. Diethyl peroxydicarbonate (Conc. = 30%)
195. Diethyl phenylene diamine	196. Diethylamine
197. Diethylene glycol	198. Diethylene glycol dinitrate
199. Diethylene triamine	200. Diethyleneglycol butyl ether
201. Diglycidyl ether	202. Digitoxin
203. Dihydroperoxypropane (Conc = 30%)	204. Diisobutyl peroxide
205. Dimefox	206. Dimethoate
207. Dimethyl dichlorosilane	208. Dimethyl hydrazine
209. Dimethyl nitrosoamine	210. Dimethyl P. phenylene diamine
211. Dimethyl phosphoramidic cyanidic acid (TABUM)	212. Dimethyl phosphorochloridothioate
213. Dimethyl sulfolane (DMS)	214. Dimethyl sulphide
215. Dimethylamine	216. Dimethylamine
217. Dimethylcarbonyl chloride	218. Dimethilan
219. Dinitro O-cresol	220. Dinitrophenol
221. Dinitrotoluene	222. Dinoseb
223. Dinoterb	224. Dioxane-p
225. Dioxathion	226. Dioxine N
227. Diphacinone	228. Diphosphoramidate octamethyl
229. Diphenyl methane di-isocyanate (MDI)	230. Dipropylene Glycol Butyl ether
231. Dipropylene glycol/methy lether	232. Disec-butyl peroxydicarbonate (Conc. 80%)
233. Disufoton	234. Dithiazamine iodide
235. Dithiobiurate	236. Endosulfan
237. Endothion	238. Endrin
239. Ephichlorohydrine	240. EPN
241. Ergocalciferol	242. Ergotamine tartrate

243. Ethanesulfonyl chloride, 2 chloro	244. Ethanol 1-2 dichloracetate
245. Ethion	246. Ethoprophos
247. Ethyl acetate	248. Ethyl alcohol
249. Ethyl benzene	250. Ethyl bis amine
251. Ethyl bromide	252. Ethyl carbamate
253. Ethyl ether	254. Ethyl hexanol-2
255. Ethyl mercaptan	256. Ethyl mercuric phosphate
257. Ethyl methacrylate	258. Ethyl nitrate
259. Ethyl thiocyanate	260. Ethylamine
261. Ethylene	262. Ethylene chlorohydrine
263. Ethylene dibromide	264. Ethylene diamine
265. Ethylene diamine hydrochloride	266. Ethylene flourolydrine
267. Ethylene oxide	268. Ethylene glycol dinitrate
269. Ethylene glycol	270. Ethylenimine
271. Ethylene di chloride	272. Femamiphos
273. Femitrothion	274. Fensulphothion
275. Fluometil	276. Fluorine
277. Fluoro 2-hydroxy butyric acid amid salt ester	278. Fluoroacetamide
279. Fluoroacetic acid amide salts and esters	280. Fluoroacetylchloride
281. Fluorobutyric acid amide salt esters	282. Fluorocrotonic acid amides salts esters
283. Fluorouracil	284. Fonofos
285. Formaldehyde	286. Formetanate hydrochloride
287. Formic acid	288. Formoparanate
289. Formothion	290. Fosthiotan
291. Fuberidazole	292. Furan
293. Gallium Trichloride	294. Glyconitrile (Hydroxyacetoneitrile)
295. Guanyl-4-nitrosaminogynyl-1-tetrazene	296. Heptachlor
297. Hexa methyl tetra-cyclohexanone (Conc. 75%)	298. Hexachlorobenzene
299. Hexachlorocyclohexan (Lindane)	300. Hexachlorocyclopentadiene

301. Hexachlorodibenzo-p-dioxin	302. Hexachloronaphthalene
303. Hexafluoropropanone sesquihydrate	304. Hexamethyl phosphoramide
305. Hexamethylene diamine NN dibutyl	306. Hexane
307. Hexanitrostilbene 2 2 4 4 6 6	308. Hexene
309. Hydrogen selenide	310. Hydrogen sulphide
311. Hydrazine	312. Hydrazine nitrate
313. Hydrochloric acid (Gas)	314. Hydrogen
315. Hydrogen bromide	316. Hydrogen cyanide
317. Hydrogen fluoride	318. I. hydrogen peroxide
319. Hydroquinone	320. Indene
321. Indium powder	322. Indomethacin
323. Iodine	324. Iridium tetrachloride
325. Ironpentacarbonyl	326. Iso benzan
327. Isomyl alcohol	328. Isobutyl alcohol
329. Isobutyro nitrile	330. Isocyanic acid 3 4-dichlorophenyl ester
331. Isodrin	332. Isofluorophosphate
333. Isophorone diisocyanate	334. Isopropyl alcohol
335. Isopropyl chlorocarbonate	336. Isopropyl formate
337. Isopropyl methyl pyrazolyl dimethyl carbamate	338. Juglone (5-Hydroxy Naphthalene 1, 4 dione)
339. Ketene	340. Lactonitrile
341. Lead arsenite	342. Lead at high temp (molten)
343. Lead azide	344. Lead styphanate
345. Leptophos	346. Lenisite
347. Liquefied petroleum gas	348. Lithium hydride
349. N-Dinitrobenzene	350. Magnesium powder or ribbon
351. Malathion	352. Maleic anhydride
353. Malononitrile	354. Manganese Tricarbonyl cyclopentadiene
355. Mechlor ethamine	356. Mephospholan
357. Mercuric chloride	358. Mercuric oxide
359. Mercury acetate	360. Mercury fulminate

361. Mercury methyl chloride	362. Mesitylene
363. Methacrolein diacetate	364. Methacrylic anhydride
365. Methacrylonitrile	366. Methacryloyloxyethyl isocyanate
367. Methanidophos	368. Methane
369. Methanesulphonyl fluoride	370. Methidathion
371. Methiocarb	372. Methonyl
373. Methoxy ethanol (2-methyl cellosolve)	374. Methoxyethyl mercuric acetate
375. Methylacryloyl chloride	376. Methyl 2-chloroacrylate
377. Methyl alcohol	378. Methyl amine
379. Methyl bromide (Bromomethane)	380. Methyl chloride
381. Methyl chloroform	382. Methyl chloroformate
383. Methyl cyclohexene	384. Methyl disulphide
385. Methyl ethyl ketone peroxide (Conc. 60%)	386. Methyl formate
387. Methyl hydrazine	388. Methyl isobuty ketone
389. Methyl isocyanate	390. Methyl isothicyanate
391. Methyl mercuric dicyanamide	392. Methyl Mercaptan
393. Methyl methacrylate	394. Methyl phencapton
395. Methyl phosphonic dichloride	396. Methyl thiocyanate
397. Methyl trichlorosilane	398. Methyl vinyl ketone
399. Methylene bis (2-chloroaniline)	400. Methylene chloride
401. Methylenebis-4, 4 (2-chloroaniline)	402. Metolcarb
403. Mevinphos	404. Mezacarbate
405. Mitomycin C	406. Molybdenum powder
407. Monocrotophos	408. Morpholine
409. Muscinol	410. Mustard gas
411. N-Butyl acetate	412. N-Butyl alcohol
413. N-Hexane	414. N-Methyl-N, 2, 4, 6-Tetranitroaniline
415. Naphtha	416. Naphtha solvent
417. Naphthalene	418. Naphthyl amine
419. Nickel carbonyl/nickel tetracarbonyl	420. Nickel powder

421. Nicotine	422. Nicotine sulphate
423. Nitric acid	424. Nitric oxide
425. Nitrobenzene	426. Nitrocellulose (dry)
427. Nitrochlorobenzene	428. Nitrocyclohexane
429. Nitrogen	430. Nitrogen dioxide
431. Nitrogen oxide	432. Nitrogen trifluoride
433. Nitroglycerine	434. Nitropropane-1
435. Nitropropane-2	436. Nitroso dimethyl amine
437. Nonane	438. Novoramide
439. O-Cresol	440. O-Nitro Toluene
441. O-Toluidine	442. O-Xylene
443. O/P Nitroaniline	444. Oleum
445. OO Diethyl S ethyl sulph. methyl phos phosphothioate	446. OO Diethyl S propylthio methyl phosphothioate
447. OO Diethyl S ethylsulphonylmethylphosphorothioate	448. OO Diethyl S ethylsulphonylmethylphosphorothioate
449. OO Diethyl S ethylthiomethylphosphorothioate	450. Organo thodium complex
451. Orotic acid	452. Osmium tetroxide
453. Oxabain	454. Oxamyl
455. Oxetane, 3, 3, -bis (chloromethyl)	456. Oxidiphenoxarsine
457. Oxy disulfoton	458. Oxygen (liquid)
459. Oxygen difluoride	460. Ozone
461. P-nitrophenol	462. Paraffin
463. Paraoxon (Diethyl 4 Nitrophenyl phosphate)	464. Parquat
465. Parquat methosulphate	466. Parathion
467. Parathion methyl	468. Paris green
469. Penta borane	470. Penta chloro ethane
471. Penta chlorophenol	472. Pentabromophenol
473. Pentachloro naphthalene	474. Pentadecyl-amine
475. Pentaerythritol tetranitrate	476. Pentane

477. Pentanone	478. Perchloric acid
479. Perchloroethylene	480. Peroxyacetic acid
481. Phenol	482. Phenol, 2, 2-thiobis (4, 6-Dichloro)
483. Phenol, 2, 2-thiobis (4 chloro 6 methyl phenol)	484. Phenol, 3-(1-methyl ethyl)- methylcarbamate
485. Phenyl hydrazine hydrochloride	486. Phenyl mercury acetate
487. Phenyl silatrane	488. Phenyl thiourea
489. Phenylene P-diamine	490. Phorate
491. Phosazetin	492. Phosfolan
493. Phosgene	494. Phosmet
495. Phosphamidon	496. Phosphine
497. Phosphonic acid	498. Phosphoric acid dimethyl (4-methyl thio) phenyl
499. Phosphorothioic acid dimethyl s (2-Bis) Ester	500. Phosphorothioic acid methyl (ester)
501. Phosphorothioic acid, OO-Dimethyl S-(2-methyl)	502. Phosphorothioic methyl-ethyl ester
503. Phosphorous	504. Phosphorous oxychloride
505. Phosphorous pentoxide	506. Phosphorous trichloride
507. Phosphorous penta chloride	508. Phthalic anhydride
509. Phylloquinone	510. Physostigmine
511. Physostigmine salicylate (1:1)	512. Picric acid (2, 4, 6-trinitrophenol)
513. Picrotoxin	514. Piperidine
515. Piprotal	516. Pirtinifos-ethyl
517. Platinous chloride	518. Platinum tetrachloride
519. Potassium arsenite	520. Potassium chlorate
521. Potassium cyanide	522. Potassium hydroxide
523. Potassium nitride	524. Potassium nitrite
525. Potassium peroxide	526. Potassium silver cyanide
527. Powdered metals and mixtures	528. Promecarb
529. Promurit	530. Propanesultone
531. Propargyl alcohol	532. Propargyl bromide

533. Propen-2-chloro-1, 3-diox diacetate	534. Propiolactone beta
535. Propionitrile	536. Propionitrile, 3-chloro
537. Propiophenone, 4-amino	538. Propyl chloroformate
539. Propylene dichloride	540. Propylene glycol, allylether
541. Propylene imine	542. Propylene oxide
543. Prothoate	544. Pseudosumene
545. Pyrazoxon	546. Pyrene
547. Pyridine	548. Pyridine, 2-methyl-3-vinyl
549. Pyridine, 4-nitro-1-oxide	550. Pyridine, 4-nitro-1-oxide
551. Pyriminil	552. Quinalphos
553. Quinone	554. Rhodium trichloride
555. Saicomine	556. Sarin
557. Selenious acid	558. Selenium Hexafluoride
559. Selenium oxychloride	560. Semicarbazide hydrochloride
561. Silane (4-amino butyl) diethoxy-meth	562. Sodium
563. Sodium anthra-quinone-1-sulphonate	564. Sodium-arsenate
565. Sodium arsenite	566. Sodium azide
567. Sodium cacodylate	568. Sodium chlorate
569. Sodium cyanide	570. Sodium fluoro-acetate
571. Sodium Hydroxide	572. Sodium pentachloro-phenate
573. Sodium picramate	574. Sodium selenate
575. Sodium selenite	576. Sodium sulphide
577. Sodium tellorite	578. Stannace acetoxy triphenyl
579. Stibine (Antimony hydride)	580. Strychnine
581. Strychnine sulphate	582. Styphnic acid (2, 4, 6-trinitroresorcinol)
583. Styrene	584. Sulphotec
585. Sulphoxide, 3-chloropropyl octyl	586. Sulphur dichloride
587. Sulphur dioxide	588. Sulphur monochloride
589. Sulphur tetrafluoride	590. Sulphur trioxide
591. Sulphuric acid	592. Tellurium (Powder)
593. Tellurium hexafluoride	594. TEPP (Tetraethyl pyrophosphate)

595. Terbufos	596. Tert-Butyl alcohol
597. Tert-Butyl peroxy carbonate	598. Tert-Butyl peroxy isopropyl
599. Tert-Butyl peroxyacetate (Conc=70%)	600. Tert-Butyl peroxyipivalate (Conc=77%)
601. Tert-Butylperoxyiso-butyrate	602. Tetrahydrofuran
603. Tetra methyl lead	604. Tetranitromethane
605. Tetra-chlorodibenzo-p-dioxin, 1, 2, 3, 7, 8 (TCDD)	606. Tetraethyl lead
607. Tetrafluoroethylene	608. Tetramethylene disulphotetramine
609. Thallic oxide	610. Thallium carbonate
611. Thallium sulphate	612. Thallous chloride
613. Thallous malonate	614. Thallous sulphate
615. Thiocarbamide	616. Thiocyanic acid, 2-(Benzothiazolyl) methyl
617. Thiofomox	618. Thiometon
619. Thionazin	620. Thionyl chloride
621. Thiophenol	622. Thiosemicarbazide
623. Thiourea (2-chloro-phenyl)	624. Thiourea (2-methyl phenyl)
625. Tirpate (2, 4-dimethyl-1, 3-di-thiolane)	626. Titanium powder
627. Titanium tetra-chloride	628. Toluene
629. Toluene 2, 4-di-isocyanate	630. Toluene 2, 6-di-isocyanate
631. Trans-1, 4-di chloro-butene	632. Tri nitro anisole
633. Tri (Cyclohexyl) methylstannyl 1, 2, 4 triazole	634. Tri (Cyclohexyl) stannyl-1H-1, 2, 3-triazole
635. Triaminotrinitrobenzene	636. Triamphos
637. Triazophos	638. Tribromophenol 2, 4, 6
639. Trichloro naphthalene	640. Trichloro chloromethyl silane
641. Trichloroacetyl chloride	642. Trichlorodichlorophenylsilane
643. Trichloroethyl silane	644. Trichloroethylene
645. Trichloromethane sulphenyl chloride	646. Trichloronate
647. Trichlorophenol 2, 3, 6	648. Trichlorophenol, 2, 4, 5
649. Trichlorophenyl silane	650. Trichlorophon
651. Triethoxy silane	652. Triethylamine

but no account shall be taken of any hazardous chemical which is in a vehicle, vessel, aircraft or hovercraft used for transporting it.

Sl. No.	Chemicals	Threshold quantities (tonnes) 1 [For application of rules 4, 5, 7 to 9 and 13 to 15]	2 [For application of rules 10 to 12]
(1)	(2)	(3)	(4)
1.	Acrylonitrile	350	5,000
2.	Ammonia	60	600
3.	Ammonium nitrate (a)	350	2,500
4.	Ammonium nitrate fertilizers (b)	1,250	10,000
5.	Chlorine	10	25
6.	Flammable gases as defined in Schedule 1, paragraph (b)(i)	50	300
7.	Extremely flammable liquids as defined in Schedule 1, paragraph (b)(ii)	5,000	50,000]
8.	Liquid Oxygen	200	2,000
9.	Sodium chlorate	25	250
10.	Sulphur dioxide	20	500
11.	Sulphur trioxide	15	100
12.	Carbonyl chloride	0.750	0.750
13.	Hydrogen sulphide	5	50
14.	Hydrogen fluoride	4	50
15.	Hydrogen cyanide	5	10
16.	Carbon disulphide	20	200
17.	Bromine	50	500
18.	Ethylene oxide	5	501
19.	Propylene oxide	5	50
20.	2-Propenal (Acrolein)	20	200
21.	Bromomethane (Methyl bromide)	20	200
22.	Methyl isocyanate	0.150	0.150
23.	Tetraethyl lead or tetramethyl lead	5	50

1. Substituted by SO 57(E), dt. 19-1-2000, w.e.f. 20-1-2000.

2. Inserted by MSIH(C (Amendment) Rules, 1994, w.e.f. 22-10-1994.

653. Triethylene melamine	654. Trimethyl chlorosilane
655. Trimethyl propane phosphite	656. Trimethyl tin chloride
657. Trinitro aniline	658. Trinitro benzene
659. Trinitro benzoic acid	660. Trinitro phenetole
661. Trinitro-m-creso]	662. Turpentine
663. Tri orthocresyl phosphate	664. Triphenyl tin chloride
665. Tris (2-chloroethyl) amine	666. Turpentine
667. Uranium and its compounds	668. Valinomycin
669. Vanadium pentaoxide	670. Vinyl acetate monomer
671. Vinyl bromide	672. Vinyl chloride
673. Vinyl cyclohexane dioxide	674. Vinyl fluoride
675. Vinyl norbornene	676. Vinyl toluene
677. Vinylidene chloride	678. Warfarin
679. Warfarin Sodium	680. Xylene dichloride
681. Xylidine	682. Zinc dichloropentamtrile
683. Zinc phosphide	684. Zirconium & compounds.]

SCHEDULE 2

[Rules 2(e)(ii), 4(1)(b), 4(2) and 6(1)(b)]
ISOLATED STORAGE AT INSTALLATIONS OTHER THAN THOSE COVERED BY SCHEDULE 4

- (a) The threshold quantities set out below relate to each installation or group of installations belonging to the same occupier where the distance between installations is not sufficient to avoid, in foreseeable circumstances, any aggravation of major accident hazards. These threshold quantities apply in any case to each group of installations belonging to the same occupier where the distance between the installations is less than 500 metres.
- (b) For the purpose of determining the threshold quantity of a hazardous chemical at an isolated storage, account shall also be taken of any hazardous chemical which is:
- (i) in that part of any pipeline under the control of the occupier having control of the site, which is within 500 metres of that site and connected to it;
 - (ii) at any other site under the control of the same occupier any part of the boundary of which is within 500 metres of the said site; and
 - (iii) in any vehicle, vessel, aircraft or hovercraft under the control of the same occupier which is used for storage purpose either at the site or within 500 metres of it;

24.	1, 2 Dibromoethane (Ethylene dibromide)	5	50
25.	Hydrogen chloride (liquefied gas)	25	250
26.	Diphenyl methane di-isocyanate (MDI)	20	200
27.	Toluene di-isocyanate (TDI)	10	100]
28.	Very Highly flammable liquids as defined in Schedule 1, paragraph (b)(iii)	7,000	7,000
29.	Highly Flammable liquids as defined in Schedule 1, paragraph (b)(iv)	10,000	10,000
30.	Flammable liquids as defined in Schedule-1, paragraph (b)(v)	15,000	1,00,000]

- (a) This applies to ammonium nitrate and mixtures of ammonium nitrate where the nitrogen content derived from the ammonium nitrate is greater than 28 per cent by weight and to aqueous solutions of ammonium nitrate where the concentration of ammonium nitrate is greater than 90 per cent by weight.
- (b) This applies to straight ammonium nitrate fertilizers and to compound fertilizers where the nitrogen content derived from the ammonium nitrate is greater than 28 per cent by weight (a compound-fertilizer contains ammonium nitrate together with phosphate and/or potash).

SCHEDULE 3

HAZARDOUS CHEMICALS FOR APPLICATION OF RULES 5 AND 7 TO 15

[Rules 2(e)(iii), 5 and 6(1)(a)]

(a) The quantities set out below relate to each installation or group of installations belonging to the same occupier where the distance between installations is not sufficient to avoid, in foreseeable circumstances, any aggravation of major accident hazards. These quantities apply in any case to each group of installations belonging to same occupier where the distance between the installations is less than 500 metres.

- (b) For the purpose of determining the threshold quantity of a hazardous chemical in an industrial installation, account shall also be taken of any hazardous chemical which
- (i) in that part of any pipeline under the control of the occupier having control of the site, which is within 500 metres of that site and connected to it;
 - (ii) at any other site under the control of the same occupier any part of the boundary of which is within 500 metres of the said site; and
 - (iii) in any vehicle, vessel, aircraft or hovercraft under the control of the same occupier which is used for storage purpose either at the site or within 500 metres of it;

but no account shall be taken of any hazardous chemical which is in a vehicle, vessel, aircraft or hovercraft used for transporting it.

1. Inserted by SO 57(E), dt. 19-1-2000, w.e.f. 20-1-2000.

**PART I
NAMED CHEMICALS**

Sl. No.	Chemical	Threshold quantities ¹		CAS No.
		For application of rules 5, 7 to 9 and 13 to 15	For application of rules 10 to 12	
(1)	(2)	(3)	(4)	(5)
GROUP 1—Toxic substances:				
1.	Aldicarb	100 kg		116-06-3
2.	4-Aminodiphenyl	1 kg		92-67-1
3.	Amiton	1 kg		78-53-5
4.	Anabasine	100 kg		495-52-0
5.	Arsenic pentoxide, arsenic (V) acid and salts	500 kg		
6.	Arsenic trioxide, arsenious (III) acid and salts	100 kg		
7.	Arsine (arsenic hydride)	10 kg		7784-42-1
8.	Azinphos-ethyl	100 kg		2642-71-9
9.	Azinphos-methyl	100 kg		86-50-0
10.	Benzidine	1 kg		92-87-5
11.	Benzidine salts	1 kg		
12.	Beryllium (powders, compounds)	10 kg		
13.	Bis (2-chloromethyl) sulphide	1 kg		505-60-2
14.	Bis (chloromethyl) ether	1 kg		542-88-1
15.	Carbofuran	100 kg		1563-66-2
16.	Carbophenothion	100 kg		786-19-6
17.	Chlorfenvinphos	100 kg		470-90-6
18.	4-(Chloroformyl) morpholine	1 kg		15159-40-7
19.	Chloromethyl methyl ether	1 kg		107-30-2
20.	Cobalt (metal, oxides, carbonates, sulphides, as powders)	1000 kg		
21.	Crimidine	100 kg		535-89-7

47.	4-Fluorobutyric acid, esters	1 kg			
48.	4-Fluorobutyric acid, amides	1 kg			
49.	4-Fluorobutyric acid	1 kg			37759-72-1
50.	4-Fluorocrotonic acid, salts	1 kg			
51.	4-Fluorocrotonic acid, esters	1 kg			
52.	4-Fluorocrotonic acid, amides	1 kg			
53.	4-Fluoro-2-hydroxybutyric acid, amides	1 kg			
54.	4-Fluoro-2-hydroxybutyric acid, salts	1 kg			
55.	4-Fluoro-2-hydroxybutyric acid, esters	1 kg			
56.	4-Fluoro-2-hydroxybutyric acid, amides	1 kg			
57.	Glycolonitrile (hydroxyacetoneitrile)	100 kg			107-16-4
58.	1, 2, 3, 7, 8, 9-Hexachlorodibenzo-p-dioxin	100 kg			194-08-74-3
59.	Hexamethylphosphoramide	1 kg			680-31-91
60.	Hydrogen selenide	10 kg			7783-07-5
61.	Isobenzan	100 kg			297-78-9
62.	Isodrin	100 kg			465-73-6
63.	Juglone (5-Hydroxy-naphthalene 1, 4-dione)	100 kg			481-39-0
64.	4, 4-Methylenebis (2-Chloroaniline)	10 kg			101-14-4
65.	Methyl isocyanate	150 kg	150 kg		624-83-9
66.	Mevinphos	100 kg			7786-34-7
67.	2-Naphthylamine	1 kg			91-59-8
68.	Nickel (metal, oxides, carbonates, sulphide, as powders)	1000 kg			
69.	Nickel tetracarbonyl	10 kg			13463-39-3
70.	Oxydisulfoton	100 kg			2497-07-6
71.	Oxygen difluoride	10 kg			7783-41-7

22.	Cynthoate	100 kg			3734-95-0
23.	Cycloheximide	100 kg			66-81-9
24.	Demeton	100 kg			8065-48-3
25.	Dialifos	100 kg			10311-84-9
26.	OO-Diethyl S-ethyl sulphurymethyl phosphorothioate	100 kg			2588-05-8
27.	OO-Diethyl S-ethyl sulphonylmethyl phosphorothioate	100 kg			2588-06-9
28.	OO-Diethyl S-ethyl thiomethyl phosphorothioate	100 kg			2600-69-3
29.	OO-Diethyl S-isopropylthiomethyl phosphorodithioate	100 kg			78-52-4
30.	OO-Diethyl S-propyl thiomethyl phosphorodithioate	100 kg			3309-68-0
31.	Dimefox	100 kg			115-26-4
32.	Dimethylcarbamoyl chloride	1 kg			79-44-7
33.	Dimethylnitrosamine	1 kg			62-75-9
34.	Dimethyl phosphoramido-cyanidic acid	1000 kg			63917-41-9
35.	Diphacinone	100 kg			82-66-6
36.	Disulfoton	100 kg			298-04-4
37.	EPN	100 kg			2104-64-5
38.	Ethion	100 kg			563-12-2
39.	Fensulfothion	100 kg			115-90-2
40.	Fuemetil	100 kg			4301-50-2
41.	Fluoroacetic acid	1 kg			144-49-0
42.	Fluoroacetic acid, salts	1 kg			
43.	Fluoroacetic acid, esters	1 kg			
44.	Fluoroacetic acid, amides	1 kg			
45.	4-Fluorobutyric acid	1 kg			462-23-7
46.	4-Fluorobutyric acid, salts	1 kg			

72.	Paraxon (Diethyl 4-nitrophenyl phosphate)	100 kg		311-45-5
73.	Parathion	100 kg		56-38-2
74.	Parathion-methyl	100 kg		298-00-0
75.	Pentaborane	100 kg		19624-22-7
76.	Phorate	100 kg		298-02-2
77.	Phosacetim	100 kg		4104-14-7
78.	Phosgene (Carbonyl chloride)	750 kg	750 kg	75-44-5
79.	Phosphamidon	100 kg		13171-21-6
80.	Phosphine (Hydrogen phosphate)	100 kg		7803-51-2
81.	Promurit (1-(3,4-Dichlorophenyl)-3-triazenethio-carboxamide)	100 kg		5836-73-7
82.	1, 3-Propanesultone	1 kg		1120-71-4
83.	1-Propen-2-chloro-1,3-diol diacetate	10 kg		10118-72-6
84.	Pyrazoxon	100 kg		108-34-9
85.	Selenium hexafluoride	10 kg		7783-79-1
86.	Sodium selenite	100 kg		10102-18-8
87.	Stibine (antimony hydroxide)	100 kg		7803-52-3
88.	Sulfotep	100 kg		3689-24-5
89.	Sulphur dichloride	1000 kg		10545-99-0
90.	Tellurium hexafluoride	100 kg		7783-80-4
91.	TEPP	100 kg		107-49-3
92.	2, 3, 7, 8-Tetrachlorodibenzo-p-dioxin (TCDD)	1 kg		1746-01-6
93.	Tetramethylenedisulphotetramine	1 kg		80-12-6
94.	Thionazin	100 kg		297-97-2
95.	Tripate (2, 4-Dimethyl-1, 3-dithiolane-2-carboxaldehyde O-methyl carbamoyloxime)	100 kg		26419-73-8

96.	Trichloromethanesulphonyl chloride	100 kg		594-42-3
97.	1-Tri (cyclohexyl) stannyl-1H-1, 2, 4-triazole	100 kg		41083-11-8
98.	Triethylenemelamine	10 kg		51-18-3
99.	Warfarin	100 kg		81-81-2
GROUP 2—Toxic substances:				
100.	Acetone cyanohydrin (2-cyanopropan-2-01)	200 t		75-86-5
101.	Acrolein (2-Propenal)	20 t	¹ [200 t]	107-02-8
102.	Acrylonitrile	20 t	200 t	107-13-1
103.	Allyl alcohol (Propen 1-01)	200 t		107-18-6
104.	Allylamine	200 t		107-11-9
105.	Ammonia	50 t	500 t	7664-41-7
106.	Bromine	40 t	¹ [500 t]	7726-95-6
107.	Carbon disulphide	20 t	200 t	71-15-0
108.	Chlorine	10 t	25 t	7782-50-5
109.	Diphenyl methane diisocyanate (MDI)	20 t	¹ [200 t]	101-68-8
110.	Ethylene dibromide (1, 2-Dibromoethane)	5 t	¹ [50 t]	106-93-4
111.	Ethylenamine	50 t		151-56-5
112.	Formaldehyde (concentration < 90%)	5 t	¹ [50 t]	50-00-0
113.	Hydrogen chloride (liquefied gas)	25 t	250 t	7647-01-0
114.	Hydrogen cyanide	5 t	20 t	74-90-8
115.	Hydrogen fluoride	5 t	50 t	7664-39-3
116.	Hydrogen sulphide	5 t	50 t	7783-06-4
117.	Methyl bromine (Bromomethane)	20 t	¹ [200 t]	74-83-9
118.	Nitrogen oxides	50 t		11104-93-1
119.	Propyleneamine	50 t		75-55-8
120.	Sulphur dioxide	20 t	250 t	7446-09-5

121.	Sulphur trioxide	15 t	75 t	7446-11-9
122.	Tetraethyl lead	5 t		78-00-2
123.	Tetramethyl lead	5 t	¹ [200 t]	75-74-1
124.	Toluene-di-isocyanate (TDI)	10 t	¹ [100 t]	584-84-9
GROUP 3—Highly Reactive substances:				
125.	Acetylene (ethyne)	5 t		74-86-2
126.	(a) Ammonium nitrate (1)	350 t	2,500 t	6484-52-2
	(b) Ammonium nitrate in the form of fertiliser (2)	1,250 t		
127.	2, 2-Bis (tert-butyl)peroxy butane (concentration ≥ 70%)	5 t		2167-23-9
128.	1, 1-Bis (tert-butyl) peroxy cyclohexane (concentration ≥ 80%)	5 t		3006-86-8
129.	Tert-butyl peroxyacetate (concentration ≥ 70%)	5 t		107-71-1
130.	Tert-butyl peroxy isobutyrate (concentration ≥ 80%)	5 t		109-13-7
131.	Tert-butyl peroxy isopropyl carbonate (concentration ≥ 80%)	5 t		2372-21-6
132.	Tert-butyl peroxy maleate (concentration ≥ 80%)	5 t		1931-62-0
133.	Tert-butyl peroxy pivalate (concentration ≥ 77%)	50 t		927-07-1
134.	Dibenzyl peroxy dicarbonate (concentration ≥ 90%)	5 t		2144-45-8
135.	Di-sec-butyl peroxy dicarbonate (concentration ≥ 80%)	5 t		19910-65-7
136.	Diethyl peroxy dicarbonate (concentration ≥ 30%)	50 t		14666-78-5
137.	2, 2-Dihydro peroxypropane (concentration ≥ 30%)	5 t		2614-76-8
138.	Di-isobutyl peroxy dicarbonate (concentration ≥ 50%)	50 t		3437-84-1

139.	Di-n-propyl peroxydicarbonate (concentration ≥ 80%)	5 t		16066-38-9
140.	Ethylene oxide	5 t	50 t	75-21-8
141.	Ethyl nitrate	50 t		625-58-1
142.	3, 3, 6, 6, 9, 9-Hexamethyl-1, 2, 4, 5-tetroxacyclononane (concentration ≥ 75%)	50 t		22397-33-7
143.	Hydrogen	2 t	50 t	1333-74-0
144.	Liquid Oxygen	200 t	¹ [2000 t]	7782-44-7
145.	Methyl ethyl ketone peroxide (concentration ≥ 60%)	5 t		1338-23-4
146.	Methyl isobutyl ketone peroxide (concentration ≥ 60%)	50 t		37206-20-5
147.	Peracetic acid (concentration ≥ 60%)	50 t		79-21-0
148.	Propylene oxide	5 t	¹ [50 t]	75-56-9
149.	Sodium chlorate	25 t		7775-09-9
GROUP 4—Explosive substances:				
150.	Barium azide	² [100 kg]		18810-58-7
151.	Bis (2, 4, 6-trinitro phenyl) amine	50 t		131-73-7
152.	Chlorotrinitro benzene	50 t		28260-61-9
153.	Cellulose nitrate (containing ≥ 12.6% nitrogen)	50 t		9004-70-0
154.	Cyclo tetramethylene tetranitramine	50 t		2691-41-0
155.	Cyclo trimethylenetrinitramine	50 t		121-82-4
156.	Diazodinitrophenol	10 t		7008-81-3
157.	Diethylene glycol dinitrate	10 t		693-21-0
158.	Dinitrophenol, salts	50 t		
159.	Ethylene glycol dinitrate	10 t		628-96-6

1. Inserted by MSIH(C (Amendment) Rules, 1994, w.e.f. 22-10-1994.
2. Substituted by SO 57(F), dt. 19-1-2000, w.e.f. 20-1-2000.

1. Inserted by GEP 2882 w.e.f. 22-10-1994

¹[PART II

CLASSES OF SUBSTANCES AS DEFINED IN PART-I, SCHEDULE 1 AND NOT SPECIFICALLY NAMED IN PART I OF THE SCHEDULE

(1)	(2)	(3)	(4)
GROUP 5—Flammable substances :			
1.	Flammable Gases	15T	200T
2.	Extremely flammable liquids	1000T	5000T
3.	Very Highly flammable liquids	1500T	10000T
4.	Highly Flammable liquids which remains liquid under pressure	25Y	200T
5.	Highly Flammable liquids	2500T	20000T
6.	Flammable liquids	5000T	50000T

SCHEDULE 4

[Rule 2(h)(f)]

1. Installations for the production, processing or treatment of organic or inorganic chemicals using for this purpose, among others,—

- (a) alkylation
- (b) amination by ammonolysis
- (c) carbonylation
- (d) condensation
- (e) dehydrogenation
- (f) esterification
- (g) halogenation and manufacture of halogens
- (h) hydrogenation
- (i) hydrolysis
- (j) oxidation
- (k) polymerization
- (l) sulphonation
- (m) desulphurization, manufacture and transformation of sulphur-containing compounds
- (n) nitration and manufacture of nitrogen compounds
- (o) manufacture of phosphorous-containing compounds
- (p) formulation of pesticides and of pharmaceutical products
- (q) distillation
- (r) extraction

160.	1-Guanyl-4-nitrosaminoguanyl-1-tetrazene	¹ [100 kg]		109-27-3
161.	2, 2, 4, 4, 6, 6-Hexanitrostilbene	50 t		20062-22-0
162.	Hydrazine nitrate	50 t		13464-97-6
163.	Lead azide	¹ [100 kt]		13424-46-9
164.	Lead styphnate (Lead 2, 4, 6-trinitroresorcinoxide)	¹ [100 kg]		15245-44-0
165.	Mercury fulminate	¹ [100 kg]		20820-45-5
166.	N-Methyl-N, 2, 4, 6-tetraaminoaniline	50 t		479-45-8
167.	Nitroglycerine	10 t	10 t	55-63-0
168.	Pentaerythritol tetranitrate	50 t		78-11-5
169.	Picric acid (2, 4, 6-trinitrophenol)	50 t		88-89-1
170.	Sodium picramate	50 t		831-52-7
171.	Styphnic acid (2, 4, 6-trinitroresorcinol)	50 t		82-71-3
172.	1, 3, 5, Triamino-2, 4, 6-trinitrobenzene	50 t		3058-38-6
173.	Trinitroaniline---	50 t		26952-42-1
174.	2, 4, 6-Trinitroanisole	50 t		606-35-9
175.	Trinitrobenzene	50 t		25377-32-6
176.	Trinitrobenzoic acid	50 t		35860-50-5
177.	Trinitroresol	50 t		28905-71-7
178.	2, 4, 6-Trinitrophenitole	50 t		4732-14-3
179.	2, 4, 6-Trinitrotoluene	50 t	50 t	118-96-7

1. Substituted by SO 57(E), dt. 19-1-2000, w.e.f. 20-1-2000.

1. Substituted by SO 57(E), dt. 19-1-2000, w.e.f. 20-1-2000.

Enforcement of directions and procedures in respect of industrial installations and isolated storages covered under the Factories Act, 1948, dealing with hazardous chemicals and pipelines including inter-State pipelines regarding—

- (i) Notification of major accidents as per rules 5(1) and 5(2).
- (ii) Notification of sites as per rules 7 to 9.
- (iii) Safety reports as per rules 10 to 12.
- (iv) Preparation of on-site emergency plans as per rule 13.
- (v) Preparation of off-site emergency plans in consultation with District Collector or District Emergency Authority as per Serial No. 9 of this Schedule.

4. Chief Inspector of Factories appointed under the Factories Act, 1948.

Enforcement of directions and procedures in respect of industrial installations and isolated storages dealing with hazardous chemicals and pipelines¹ inside a port covered under the Dock Workers (Safety, Health and Welfare) Act, 1986 regarding—

- (i) Notification of major accidents as per rule 5(1) and 5(2).
- (ii) Notification of sites as per rules 7 to 9.
- (iii) Safety reports as per rules 10 to 12.
- (iv) Preparation of on-site emergency plans as per rule 13.
- (v) Preparation of off-site emergency plans in consultation with District Collector or District Emergency Authority as per Serial No. 9 of this Schedule.

5. Chief Inspector of Dock Safety appointed under the Dock Workers (Safety, Health and Welfare) Act, 1986.

Enforcement of directions and procedures in respect of industrial installations and isolated storages dealing with the hazardous chemicals² inside a port regarding—

- (i) Notification of major accidents as per rule 5(1) and 5(2).
- (ii) Notification of sites as per rules 7 to 9.
- (iii) Safety reports as per rules 10 to 12.
- (iv) Preparation of on-site emergency plans as per rule 13.
- (v) Preparation of off-site emergency plans in consultation with District Collector or District Emergency Authority as per Serial No. 9 of this Schedule.

6. Chief Inspector of Mines appointed under the Mines Act, 1952.

1. Substituted vide SO 57(E), dt. 19-1-2000, w.e.f. 20-1-2000.
2. Words "and pipelines including inter-State pipelines" omitted vide SO 57(F), w.e.f. 20-1-2000.

- (s) solvation
- (t) mixing.

2. Installations for distillation, refining or other processing of petroleum or petroleum products.

3. Installations for the total or partial disposal of solid or liquid substances by incineration or chemical decomposition.

4. Installations for production, processing¹ [use] or treatment of energy gases, for example, LPG, LNG, SNG.

5. Installations for the dry distillation of coal or lignite.

6. Installations for the production of metals or non-metals by a wet process or by means of electrical energy.

SCHEDULE 5
[Rules 2(b) and 3]

Sl. No.	Authority(ies) with legal backing	Duties and corresponding rule
(1)	(2)	(3)
1.	Ministry of Environment and Forests under Environment (Protection) Act, 1986.	(1) Notification of hazardous chemicals as per rules 2(e)(i), 2(e)(ii) and 2(e)(iii).
2.	Chief Controller of Imports and Exports under Import and Export (Control) Act, 1947.	Import of hazardous chemicals as per rule 18.
3.	Central Pollution Control Board or ² [State Pollution Control Board] or Committee under Environment (Protection) Act, 1986 as the case may be.	(1) Enforcement of directions and procedures in respect of isolated storage of hazardous chemicals, regarding— (i) Notification of major accidents as per rule 5(1) and 5(2). (ii) Notification of sites as per rules 7 to 9. (iii) Safety reports in respect of isolated storages as per rules 10 to 12. (iv) Preparation of on site emergency plans as per rule 13. (2) Import of hazardous chemicals and enforcement of directions and procedures on import of hazardous chemicals as per rule 18.

1. Substituted by SO 57(E), dt. 19-1-2000, w.e.f. 20-1-2000.
2. Inserted by SO 57(E), dt. 19-1-2000, w.e.f. 20-1-2000.

7. Atomic Energy Regulatory Board appointed under the Atomic Energy Act, 1972.
1. Enforcement of directions and procedures regarding:
- (a) Notification of major accidents as per rules 5(1) and 5(2);
 - (b) Approval and Notification of Sites as per rule 7;
 - (c) Safety report and safety audit reports as per rule 10 to 12;
 - (d) acceptance of On-Site Emergency plans as per rule 13;
 - (e) assisting the District Collector in the preparation of Off-Site emergency plans as per serial number 9 of this Schedule.]
2. Enforcement of directions and procedures as per the provisions of
- (i) The Explosives Act, 1884 and the rules made thereunder, namely:
 - (a) The Gas Cylinder Rules, 1981;
 - (b) The Static and Mobile Pressure Vessel (Unfired) Rules, 1981;
 - (c) The Explosives Rules, 1981;
 - (ii) The Petroleum Act, 1934 and the Rules made thereunder, namely:
 - (a) The Petroleum Rules, 1976;
 - (b) The Calcium Carbide Rules, 1987.]
3. [and in respect of industrial installation and isolated storages dealing with hazardous chemicals and pipelines including inter-State pipeline regarding—
- (a) Notification of major accidents as per rule 5;
 - (b) approval and Notification of Sites as per rule 7;
 - (c) safety report and safety audit reports as per rule 10 to 12;
 - (d) acceptance of On-Site Emergency plans as per rule 13;
 - (e) assisting the District Collector in the preparation of Off-Site emergency plans as per serial number 9 of this Schedule.]

1. Substituted by SO 57(E), dt. 19-1-2000, w.e.f. 20-1-2000.
 2. Substituted by GSR 2882, dt. 3-10-1984, w.e.f. 22-10-1994.
 3. Inserted by SO 57(E), dt. 19-1-2000, w.e.f. 20-1-2000.

9. District Collector or District Emergency Authority designated by the State Government.
10. 1. [Centre for Environment and Explosive Safety (CEES)], Defence Research and Development Organisation (DRDO), Department of Defence Research and Development, Ministry of Defence.
2. Enforcement of directions and procedures in respect of laboratories, industrial establishments and isolated storages dealing with hazardous chemicals in the Ministry of Defence.]

SCHEDULE 6

INFORMATION TO BE FURNISHED REGARDING NOTIFICATION OF A MAJOR ACCIDENT
[Rule 5(1)]

Report number.....
 of the particular accident.

1. GENERAL DATA :

- (a) Name of the site
- (b) Name and address of the manufacturer (also state telephone/telex number)
- (c) (i) Registration number
 (ii) Licence number
 (As may have been allotted under any statutes applicable to the site, e.g. the Factories Act)
- (d) (i) Nature of industrial activity (mention what is actually manufactured, stored, etc.)
 (ii) National Industrial Classification 1987, at the four digit level

2. TYPE OF MAJOR ACCIDENT :

Explosion	<input type="checkbox"/>	Fire	<input type="checkbox"/>	Emission of dangerous substance	<input type="checkbox"/>
-----------	--------------------------	------	--------------------------	---------------------------------	--------------------------

Substance(s) emitted

3. DESCRIPTION OF THE MAJOR ACCIDENT :

- (a) Date, shift and hour of the accident
- (b) Department/Section and exact place where the accident took place
- (c) The process/operation undertaken in the department/section where the accident took place
 (attach a flow chart, if necessary)

1. Substituted by SO 57(E), dt. 19-1-2000, w.e.f. 20-1-2000.

(d) The circumstances of the accident and the dangerous substance involved

4. Emergency measures taken and measures envisaged to be taken to alleviate short-term effects of the accident.

5. Causes of the major accident

Known (to be specified)

Not known

Information to be supplied as soon as possible

6. NATURE AND EXTENT OF DAMAGE:

(a) Within the establishment—

Casualties

.....killed
.....injured
.....poisoned

Persons exposed to the major accident

Material damage

.....

The danger is still present

.....

The danger no longer exists

.....

(b) Outside the establishment—

casualties

.....killed
.....injured
.....poisoned

Persons exposed to the major accident

Material damage

.....

Danger to environment

.....

The danger is still present

.....

The danger no longer exists

7. Data available for assessing the effects of the accident of persons and environment

8. STEPS ALREADY TAKEN OR ENVISAGED:

(a) To alleviate medium or long-term effects of the accident

(b) To prevent recurrence of similar major accidents

(c) Any other relevant information

SCHEDULE 7

INFORMATION TO BE FURNISHED FOR THE NOTIFICATIONS OF SITES
PART I

Particulars to be included in a notification of a site:

1. The name and address of the employer making the notification.

2. The full postal address of the site where the notifiable industrial activity will be carried on.

3. The area of the site covered by the notification and of any adjacent site which is required to be taken into account by virtue of b(ii) of Schedules 2 and 3.

4. The date on which it is anticipated that the notifiable industrial activity will commence, or if it has already commenced a statement to that effect.

5. The name and maximum quantity liable to be on the site of each dangerous substance for which notification is being made.

6. Organisation structure, namely, organisation diagram for the proposed industrial activity and set up for ensuring safety and health.

7. Information relating to the potential for major accidents, namely—

(a) identification of major accident hazards;

- (b) the conditions or events which could be significant in bringing one about; and
- (c) a brief description of the measures taken.
8. Information relating to the site, namely—
- (a) a map of the site and its surrounding area to a scale large enough to show any features that may be significant in the assessment of the hazard or risk associated with the site—
- (i) area likely to be affected by the major accident;
- (ii) population distribution in the vicinity;
- (b) a scale plan of the site showing the location and quantities of all significant inventories of the hazardous chemicals;
- (c) a description of the process or storage involving the hazardous chemicals and an indication of the conditions under which it is normally held;
- (d) the maximum number of persons likely to be present on site.

9. The arrangement for training of workers and equipment necessary to ensure safety of such workers.

PART II

Particulars to be included regarding pipeline:

- The name and the address of the person making the notification.
- The full postal address of the place from which the pipeline activity is controlled, addresses of the places where the pipeline starts and finishes and a map showing the pipeline route drawn to a scale of not less than 1 : 400000.
- The date on which it is anticipated that the notifiable activity will commence, or if it is already commenced a statement to that effect.

- The total length of the pipeline, its diameter and normal operating pressure and the name and maximum quantity liable to be in the pipeline of each hazardous chemical for which notification is being made.

SCHEDULE 8

INFORMATION TO BE FURNISHED IN A SAFETY REPORT

[Rule 10(1)]

- The name and address of the person furnishing the information.
- Description of the industrial activity, namely:—
 - site,
 - construction design,
 - protection zones explosion protection, separation distances,
 - accessibility of plant,
 - maximum number of persons working on the site and particularly of those persons exposed to be hazard.
- Description of the processes, namely—
 - technical purpose of the industrial activity,
 - basic principles of the technological process,
 - process and safety-related data for the individual process stages,
 - process description,
 - safety-related types of utilities.
- Description of the hazardous chemicals, namely—
 - chemicals (quantities, substance data, safety-related data, toxicological data and threshold values),

- (a) maintenance and inspection schedules,
 - (b) guidelines for the training of personnel,
 - (c) allocation and delegation of responsibility for plant safety,
 - (d) implementation of safety procedures.
9. Information on assessment of the consequences of major accidents, namely—
- (a) assessment of the possible release of hazardous chemicals or of energy,
 - (b) possible dispersion of released chemicals,
 - (c) assessment of the effects of the releases (size of the affected area, health effects, property damage).

10. Information on the mitigation of major accidents, namely—

- (a) fire brigade,
- (b) alarm systems,
- (c) emergency plan containing system of organisation used to fight the emergency, the alarm and the communication rules, guidelines for fighting the emergency, information about hazardous chemicals, examples of possible accident sequences,
- (d) co-ordination with the District Emergency Authority and its off-site emergency plan.
- (e) notification of the nature and scope of the hazard in the event of an accident.
- (f) antidotes in the event of release of a hazardous chemical

SCHEDULE 9
SAFETY DATA SHEET
[Rule 17]

1. CHEMICAL IDENTITY:

Chemical name

Chemical classification

- (b) the form in which the chemical may occur on or into which they may be transformed in the event of abnormal conditions,
 - (c) the degree of purity of the hazardous chemical.
5. Information on the preliminary hazard analysis, namely—
- (a) types of accident,
 - (b) system elements or events that can lead to a major accident,
 - (c) hazards,
 - (d) safety-relevant components.
6. Description of safety-relevant units, among others:
- (a) special design criteria,
 - (b) controls and alarms,
 - (c) special relief systems,
 - (d) quick-acting valves,
 - (e) collecting tanks/dump tank,
 - (f) sprinkler system,
 - (g) fire-fighting, etc.
7. Information on the hazard assessment, namely—
- (a) identification of hazards,
 - (b) the cause of major accidents,
 - (c) assessment of hazards according to their occurrence frequency,
 - (d) assessment of accident consequences,
 - (e) safety systems,
 - (f) known accident history.
8. Description of information on organisational systems used to carry on the industrial activity safety, namely—

Synonyms Trade name
 Formula C.A.S. No. U.N. No.
 Regulated identification Shipping name
 Codes/Labels Hazchem No.

Hazardous waste

I.D. No.:
 Hazardous ingredients C.A.S. No. Hazardous ingredients C.A.S. No.:
 1. 3.
 2. 4.

2. PHYSICAL AND CHEMICAL DATA:

Boiling range/point °C Physical state Appearance
 Melting/freezing point °C Vapour pressure at 35°C mm Hg Odour
 Vapour density (Air = 1) Solubility in water at 30°C Others
 Specific gravity (Water = 1) pH

3. FIRE AND EXPLOSION HAZARD DATA:

Flammability Yes/No LEL % Flash point °C Auto-ignition °C temperature
 TDG flammability UEL % Flash point °C
 Explosion sensitivity to impact Hazardous combustion products
 Hazardous polymerisation
 Combustible liquid Explosive material Corrosive material
 Flammable material Oxidiser Others
 Pyrophoric material Organic peroxide

4. REACTIVITY DATA:

Chemical stability
 Incompatibility with other material

Reactivity

Hazardous reaction products

5. HEALTH HAZARD DATA:

Routes of entry

Effects of exposure/symptoms

Emergency treatment

TLV (ACGIH) ppm mg/m³ STEL mg/m³
 Permissible exposure limit ppm mg/m³ Odour threshold LD₅₀ mg/m³

NEPA hazard signals Health Flammability Stability Special

6. PREVENTIVE MEASURES:

Personnel protective equipment
 Handling and storage precautions

7. EMERGENCY AND FIRST AID MEASURES:

Fire Fire extinguishing media
 Special procedures
 Unusual hazards
 Exposure First-aid measures
 Spills Antidotes/dosages
 Steps to be taken
 Waste disposal method

8. ADDITIONAL INFORMATION/REFERENCES:

9. MANUFACTURER/SUPPLIERS DATA:

Name of firm Contact person in emergency
 Mailing address Local bodies involved
 Telephone/Telex Nos. Standard packing
 Telegraphic address Tremcard details/Ref.
 Other

10. DISCLAIMER:

Information contained in this material data sheet is believed to be reliable but no representation, guarantee or warranties of any kind are made as to its accuracy, suitability for a particular application or results to be obtained from them. It is up to the manufacturer/seller to ensure that the information contained in the material safety data sheet is relevant to the product manufactured/handled or sold by him, as the case may be. The government makes no warranties expressed or implied in respect of the adequacy of this document for any particular purpose.

SCHEDULE 10**FORMAT FOR RECORD MAINTENANCE OF HAZARDOUS CHEMICALS IMPORTED**

[Rule 18(5)]

1. Name and address of the importer :
2. Date and reference number of issuance of permission to import hazardous chemicals :
3. Description of hazardous chemicals :
 - (a) Physical form :
 - (b) Chemical form :
 - (c) Total volume and weight: (in kilogrammes/tonnes)
4. Description of purpose of import :
5. Description of storage of hazardous chemicals :
 - (a) Date :
 - (b) Method of storage :

¹[SCHEDULE 11

[Rule 13(1)]

DETAILS TO BE FURNISHED IN THE ONSITE EMERGENCY PLAN :

1. Name and address of the person furnishing the information.
 2. Key personnel of the organisation and responsibilities assigned to them in case of an emergency.
 3. Outside organisations if involved in assisting during on-site emergency :
 - (a) Type of accidents.
 - (b) Responsibility assigned.
 4. Details of liaison arrangement between the organisations.
5. Information on the preliminary hazard analysis:
 - (a) Type of accidents.
 - (b) System elements or events that can lead to a main accident.
 - (c) Hazards.
 - (d) Safety relevant components.
 6. Details about the site :
 - (a) Location of dangerous substances.
 - (b) Seat of key personnel.
 - (c) Emergency control room.
 7. Description of hazardous chemicals at plant site:
 - (a) Chemicals (quantities and toxicological data).
 - (b) Transformation if any which could occur.
 - (c) Purity of hazardous chemicals.
 8. Likely dangers to the plant.
 9. Enumerate effects of :
 - (i) stress and strain caused during normal operations;
 - (ii) fire and explosion inside the plant and effect if any of fire and explosion outside.
 10. Details regarding :
 - (i) Warning, alarm and safety and security systems.
 - (ii) Alarm and hazard control plans in line with disaster control and hazard control planning, ensuring necessary technical and organisational precaution.
 - (iii) Reliable measuring instruments, control units and servicing of such equipments.
 - (iv) Precautions in designing of the foundation and load bearing parts of the building.
 - (v) continuous surveillance of operations.
 - (vi) maintenance and repair work according to the generally recognised rules of goods engineering practices.
 11. Details of communication facilities available during emergency and those required for an off-site emergency

¹ Inserted by MS&IoH Chemicals (Amendment) Rules, 1994, w.e.f. 22-10-1994.

12. Details of fire fighting and other facilities available and those required for an off-site emergency.
13. Details of first aid and hospital services available and its adequacy.

SCHEDULE 12

[Rule 14(1)]

DETAILS TO BE FURNISHED IN THE OFFSITE EMERGENCY PLAN :

1. The types of accidents and release to be taken into account.
2. Organisations involved including key personnel and responsibilities and liaison arrangements between them.
3. Information about the site including likely locations of dangerous substances, personnel and emergency control rooms.
4. Technical information such as chemical and physical characteristics and dangers of the substances and plant.
5. Identify the facilities and transport routes.
6. Contact for further advice, e.g. meteorological information, transport, temporary food and accommodation, first aid and hospital services, water and agricultural authorities.
7. Communication links including telephones, radios and standby methods.
8. Special equipment including fire fighting materials, damage control and repair items.
9. Details of emergency response procedures.
10. Notify the public.
11. Evacuation arrangements.
12. Arrangements for dealing with the press and other media interests.
13. Longer term clean up.]

NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000

[SO 123(E), w.e.f. 14-2-2000]

[As amended by SO 1088(E), dt. 11-10-2002]

WHEREAS the increasing ambient noise levels in public places from various sources, inter alia, industrial activity, construction activity, generator sets, loud speakers, public address systems, music systems, vehicular horns and other mechanical devices have deleterious effects on human health and the psychological well-being of the people; it is considered necessary to regulate and control noise producing and generating sources with the objective of maintaining the ambient air quality standards in respect of noise;

WHEREAS a draft of Noise Pollution (Control and Regulation) Rules, 1999 was published under the notification of the Government of India in the Ministry of Environment and Forests *vide* number S.O. 528(E) dated the 28th June, 1999 inviting objections and suggestions from all the persons likely to be affected thereby, before the expiry of the period of sixty days from the date on which the copies of the Gazette containing the said notification are made available to the public;

AND WHEREAS copies of the said Gazette were made available to the public on the 1st day of July, 1999;

AND WHEREAS the objections and suggestions received from the public in respect of the said draft rules have been duly considered by the Central Government.

NOW, THEREFORE, in exercise of the powers conferred by clause (iii) of sub-section (2) of section 3, sub-section (1) and clause (b) of sub-section (2) of section 6 and section 25 of the Environment (Protection) Act, 1986 (29 of 1986) read with rule 5 of the Environment (Protection) Rules, 1986, the Central Government hereby makes the following rules for the regulation and control of noise producing and generating sources, namely:

1. Short title and commencement

- (1) These rules may be called the Noise Pollution (Regulation and Control) Rules, 2000.
- (2) They shall come into force on the date of their publication in the Official Gazette.

2. Definitions

In these rules, unless the context otherwise requires—

- (a) "Act" means the Environment (Protection) Act, 1986 (29 of 1986);
- (b) "area/zone" means all areas which fall in either of the four categories given in the Schedule annexed to these rules;

¹[(c) "authority" means an authority or officer authorised by the Central Government, or as the case may be, the State Government in accordance

with the laws in force and includes a District Magistrate, Police Commissioner, or any other officer not below the rank of the Deputy Superintendent of Police designated for the maintenance of the ambient air quality standards in respect of noise under any law for the time being in force.}]

¹[(d) "court" means a governmental body consisting of one or more Judges who sit to adjudicate disputes and administer justice and includes any court of law presided over by a Judge, Judges or a Magistrate and acting as a Tribunal in civil, taxation and criminal cases;

(e) "educational institution" means a school, seminary, college, university, professional academies, training institutes or other educational establishments, not necessarily a chartered institution and includes not only buildings, but also all grounds necessary for the accomplishment of the full scope of educational instruction, including those things essential to mental, moral and physical development;

(f) "hospital" means an institution for the reception and care of sick, wounded, infirm or aged persons, and includes government or private hospitals, nursing homes and clinics.}]

²[(g) "person" shall include any company or association or body of individuals, whether incorporated or not;

(h) "State Government" in relation to a Union Territory means the Administrator thereof appointed under article 239 of the Constitution.}]

3. Ambient air quality standards in respect of different areas/zones

(1) The ambient air quality standards in respect of noise for different areas/zones shall be such as specified in the Schedule annexed to these rules.

(2) The State Government³ [shall categorize] the areas into industrial, commercial, residential or silence areas/zones for the purpose of implementation of noise standards for different areas.

(3) The State Government shall take measures for abatement of noise including noise emanating from vehicular movements and ensure that the existing noise levels do not exceed the air quality standards specified under these rules.

(4) All development authorities, local bodies and other concerned authorities while planning developmental activity or carrying out functions relating to town and country planning shall take into consideration all aspects of noise pollution as a parameter of quality of life to avoid noise menace and to achieve the objective of maintaining the ambient air quality standards in respect of noise.

(5) An area comprising not less than 100 metres around hospitals, educational institutions and courts may be declared as silence area/zone for the purpose of these rules.

4. Responsibility as to enforcement of noise pollution control measures

(1) The noise levels in any area/zone shall not exceed the ambient air quality standards in respect of noise as specified in the Schedule.

1 Inserted by SO 1046(E), w.e.f. 22-11-2000.

2 Existing cls. (d) and (e) re-numbered as cls. (g) and (h) respectively, and thereafter cl. (g) as so re-numbered substituted by SO 1046(E), w.e.f. 22-11-2000.

3 Substituted for "may categorize" by SO 1046(E), w.e.f. 22-11-2000.

(2) The authority shall be responsible for the enforcement of noise pollution control measures and the due compliance of the ambient air quality standards in respect of noise.

5. Restrictions on the use of loud speakers/public address system

(1) A loud speaker or a public address system shall not be used except after obtaining written permission from the authority.

(2) A loud speaker or a public address system shall not be used at night (between 10.00 p.m. and 6.00 a.m.) except in closed premises for communication within e.g. auditoria conference rooms, community halls and banquet halls.

¹[(3) Notwithstanding anything contained in sub-rule (2), the State Government may, subject to such terms and conditions as are necessary to reduce noise pollution, permit use of loud-speakers of public address systems during night hours (between 10.00 p.m. to 12.00 midnight) on or during any cultural or religious festive occasion of a limited duration not exceeding fifteen days in all during a calendar year.]

6. Consequences of any violation in silence zone/area

Whoever, in any place covered under the silence zone/area commits any of the following offence, he shall be liable for penalty under the provisions of the Act—

(i) whoever, plays any music or uses any sound amplifiers,

(ii) whoever, beats a drum or tom-tom or blows a horn either musical or pressure, or trumpet or beats or sounds any instrument, or

(iii) whoever, exhibits any mimetic, musical or other performances of a nature to attract crowds.

7. Complaints to be made to the authority

(1) A person may, if the noise level exceeds the ambient noise standards by 10 dB(A) or more given in the corresponding columns against any area/zone, make a complaint to the authority.

(2) The authority shall act on the complaint and take action against the violator in accordance with the provisions of these rules and other law in force.

8. Power to prohibit, etc. continuance of music sound or noise

(1) If the authority is satisfied from the report of an officer incharge of a police station or other information received by him that it is necessary to do so in order to prevent annoyance, disturbance, discomfort or injury or risk of annoyance, disturbance, discomfort or injury to the public or to any person who dwells or occupies property on, the vicinity, he may, by a written order issue such directions as he may consider necessary to any person for preventing, prohibiting, controlling or regulating:

(a) the incidence or continuance in or upon any premises of—

(i) any vocal or instrumental music,

(ii) sounds caused by playing, beating, clashing, blowing or use in any manner whatsoever of any instrument including loudspeakers, public address systems, appliance or apparatus or contrivance which is capable of producing or re-producing sound, or

(b) the carrying on in or upon, any premises of any trade, avocation or operation or process resulting in or attended with noise.

1 Interest by Noise Pollution (Regulation and Control) (Amtd.) Rules, 2002, vide GSR 1088(E), dt. 11-10-2002

(2) The authority empowered under sub-rule (1) may, either on its own motion, or on the application of any person aggrieved by an order made under sub-rule (1) either rescind, modify or alter any such order.

PROVIDED that before any such application is disposed of, the said authority shall afford to the applicant an opportunity of appearing before it either in person or by a person representing him and showing cause against the order and shall, if it rejects any such application either wholly or in part, record its reasons for such rejection.

SCHEDULE
 AMBIENT AIR QUALITY STANDARDS IN RESPECT OF NOISE
 (Rules 31(1) and 4(1))

Area Code	Category of Area/Zone	Limits in dB(A) Leq*	
		Day Time	Night Time
(A)	Industrial area	75	70
(B)	Commercial area	65	55
(C)	Residential area	55	45
(D)	Silence Zone	50	40

Note : 1. Day time shall mean from 6.00 a.m. to 10.00 p.m.

2. Night time shall mean from 10.00 p.m. to 6.00 a.m.

[3. Silence zone is an area comprising not less than 100 metres around hospitals, educational institutions, courts, religious places or any other area which is declared as such by the competent authority.]

4. Mixed categories of areas may be declared as one of the four above mentioned categories by the competent authority.

dB(A) Leq denotes the time weighted average of the level of sound in decibels on scale A which is relatable to human hearing.

A "decibel" is a unit in which noise is measured.

"A", in dB(A) Leq, denotes the frequency weighting in the measurement of noise and corresponds to frequency response characteristics of the human ear.

Leq : It is an energy mean of the noise level over a specified period.

BIO-MEDICAL WASTE (MANAGEMENT AND HANDLING) RULES, 1998

[SO 630(E), dt. 20-7-1998, w.e.f. 27-7-1998]

WHEREAS a notification in exercise of the powers conferred by sections 6, 8 and 25 of the Environment (Protection) Act, 1986 (29 of 1986) was published in the Gazette vide S.O. 746(E) dated 16 October, 1997 inviting objections from the public within 60 days from the date of the publication of the said notification on the Bio-Medical Waste (Management and Handling) Rules, 1998 and whereas all objections received were duly considered.

NOW, THEREFORE, in exercise of the powers conferred by sections 6, 8 and 25 of the Environment (Protection) Act, 1986 the Central Government hereby notifies the rules for the management and handling of bio-medical waste.

1. Short title and commencement

(1) These rules may be called the Bio-Medical Waste (Management and Handling) Rules, 1998.

(2) They shall come into force on the date of their publication in the Official Gazette.

2. Application

These rules apply to all persons who generate, collect, receive, store, transport, treat, dispose, or handle bio-medical waste in any form.

3. Definitions

In these rules unless the context otherwise requires:

- (1) "Act" means the Environment (Protection) Act, 1986 (29 of 1986);
- (2) "Animal House" means a place where animals are reared/kept for experiments or testing purposes;
- (3) "Authorisation" means permission granted by the prescribed authority for the generation, collection, reception, storage, transportation, treatment, disposal and/or any other form of handling of bio-medical waste in accordance with these rules and any guidelines issued by the Central Government;
- (4) "Authorised person" means permission granted by the prescribed authority for the generation, collection, reception, storage, transportation, treatment, disposal and/or any other form of handling of bio-medical waste in accordance with these rules and any guidelines issued by the Central Government;
- (5) "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, and including categories mentioned in Schedule I;

(6) "Biologicals" means any preparation made from organisms or micro-organisms or product of metabolism and biochemical reactions intended for use in the diagnosis, immunisation or the treatment of human beings or animals or in research activities pertaining thereto;

(7) "Bio-medical waste treatment facility" means any facility wherein treatment, disposal of bio-medical waste or processes incidental to such treatment or disposal is carried out [and includes common treatment facilities];

¹{(7A) "Form" means Form appended to these rules;}

(8) "Occupier" in relation to any 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, means a person who has control over that institution and/or its premises;

(9) "Operator of a bio-medical waste facility" means a person who owns or controls or operates a facility for the collection, reception, storage, transport, treatment, disposal or any other form of handling of bio-medical waste;

(10) "Schedule" means schedule appended to these rules.

4. 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 death and the environment.

5. Treatment and disposal

(1) Bio-medical waste shall be treated and disposed of 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.

6. Segregation, packaging, transportation and storage

(1) Bio-medical waste shall not be fixed with other wastes.

(2) Bio-medical waste shall be segregated into containers/bags at the point of generation in accordance with Schedule II prior to its storage, transportation, treatment and disposal. The containers shall be labelled according to Schedule III.

(3) If a container is transported from the premises where bio-medical waste is generated to any waste treatment facility outside the premises, the container shall, apart from the label prescribed in Schedule III, also carry information prescribed in Schedule IV.

(4) Notwithstanding anything contained in the Motor Vehicles Act, 1988, or rules thereunder, untreated bio-medical waste shall be transported only in such vehicle as

1 Inserted by S.O. 545(E), dt. 2.6.2000, w.e.f. 2.6.2000.

may be authorised for the purpose by the competent authority as specified by the Government.

(5) No untreated bio-medical waste shall be kept stored beyond a period of 48 hours.

¹{(6) The Municipal body of the area shall continue to pick up and transport segregated non bio-medical solid waste generated in hospitals and nursing homes, as well as duly treated bio-medical wastes for disposal at municipal dump site;}

PROVIDED that if for any reason it becomes necessary to store the waste beyond such period, the authorised person must take permission of the prescribed authority and take measures to ensure that the waste does not adversely affect human health and the environment.

7. Prescribed authority

²{(1) ³[Save as otherwise provided, the prescribed authority for enforcement] of the provisions of these rules shall be the State Pollution Control Boards in respect of States and the Pollution Control Committees in respect of the Union Territories and all pending cases with a prescribed authority appointed earlier shall stand transferred to the concerned State Pollution Control Board, or as the case may be, the Pollution Control Committees.]

⁴{(1A) The prescribed authority for enforcement of the provisions of these rules in respect of all health care establishments including hospitals, nursing homes, clinics, dispensaries, veterinary institutions, Animal houses, pathological laboratories and blood banks of the Armed Forces under the Ministry of Defence shall be the Director General, Armed Forces Medical Services.]

(2) The prescribed authority for the State or Union Territory shall be appointed within one month of the coming into force of these rules.

(3) The prescribed authority shall on receipt of Form I make such enquiry as it deems fit and if it is satisfied that the applicant possesses the necessary capacity to handle bio-medical waste in accordance with these rules, grant or renew an authorisation as the case may be.

(5) An authorisation shall be granted for a period of three years, including an initial trial period of one year from the date of issue. Thereafter, an application shall be made by the occupier/operator for renewal. All such subsequent authorisation shall be for a period of three years. A provisional authorisation will be granted for the trial period, to enable the occupier/operator to demonstrate the capacity of the facility.

(6) The prescribed authority may after giving reasonable opportunity of being heard to the applicant and for reasons thereof to be recorded in writing, refuse to grant or renew authorisation.

(7) Every application for authorisation shall be disposed of by the prescribed authority within ninety days from the date of receipt of the application.

(8) The prescribed authority may cancel or suspend an authorisation, if for reasons, to be recorded in writing, the occupier/operator has failed to comply with any provision of the Act or these rules:

1 Inserted by SO 545(E), dt. 2-6-2000, w.e.f. 2-6-2000.

2. Substituted by SO 545(E), dt. 2-6-2000, w.e.f. 2-6-2000.

3 Substituted for "The prescribed authority for enforcement" vide SO 1069(E), dt. 17-9-2003, w.e.f. 17-9-2003.

4 Inserted, *ibid*.

PROVIDED that no authorisation shall be cancelled or suspended without giving a reasonable opportunity to the occupier/operator of being heard.

8. Authorisation

(1) Every occupier of an institution generating, collecting, receiving, storing, transporting, treating, disposing and/or handling bio-medical waste in any other manner, except such occupier of clinics, dispensaries, pathological laboratories, blood banks providing treatment/service to less than 1000 (one thousand) patients per month, shall make an application in Form I to the prescribed authority for grant of authorisation.

(2) Every operator of a bio-medical waste facility shall make an application in Form I to the prescribed authority for grant of authorisation.

(3) Every application in Form I for grant of authorisation shall be accompanied by a fee as may be prescribed by the Government of the State or Union Territory.

¹[(4) The authorization to operate a facility shall be issued in Form IV, subject to conditions laid therein and such other condition, as the prescribed authority, may consider it necessary.]

9. Advisory committee

²[(1)] 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, environmental management, municipal administration, and any other related department or organisation including non-governmental organisation. [***] As and when required, the committee shall advise the Government of State/Union Territory and the prescribed authority about matters related to the implementation of these rules.

⁴[(2) Notwithstanding anything contained in sub-rule (1), the Ministry of Defence shall constitute in that Ministry, an Advisory Committee consisting of the following in respect of all health care establishments including hospitals, nursing homes, clinics, dispensaries, veterinary institutions, animal houses, pathological laboratories and blood banks of the Armed Forces under the Ministry of Defence, to advise the Director General, Armed Forces Medical Services and the Ministry of Defence in matters relating to implementation of these rules, namely:—

- | | |
|---|----------------|
| (1) Additional Director General of Armed Forces Medical Services | Chairman |
| (2) A representative of the Ministry of Defence not below the rank of Deputy Secretary, to be nominated by that Ministry | Member. |
| (3) A representative of the Ministry of Environment and Forests not below the rank of Deputy Secretary to be nominated by that Ministry | Member |
| (4) A representative of the Indian Society of Hospitals Waste Management, Pune | Member] |

1 Inserted by S.O. 545(E), dt. 2-6-2000, w.e.f. 2-6-2000.

2 Existing rule 9 renumbered as sub-rule (1) thereof vide CSR No. SO 1069(E), dt. 17-9-2003, w.e.f. 17-9-2003.

3 The words "The State Pollution Control Board/ Pollution Control Committee shall be represented" omitted by S.O. 545(E), dt. 2-6-2000, w.e.f. 2-6-2000.

4 Inserted vide GSR No. SO 1069(E), dt. 17-9-2003, w.e.f. 19-2003.

19A. Monitoring of implementation of the rules in Armed Forces Health Care Establishments

(1) The Central Pollution Control Board shall monitor the implementation of these rules in respect of all the Armed Forces health care establishments under the Ministry of Defence.

(2) After giving prior notice to the Director General, Armed Forces Medical Services, the Central Pollution Control Board along with one or more representatives of the Advisory Committee constituted under sub-rule (2) of rule 9 may, if it considers it necessary, inspect any Armed Forces health care establishments.]

10. 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 bio-medical 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.

11. Maintenance of records

(1) Every authorised person shall maintain records 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.

12. 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.

13. Appeal

²[(1)] ³[Save as otherwise provided in sub-rule (2), any person] aggrieved by an order made by the prescribed authority these rules may, within thirty days from the date on which the order is communicated to him, prefer an appeal [in Form V] 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.

⁴[(2) Any person aggrieved by an order of the Director General, Armed Forces Medical Services under these rules may, within thirty days from the date on which the order is communicated to him prefer an appeal to the Central Government in the Ministry of Environment and Forests.]

14. Common disposal/incineration sites

Without prejudice to rule 5 of these rules, the Municipal Corporations, Municipal Boards or Urban Local Bodies, as the case may be, shall be responsible for providing suitable common disposal/incineration sites for the bio-medical wastes generated in it

1 Inserted vide CSR No. SO 1069(E), dt. 17-9-2003, w.e.f. 17-9-2003.

2 Existing rule 13 renumbered as sub-rule (1) thereof, ibid.

3 Substituted for "Any person" ibid.

4 Inserted, ibid.

area under their jurisdiction and in areas outside the jurisdiction of any municipal body, it shall be the responsibility of the occupier generating bio-medical waste/operator of a bio-medical waste treatment facility to arrange for suitable sites individually or in association, so as to comply with the provisions of these rules.

SCHEDULE I
CATEGORIES OF BIO-MEDICAL WASTE
[Rule 5]

Waste Category No.	Waste Category Type	Treatment and Disposal option*
Category No. 1	Human Anatomical Waste (Human tissues, organs, body parts)	incineration ^{@@} / deep burial ^{##}
Category No. 2	Animal Waste (Animal tissues, organs, body parts, carcasses, bleeding parts, fluid, blood and experimental animals used in research, waste generated by veterinary hospitals, colleges, discharge from hospitals, animal houses).	incineration ^{@@} / deep burial ^{##}
Category No. 3	Microbiology & Biotechnology Waste (Wastes from laboratory cultures, stocks 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, wastes from production of biologicals, toxins, dishes and devices used for transfer of cultures)	local autoclaving/ microwaving/ incineration ^{@@}
Category No. 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 and mutilation/ shredding ^{##}
Category No. 5	Discarded Medicines and Cytotoxic drugs wastes comprising of outdated, conta-minated and discarded medicines)	incineration ^{@@} /destruction and drugs disposal in secured landfills
Category No. 6	Soiled Waste (Items contaminated with blood, and body fluids including cotton, dressings, solid plaster casts, lines, beddings, other material contaminated with blood)	incination ^{@@} autoclaving, microwaving

Category No. 7	Solid Waste (Wastes generated from disposable items other than the waste [sharps] such as tubings, catheters, intravenous sets, etc.	disinfection by chemical treatment ^{@@} autoclaving/microwaving and shredding ^{##}
Category No. 8	Liquid Waste (Waste generated from laboratory and washing, cleaning, house-keeping and disinfecting activities)	disinfection by chemical treatment ^{@@} and discharge into drains.
Category No. 9	Incineration Ash (ash from incineration of any bio-medical waste)	disposal in municipal landfill
Category No. 10	Chemical Waste (chemicals used in production of biologicals, chemicals used in disinfection, as insecticides, etc.)	chemical ^{@@} and treatment ^{@@} and discharge into drains for liquids and secured landfill 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 pretreatment before incineration. Chlorinated plastics shall not be incinerated.

^{*} Deep burial shall be an option available only in towns with population less than five lakhs and in rural areas.

⁺ Options given above are based on available technologies. Occupier/operator wishing to use other-State-of-the-art technologies shall approach the Central Pollution Control Board to get the standards laid down to enable the prescribed authority to consider grant of authorisation.

SCHEDULE II

COLOUR CODING AND TYPE OF CONTAINER FOR DISPOSAL OF BIO-MEDICAL WASTES

Colour Coding	Type of Container	Waste Category	Treatment Options as per Schedule I
Yellow	Plastic bag	Cat. 1, Cat. 2, and Cat. 3, Cat. 6.	Incineration/deep burial
Red	Disinfected container/plastic bag	Cat. 3, Cat. 6	Cat. 7

Blue/White Translucent	Plastic bag/puncture proof of container	Cat. 4, Cat. 7,	Autoclaving Micro-waving/Chemical Treatment and destruction/shredding
Black	Plastic bag	Cat. 5 and Cat. 9 and Cat. 10, (solid)	Disposal in secured landfill

Notes :

1. Colour coding of waste categories with multiple treatment options as defined in Schedule I, shall be selected depending on treatment option chosen, which shall be as specified in Schedule I.
2. Waste collection bags for waste types needing incineration shall not be made of chlorinated plastics.
3. Categories 8 and 10 (liquid) do not require containers/bags.
4. Category 3 if disinfected locally need not be put in containers/bags.

SCHEDULE III

[Rule 6]

LABEL FOR BIO-MEDICAL WASTE CONTAINERS/BAGS

BIOHAZARD SYMBOL

CYTOTOXIC HAZARD SYMBOL

BIOHAZARD

HANDLE WITH CARE

CYTOTOXIC

Note : Label shall be non-washable and prominently visible.

SCHEDULE IV

LABEL FOR TRANSPORT OF BIO-MEDICAL WASTE CONTAINERS/BAGS

[Rule 6]

Waste category No. Day Month
 Waste class Year
 Waste description Date of generation

Sender's Name & Address Receiver's Name & Address
 Phone No. Phone No.
 Telex No. Telex No.
 Fax No. Fax No.
 Contact Person Contact Person

In case of emergency please contact:

Name & Address:—
 Phone No.

Note: Label shall be non-washable and prominently visible.

SCHEDULE V

STANDARDS FOR TREATMENT AND DISPOSAL OF BIO-MEDICAL WASTES
 STANDARDS FOR INCINERATORS:

[Rule 5 and Schedule I]

All incinerators shall meet the following operating and emission standards:

A. Operating Standards

1. Combustion efficient (CE) shall be at least 99.00%.
2. The Combustion efficiency is computed as follows:

$$C.E. = \frac{\%CO_2}{\%CO_2 + \%CO} \times 100$$
3. The temperature of the primary chamber shall be 800+50 deg. C.
4. The secondary chamber gas residence time shall be at least 1 (one) second at 1050+50°, with minimum 3% Oxygen in the stack gas.

B. Emission Standards

Parameters	Concentration mg/Nm ³ at (12% CO ² correction
(1) Particulate matter	150
(2) Nitrogen Oxides	450
(3) HCl	50
(4) Minimum stack height shall be 30 metres above ground	
(5) Volatile organic compounds in ash shall not be more than 0.01%	

Note : Suitably designed pollution control devices should be installed/retrofitted with the incinerator to achieve the above emission limits, if necessary.

Wastes to be incinerated shall not be chemically treated with any chlorinated disinfectants.

Chlorinated plastics shall not be incinerated.

Toxic metals incineration ash shall be limited within the regulatory quantities as defined under the Hazardous Waste (Management and Handling Rules), 1989.

Only law sulphur fuel like L.D.O./L.S.H.S/Diesel shall be used as fuel in the incinerator.

STANDARDS FOR WASTE AUTOCLAVING

The autoclave should be dedicated for the purposes of disinfecting the treating bio-medical water,

- (I) When operating a gravity flow autoclave, medical waste shall be subjected to:
 - (i) a temperature of not less than 121°C and pressure of 15 pounds per square inch (psi) for an autoclave residence time of not less than 60 minutes; or
 - (ii) a temperature of not less than 135°C and a pressure of 31 psi for an autoclave residence time of not less than 45 minutes; or
 - (iii) a temperature of not less than 149 and a pressure of 52 psi for an autoclave residence time of not less than 30 minutes.
- (II) When operating a vacuum autoclave, medical waste shall be subjected to minimum of one pre-vacuum pulse to purge the autoclave of all air. The waste shall be subjected to the following:
 - (i) a temperature of not less than 121°C and pressure of 15 psi for an autoclave residence time of not less than 45 minutes; or

(ii) a temperature of not less than 135°C and a pressure of 31 psi for an autoclave residence time of not less than 30 minutes;

(iii) Medical waste shall not be considered properly treated unless that time, temperature and pressure indicators indicate that the required time, temperature and pressure were reached during the autoclave process. If for any reasons, time temperature of pressure indicator indicates that the required temperature, pressure or residence time was not reached, the entire load of medical waste must be autoclaved again until the proper temperature, pressure and residence time were achieved.

(IV) Recording of operational parameters

Each autoclave shall have graphic or computer recording devices which will automatically and continuously monitor and record dates, time of day, load identification number and operating parameters throughout the entire length of the autoclave cycle.

(V) Validation test

Spore testing:

The autoclave should completely and consistently kill the approved biological indicator at the maximum design capacity of each autoclave unit. Biological indicator for autoclave shall be *Bacillus stearothermophilus* spores using vials or spore strips, with at least 1×10^4 spores per millilitre. Under no circumstances will an autoclave have minimum operating parameters less than a residence time of 30 minutes, regardless of temperature and pressure, a temperature less than 121°C or a pressure less than 1.5 psi.

(VI) Routine Test

A chemical indicator strip/ tape that changes colour when a certain temperature is reached can be used to verify that a specific temperature has been achieved. It may be necessary to use more than one strip over the waste package at different location to ensure that the inner content of the package has been adequately autoclaved.

STANDARDS FOR LIQUID WASTE

The effluent generated from the hospital should conform to the following limits:

Parameters	Permissible limits
pH	6.5-9.0
Suspended solids	100 mg/l
Oil and grease	10 mg/l
BOD	30 mg/l
COD	250 mg/l
Bio-assay test	90% survival of fish after 96 hours in 100% effluent.

These limits are applicable to those hospitals which are either connected with sewers without terminal sewage treatment plant or not connected to public sewers. For discharge into public sewers with terminal facilities, the general standards as notified under the Environment (Protection) Act, 1986 shall be applicable.

STANDARDS OF MICROWAVING

1. Microwave treatment shall not be used for cytotoxic, hazardous or radioactive wastes, contaminated animal carcasses, body parts and large metal items.
2. The microwave system shall comply with the efficacy test/ routine tests and a performance guarantee may be provided by the supplier before operation of the unit.
3. The microwave should completely and consistently kill the bacteria at the maximum design capacity of each microwave unit. Biological indicators for microwave

shall be *Bacillus Subtilis* spores using vials or spore strips with at least 1×10^4 spores per millilitre.

STANDARDS FOR DEEP BURIAL

1. A pit or trench should be dug 2 metres deep. It should be half filled with waste., then covered with lime within 50 cm of the surface, before filling the rest of the pit with soil.
2. It must be ensured that animals do not have any access to burial sites. Covers of galvanised iron/ wire meshes may be used.
3. On each occasion when wastes are added to the pit, a layer of 10 cm of soil shall be added to cover the wastes.
4. Burial must be performed under close and dedicated supervision.
5. The deep burial site should be relatively impermeable and no shallow well should be close to the site.
6. The pits should be distant from habitation, and sited so as to ensure that no contamination occurs of any surface water or ground water. The area should not be prone to flooding or erosion.
7. The location of the deep burial site will be authorised by the prescribed authority.
8. The institution shall maintain a record of all pits for deep burial.

[SCHEDULE VI

SCHEDULE FOR WASTE MANAGEMENT FACILITIES LIKE INCINERATOR/AUTOClave/MICROWAVE SYSTEM

(Rule 5)

- A. Hospitals and nursing homes in towns with population of 30 lakhs and above by 30th June, 2000 or earlier
- B. Hospitals and nursing homes in towns with population of below 30 lakhs,
 - (a) with 500 beds and above by 30th June, 2000 or earlier
 - (b) with 2000 beds and above but less than 500 beds by 31st December, 2000 or earlier
 - (c) with 50 beds and above but less than 200 beds by 31st December, 2001 or earlier
 - (d) with less than 50 beds by 31st December, 2002 or earlier
- C. All other institutions generating bio-medical waste not included in A and B above by 31st December, 2000 or earlier]

FORM I

(See rule 8)

²[APPLICATION FOR AUTHORISATION/RENEWAL OF AUTHORISATION]

(To be submitted in duplicate.)

To,

The Prescribed Authority

(Name of the State Govt. / UT Administration)
Address

1. Particulars of Applicant

(i) Name of the Applicant

- 1 Substituted by S.O. 201(E), dt. 6-3-2000, w.e.f. 7-3-2000.
- 2 Substituted by S.O. 545(E), dt. 2-6-2000, w.e.f. 2-6-2000.

(In black letters and in full)

- (ii) Name of the Institution:
Address:
Tel No., Fax No. Telex No.

2. Activity for which authorisation is sought:

- (i) Generation
 - (ii) Collection
 - (iii) Reception
 - (iv) Storage
 - (v) Transportation
 - (vi) Treatment
 - (vii) Disposal
 - (viii) Any other form of handling.
3. Please state whether applying for fresh authorisation or for renewal (In case of renewal previous authorisation-number and date)
- 4. (i) Address of the institution handling bio-medical wastes;
 - (ii) Address of the place of the treatment facility;
 - (iii) Address of the place of disposal of the waste;
 - 5. (i) Mode of transportation (in any) of bio-medical waste;
 - (ii) Mode(s) of treatment;
 - 6. Brief description of method of treatment and disposal (attach details)
 - 7. (i) Category (see Schedule I) of waste to be handled
 - (ii) Quantity of waste (category-wise) to be handled per month

8. Declaration

I do hereby declare that the statements made and information given above are true to the best of my knowledge and belief and that I have not concealed any information. I do also hereby undertake to provide any further information sought by the prescribed authority in relation to these rules and to fulfil any conditions stipulated by the prescribed authority.

Date:
Place:
Signature of the applicant
Designation of the applicant

FORM II
(Rule 10)

ANNUAL REPORT

(To be submitted to the prescribed authority by 31st January every year).

- 1. Particulars of the applicant:
(i) Name of the authorised person (occupier/operator)
- (ii) Name of the institution:
Address
Tel. No
Telex No.
Fax No.

2. Categories of waste generated and quantity on a monthly average basis:

3. Brief details of the treatment facility:

- In case of off-site facility:
- (i) Name of the operator
 - (ii) Name and address of the facility:
Tel. No., Telex No., Fax No.
- 4. Category-wise quantity of waste treated:
 - 5. Mode of treatment with details:
 - 6. Any other information:
 - 7. Certified that the above report is for the period from Signature

Date
Place
Signature

FORM III

ACCIDENT REPORTING

(Rule 12)

- 1. Date and time of accident.
- 2. Sequence of events leading to accident:
- 3. The waste involved in accident
- 4. Assessment of the effects of the accidents on human health and the environment.
- 5. Emergency measures taken:
- 6. Steps taken to alleviate the effects of accidents:
- 7. Steps taken to prevent the recurrence of such an accident:

Date:
Place:
Signature

FORM IV

AUTHORISATION FOR OPERATING A FACILITY FOR COLLECTION, RECEPTION, TREATMENT, STORAGE, TRANSPORT AND DISPOSAL OF BIOMEDICAL WASTES

(Rule 8(4))

- 1. File number of authorisation and date of issue
- 2. of is hereby granted an authorisation to operate a facility for collection, reception, storage, transport and disposal of biomedical waste on the premises situated at
- 3. This authorisation shall be in force for a period of years from the date of issue.
- 4. This authorisation is subjected to the conditions stated below and to such other conditions as may be specified in the rules for the time being in force under the Environment (Protection) Act, 1986.

Date
Place
Signature

TERMS AND CONDITIONS OF AUTHORISATION¹

1. The authorisation shall comply with the provisions of the Environment (Protection) Act, 1986, and the rules made thereunder.
2. The authorisation or its renewal shall be produced for inspection at the request of an officer authorised by the prescribed authority.
3. The person authorised shall not rent, lend, sell, transfer or otherwise transport the biomedical wastes without obtaining prior permission of the prescribed authority.
4. Any unauthorised change in personnel, equipment or working conditions as mentioned in the application by the person authorised shall constitute a breach of his authorisation.
5. It is the duty of the authorised person to take prior permission of the prescribed authority to close down the facility.

²FORM V
[Rule 13]

APPLICATION FOR FILING APPEAL AGAINST ORDER PASSED BY THE PRESCRIBED AUTHORITY AT DISTRICT LEVEL OR REGIONAL OFFICE OF THE POLLUTION CONTROL BOARD ACTING AS PRESCRIBED AUTHORITY OR THE STATE/UNION TERRITORY LEVEL AUTHORITY

1. Name and address of the person applying for appeal:
2. Number, date of order and address of the authority which passed the order, against which appeal is being made (Certified copy of order to be attached)
3. Ground on which the appeal is being made
4. List of enclosures other than the order referred in para 2 against which appeal is being filed.

Date

Place

Signature

Designation

Latest Publications

⊙ Employees' Provident Pension & Insurance Funds	Edition	2003
S. Krishnamurthi	Rs.	600
⊙ Guide to Employees' State Insurance	Edition	2003
S. Krishnamurthi	Rs.	550
⊙ Commentary on Payment of Bonus	Edition	2003
S. Krishnamurthi	Rs.	300
⊙ Manual on Labour & Industrial Laws	Edition	2004
	Rs.	550
⊙ Guide to Payment of Gratuity Act, 1972	Edition	2004
S. Krishnamurthi	Rs.	250
⊙ Guide to Contract Labour	Edition	2004
S. Krishnamurthi	Rs.	250
⊙ Practice Guide to Industrial Disputes Act, 1947	Edition	2004
H. S. Sharma (Advocate)	Rs.	150
⊙ Practice Guide to Employees' Provident Fund	Edition	2004
	Rs.	190



**Global Environmental Monitoring Stations/
Monitoring of Indian National Aquatic Resources**

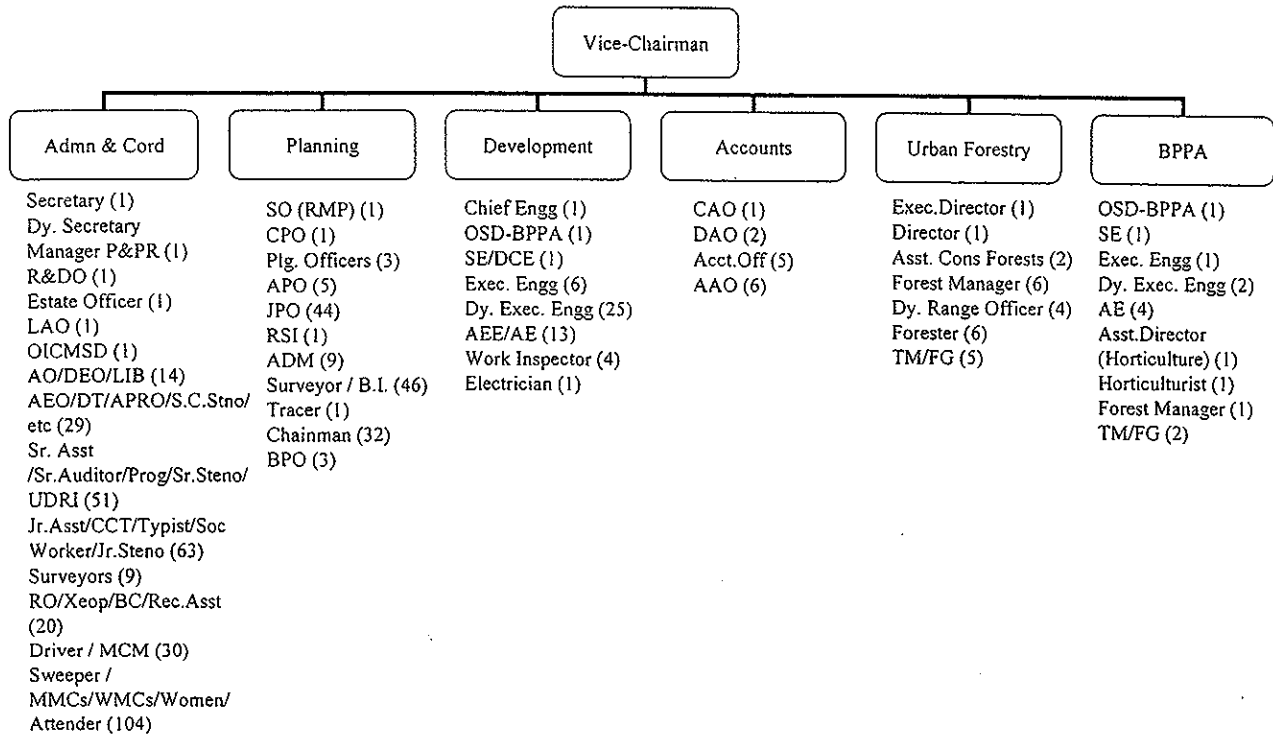
Water Quality Criteria

Designated-Best-Use	Class of water	Criteria
Drinking Water Source without conventional treatment but after disinfection	A	<ol style="list-style-type: none"> Total Coliforms Organism/100ml shall be 50 or less pH between 6.5 and 8.5 Dissolved Oxygen 6mg/l or more Biochemical Oxygen Demand 5 days 20oC 2mg/l or less
Outdoor bathing (Organised)	B	<ol style="list-style-type: none"> Total Coliforms Organism MPN/100ml shall be 500 or less pH between 6.5 and 8.5 Dissolved Oxygen 5mg/l or more Biochemical Oxygen Demand 5 days 20oC 3mg/l or less
Drinking water source after conventional treatment and disinfection	C	<ol style="list-style-type: none"> Total Coliforms Organism MPN/100ml shall be 5000 or less pH between 6 to 9 Dissolved Oxygen 4mg/l or more Biochemical Oxygen Demand 5 days 20oC 3mg/l or less
Propagation of Wild life and Fisheries	D	<ol style="list-style-type: none"> pH between 6.5 to 8.5 Dissolved Oxygen 4mg/l or more Free Ammonia (as N) 1.2 mg/l or less
Irrigation, Industrial Cooling, Controlled Waste disposal	E	<ol style="list-style-type: none"> pH between 6.0 to 8.5 Electrical Conductivity at 25oC micro mhos/cm Max.2250 Sodium absorption Ratio Max. 26 Boron Max. 2mg/l
	Below-E	Not Meeting A, B, C, D & E Criteria

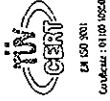
**Central Pollution Control Board
standards on water quality**

HYDERABAD URBAN DEVELOPMENT AUTHORITY

ORGANISATION CHART - STAFF STRENGTH



Organization Chart of HUDA & Staff strength



CGWB
Central Ground Water Board
Ministry of Water Resources
Government of India
New Delhi - 110 002

Lake Water quality of Hussainsagar lake

Surface Water & Groundwater Quality Data Base in the Hussainsagar Catchment Area

*CSIR Network Project on Groundwater Studies
Activity (iv) – Anthropogenic Pollution*

Contributors:

Groundwater Department, Government of Andhra Pradesh,
Jeedimetla Effluent Treatment Limited (JETL), Jeedimetla IDA
ICP-MS Laboratory, CCM, BARC, Hyderabad
Urban Forestry, Hyderabad Urban Development Authority (HUDA)



Environmental Hydrology Group
National Geophysical Research Institute
Hyderabad – 500 007

June 2004

Salient features of Water Quality in the Hussainsagar Catchment Area

There are 5 watersheds draining into the Hussainsagar Lake viz., Banjara Hills watershed, Yusufguda watershed, Kukapally watershed, Hasmathpet watershed and Karkhana watershed. Asokhnagar Nala drains the Hussainsagar lake and meets Musi river in the downstream. The catchment area covers about 240 sq. km. All the watersheds are draining domestic sewage/runoff water except the Kukapally watershed, which located amidst the industrial development areas.

NGRI under CSIR network project on Groundwater has established 125 observation wells and about 30 surface water sampling points on the nalas as well as in the Hussainsagar.

Bimonthly water quality of the lake water has been analyzed for BOD, COD, Total Nitrogen (TN), Total Phosphorous (TP) and Dissolved Oxygen since June 2003. The sediment samples at 6 locations in the Hussainsagar have also been analyzed for TN & TP for the same period.

Premonsoon Lake water quality during June 2003 & Post monsoon (November 2003)

	June 2003	November 2003	June 8 2004
DO	0.9 - 1.9mg/l	6.6 -- 12 mg/l	1.6 - 11.3 mg/l
BOD	<10 -- 25 mg/l	<10 -- 15 mg/l	<10 - 32 mg/l
COD	53 -- 97 mg/l	43	56 - 105 mg/l
TN	11.6 - 14 mg/l	2 -- 13 mg/l	0.3 - 1.5 mg/l
TP	1.6 -- 2.3 mg/l	2.6 -- 6.35 mg/l	.42 - 0.93 mg/l

Sediment Samples

TN	102 - 235 mg/kg	No sediment sample	1.2 - 9 mg/kg
TP	115 - 246 mg/kg		24 - 36 mg/kg

- At a depth 3 - 5 m all the above parameter values are found to be higher than at the surface in the lake water

Major ion concentration of Lake water of Hussainsagar (August 2003)

	at the surface	850 mg/l
TDS	at the surface	850 - 860 mg/l
	At depth >5m	
Chloride	S	120 - 220 mg/l
	Depth	160 - 220 mg/l
Sulphate	S	74 - 126 mg/l
	Depth	84 - 140 mg/l
Nitrate as N	S	4.4 -- 12.6 mg/l
	Depth	1.6 -- 11.5 mg/l
Fluoride	S	< 1.0 mg/l
Bicarbonate	S	160 - 220 mg/l
	Depth	160 - 230 mg/l

Note: At depth the concentration each constituent increases

Heavy metal concentrations (August 2003)

Nickel	> 40 µg/l
Selenium	> 30 µg/l
Mercury	> 4 µg/l
Vanadium	> 15 µg/l
Molybdenum	> 5 µg/l
Strontium	> 5000 µg/l
Aluminum	> 30 µg/l
Chromium	> 10 µg/l

Groundwater quality

Among the five watersheds, groundwater samples from Kukatpally watershed have shown elevated TDS concentration > 1000 mg/l.

Chlorides	> 300 mg/l
Sulphates	> 150 mg/l
Nitrate as N	> 10 mg/l
Fluorides F	> 1.0 mg/l

Balanagar, Kukatpally watersheds have industrial areas and thus contributing to the elevated concentrations due to indiscriminate discharge of industrial effluents.

Depth to water levels are ranging from 5 to 25 m in all the watersheds due to over exploitation of groundwater for domestic and industrial use.

Trace Element concentration of Sediment samples

The sediments in Hussainsagar lake around Kukatpally nala has been found to be 3 times higher concentration with regard to Molybdenum, Copper, Lead, Zinc, Silver.

Arsenic is also found 2 times higher than the average value for the lake

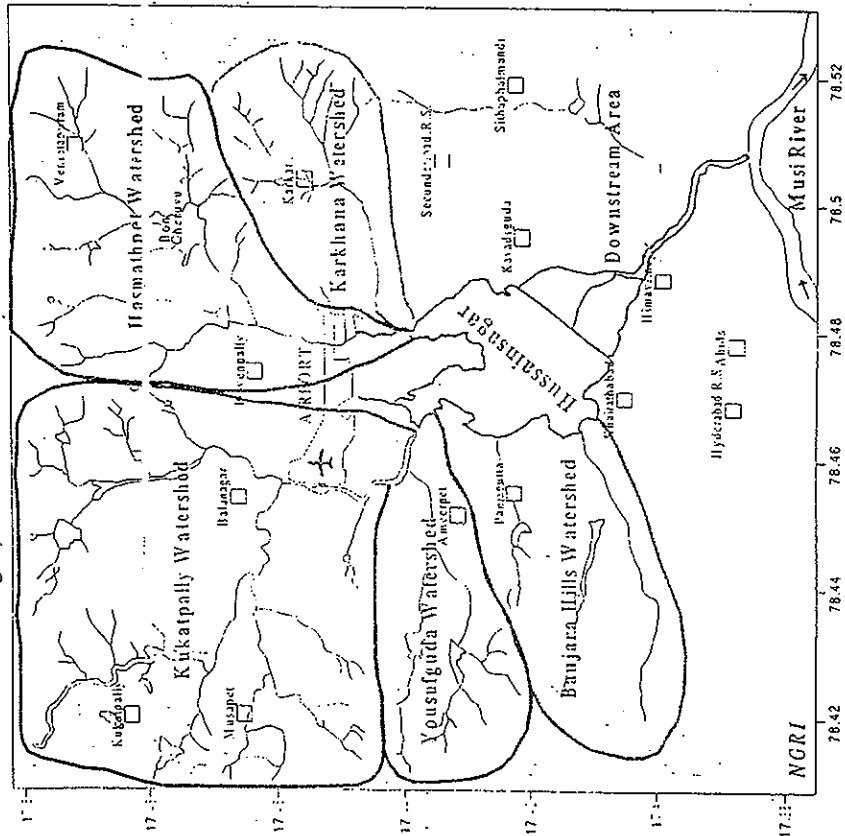
Cadmium has been found elevated 4 times higher than the average at H1 & H3. Bismuth and Chromium are 2 times elevated than the average for the lake sediments

Selenium has been found 5 times elevated at H11 near Boating point

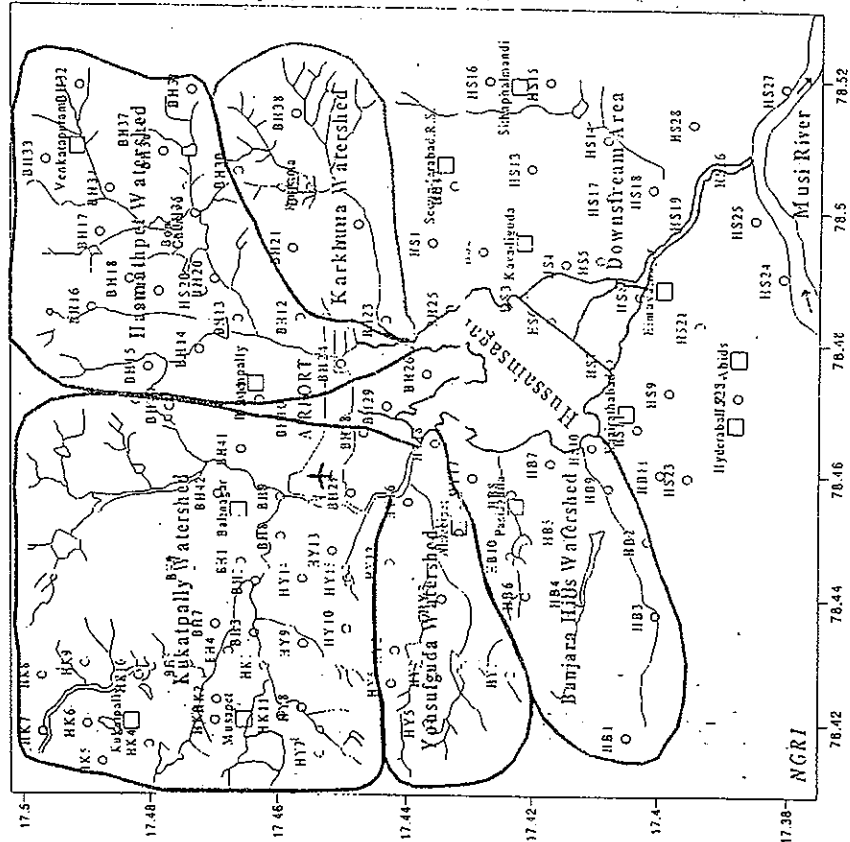
High concentration of Selenium, Mercury could be due to Ganesh immersion with lot paints containing these constituents.

The preliminary data base collected during last one year suggests that still the Hussainsagar lake is receiving some industrial effluents clandestinely discharged in the Kukatpally nala situated in the industrial area. Further investigations have been carried out during June 2004 for assessing lake water quality and groundwater quality under the project.

Environmental Hydrology Group, National Geophysical Research Institute
Hussainsagar Catchment Area, Hyderabad



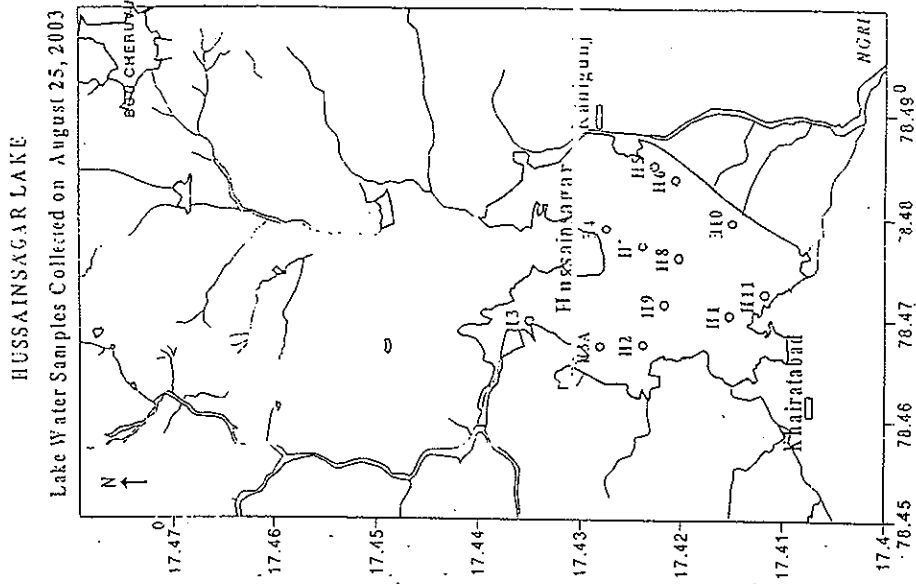
Environmental Hydrology Group, National Geophysical Research Institute
Hussainsagar Catchment Area, Hyderabad

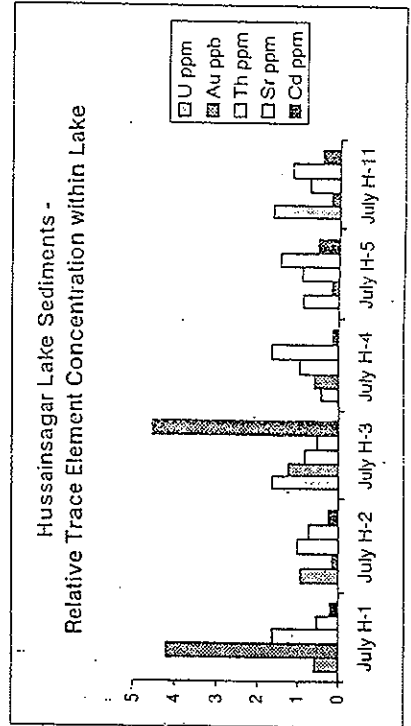
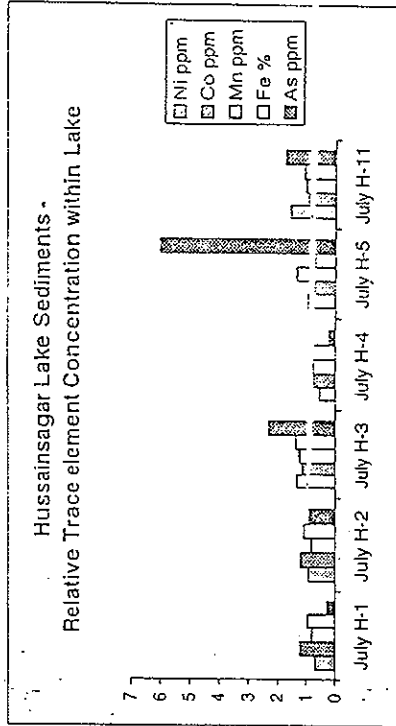
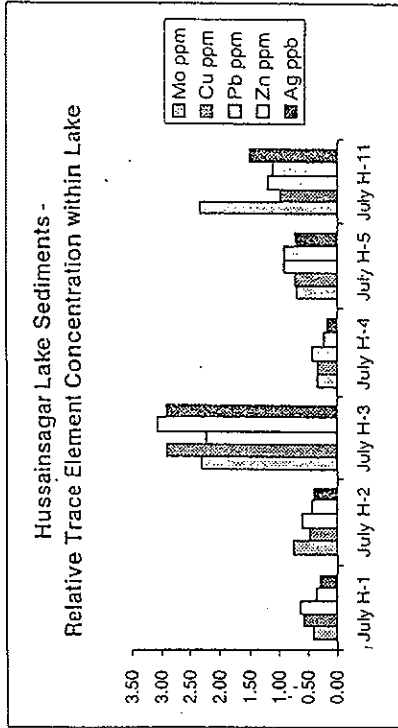
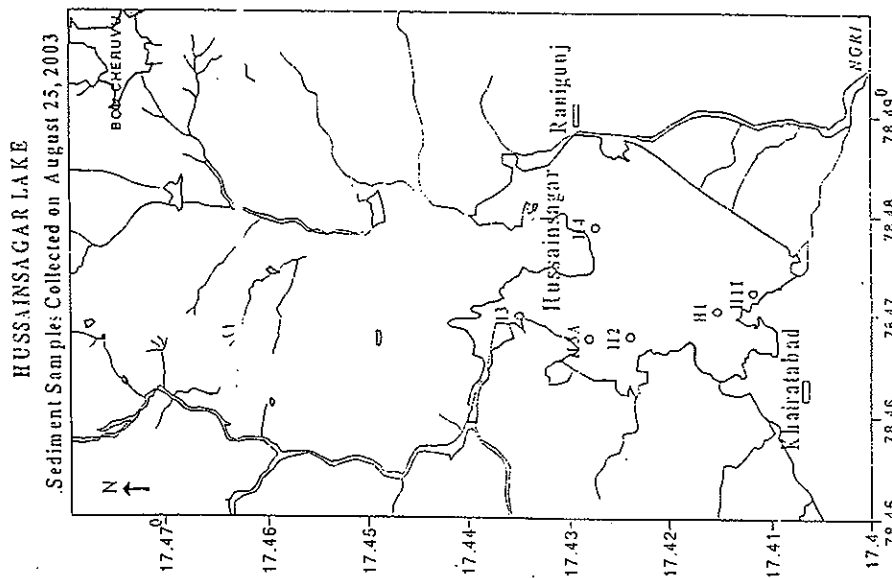


ENVIRONMENTAL HYDROLOGY GROUP
NATIONAL GEOPHYSICAL RESEARCH INSTITUTE
 (Activity: (iv) Anthropogenic pollution under CSIR Network Project)

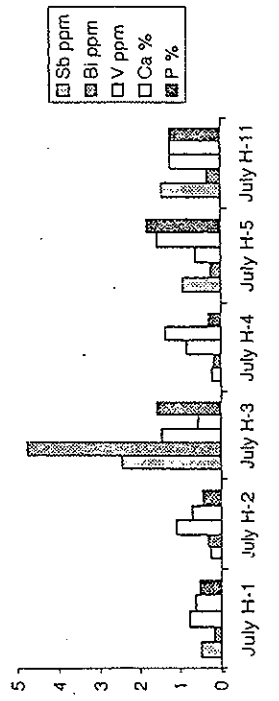
HUSSAINSAGAR LAKE – Water and Sediment samples collected on August 25, 2003

Sl.No.	Sample No.	Location	Longitude	Latitude
1	H1	Inlet from Khairatabad	78° 28'	17° 24' 56.8"
2	H2S	Inlet near Necklace Road	78° 27' 53.8"	17° 25' 26.3"
3	H2D	-DO-	78° 27' 53.8"	17° 25' 26.3"
4	H3(A)S	Inlet from Banjara Hills	78° 27' 44.9"	17° 25' 35.9"
5	H3(A)D	-DO-	78° 27' 44.9"	17° 25' 35.9"
6	H3S	Inlet from Begumpet	78° 28' 9.2"	17° 26' 12.0"
7	H3D	-DO-	78° 28' 9.2"	17° 26' 12.0"
8	H4S	Inlet from Kukupalli	78° 28' 33.4"	17° 25' 43.6"
9	H4D	-DO-	78° 28' 33.4"	17° 25' 43.6"
10	H5S	Outlet near Viceroy hotel	78° 29' 1.1"	17° 25' 24.4"
11	H5D	-DO-	78° 29' 1.1"	17° 25' 24.4"
12	H6S	Outlet near Sir Arthur cotton Statue	78° 28' 57.3"	17° 25' 12.1"
13	H6D	-DO-	78° 28' 57.3"	17° 25' 12.1"
14	H7S	Middle of the Lake	78° 28' 43.9"	17° 25' 12.8"
15	H7D	-DO-	78° 28' 43.9"	17° 25' 12.8"
16	H8S	Near Buddha statue	78° 28' 30.8"	17° 24' 57.5"
17	H8D	-DO-	78° 28' 30.8"	17° 24' 57.5"
18	H9S	Near Lepakshi	78° 28' 38.5"	17° 24' 50.1"
19	H9D	-DO-	78° 28' 38.5"	17° 24' 50.1"
20	H10S	Backside of Buddha Statue	78° 28' 22.3"	17° 25' 9.9"
21	H10D	-DO-	78° 28' 22.3"	17° 25' 9.9"
22	H11S	Near Boating point (opp. BRKR bldg.)	78° 28' 28.0"	17° 24' 37.0"
23	H11D	-DO-	78° 28' 28.0"	17° 24' 37.0"

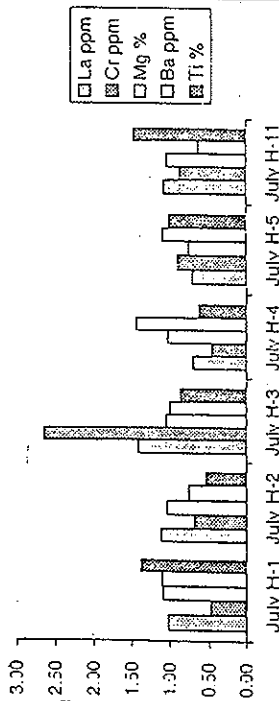




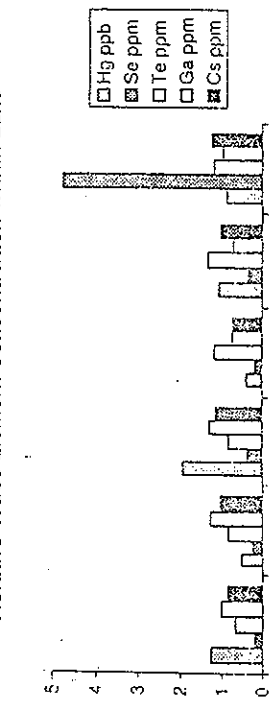
Hussainsagar Lake Sediment -
Relative Trace Element Concentration within Lake



Hussainsagar Lake Sediments -
Relative Trace Element Concentration within Lake



Hussainsagar Lake Sediments-
Relative Trace Element Concentration within Lake



ENVIRONMENTAL HYDROLOGY GROUP
NATIONAL GEOPHYSICAL RESEARCH INSTITUTE
(Activity: (iv) Anthropogenic pollution under CSIR Network Project)
HUSSAINSAGAR LAKE - Water and Sediment samples collected on June 20, 2003

All values in mg/l

Sample No.	Dissolved Oxygen	COD	BOD	Total Nitrogen	Total Phosphorous
H1	Nil	58	10	13.6	2.3
H2	0.9	90	22	12	1.8
H3	1.0	74	15	11.6	1.8
H4	1.5	69	<10	13.1	1.8
H5	1.6	90	25	12.1	1.9
H6	1.0	64	10	13	1.9
H7	1.1	80	15	12.6	1.6
H8	1.9	80	<10	13.1	1.8
H9	1.8	69	<10	12.5	1.7
H10	1.5	90	20	12.6	1.9
H11	1.1	58	<10	13.1	2.0
H12	1.4	53	<10	11	2.1

Sediment mg/kg

Sample No.	Total Nitrogen	Total Phosphorous
H1	102	235
H2	335	145
H3	210	132
H4	198	172
H5	216	115
H11	156	246

ENVIRONMENTAL HYDROLOGY GROUP
NATIONAL GEOPHYSICAL RESEARCH INSTITUTE
(Activity: (iv) Anthropogenic pollution under CSIR Network Project)
HUSSAINSAGAR LAKE - Water and Sediment samples collected on August 25, 2003

At the Surface

Sample No.	Dissolved Oxygen (mg/l)	COD (mg/l)	BOD (mg/l)	Total Nitrogen (mg/l)	Total Phosphorous (mg/l)
H1-S	4.8	48	10	0.7	3.05
H2-S	6.3	74	20	1.48	3.12
H3-S	0.6	58	<10	8.2	3.42
H3A-S	1.9	64	30	0.38	2.8
H4-S	7.1	85	24	1.0	2.02
H5-S	7.5	80	<10	1.31	2.8
H6-S	7.6	85	<10	0.65	2.05
H7-S	7.6	85	10	0.57	2.6
H8-S	7.1	69	<10	1.02	3.05
H9-S	7.6	48	Nil	0.92	2.18
H10-S	6.6	37	Nil	0.94	2.35
H11-S	8.0	48	Nil	0.86	3.05

4-5 m Depth

Sample No.	Dissolved Oxygen (mg/l)	COD (mg/l)	BOD (mg/l)	Total Nitrogen (mg/l)	Total Phosphorous (mg/l)
H2-D	6.4	58	<10	1.4	3.55
H3-D	2.8	64	20	6.2	3.65
H3A-D	6.3	53	<10	0.41	2.8
H4-D	8.1	80	Nil	1.3	3.05
H5-D	7.8	80	Nil	0.27	3.12
H6-D	7.4	60	20	0.41	3.55
H7-D	7.4	48	10	0.61	2.05
H8-D	6.9	90	10	1.2	2.15
H9-D	7.2	37	Nil	0.86	2.46
H10-D	6.1	90	20	1.2	2.85
H11-D	7.4	64	Nil	0.37	3.8

Sediment g/kg

Sample No.	Total Nitrogen	Total Phosphorous
H1	5.8	1.33
H2	11.5	1.42
H3	12.6	1.56
H4	6.2	3.78
H11	6.6	2.21
H3A	5.1	1.98

ENVIRONMENTAL HYDROLOGY GROUP
NATIONAL GEOPHYSICAL RESEARCH INSTITUTE
(Activity: (iv) Anthropogenic pollution under CSIR Network Project)
Inlet Channels of HUSSAINSAGAR- Water and Sediment samples collected
on September 2, 2003

Sample No.	Dissolved Oxygen (mg/l)	COD (mg/l)	BOD (mg/l)	Total Nitrogen (mg/l)	Total Phosphorous (mg/l)
HSW1	Nil	248	100	3.2	8.55
HSW2	Nil	384	165	3.12	8.85
HSW3	Nil	248	100	1.68	4.65
HSW4	Nil	256	100	1.75	6.55
HSW5	Nil	352	172	1.64	5.65
HSW6	Nil	352	140	3.27	6.55
HSW7	Nil	472	260	0.99	6.3
HSW8	Nil	96	20	1.42	6.25
HSW9	Nil	1040	440	4.31	22.6
HSW10	Nil	296	80	1.7	11.65
HSW11	Nil	128	80	1.5	6.55
HSW12	Nil	91	20	1.8	5.5
HSW13	Nil	283	130	2.0	6.3(SRP=2.6)
HSW14	5.9	69	<10	1.6	4.55
HSW15	Nil	107	40	2.2	3.8
HSW16	6.0	5	Nil	Nil	3.7
HSW17	Nil	59	<10	2.2	4.2
HSW18	Nil	203	90	4.2	18.8
HSW19	Nil	139	75	3.8	10.3
HSW20	Nil	107	40	2.2	14.2
HSW21	Nil	267	100	6.2	6.2
HSW22	5.8	37	Nil	1.2	5.05
HSW23	6.9	11	Nil	Nil	4.5
HSW24	3.9	43	<10	2.8	7.6
HSW25	Nil	107	50	2.5	9.55

ENVIRONMENTAL HYDROLOGY GROUP
 NATIONAL GEOPHYSICAL RESEARCH INSTITUTE
 (Activity: (iv) Anthropogenic pollution under CSIR Network Project)
 HUSSAINSAGAR LAKE – Water and Sediment samples collected on November 6, 2003

At the Surface

Sample No.	Dissolved Oxygen (mg/l)	COD (mg/l)	BOD (mg/l)	Total Nitrogen (mg/l)	Total Phosphorous (mg/l)
H1	10.8	96	<10	2	6.35
H2	11.5	101	15	3	5.6
H3	7.9	75	<10	2	3.61
H3A	10.6	80	<10	2	4.1
H4	10.5	91	15	6	3.6
H5	6.7	59	<10	8	2.6
H6	7.5	75	<10	6	3.2
H7	9.9	69	<10	10	3.2
H8	10.1	59	<10	2	3.8
H9	6.6	43	<10	3	3.2
H10	11.7	48	<10	2	2.6
H11	12.0	69	<10	13	3.6

4-5 m Depth

Sample No.	Dissolved Oxygen (mg/l)	COD (mg/l)	BOD (mg/l)	Total Nitrogen (mg/l)	Total Phosphorous (mg/l)
H-7-I	2.7	59	<10	4	2.1
H-10-I	3.0	75	12	7	2.8

More than 5m Depth

Sample No.	Dissolved Oxygen (mg/l)	COD (mg/l)	BOD (mg/l)	Total Nitrogen (mg/l)	Total Phosphorous (mg/l)
H2-D	Nil	752	248	42	28.92
H3-D	Nil	795	256	36	30.4
H3A-D	0.9	485	135	28	6.9
H4-D	Nil	752	210	53	20.3
H5-D	1.9	85	<10	5	4.1
H6-D	0.9	107	36	21	5.6
H7-D	Nil	299	72	6	4.3
H8-D	1.4	59	<10	3	3.9
H9-D	Nil	43	<10	6	4.6
H10-D	Nil	496	110	43	19.3
H11-D	1.7	363	107	47	19.4

No Sediment on Nov 6, Sampling.

ENVIRONMENTAL HYDROLOGY GROUP
 NATIONAL GEOPHYSICAL RESEARCH INSTITUTE
 (Activity: (iv) Anthropogenic pollution under CSIR Network Project)
 HUSSAINSAGAR LAKE – Water and Sediment samples collected on January 6, 2004

At the Surface

Sample No.	Dissolved Oxygen (mg/l)	COD (mg/l)	BOD (mg/l)	Total Nitrogen (mg/l)	Total Phosphorous (mg/l)
H1	4.8	42	8.5	6	0.68
H2	7.5	74	12	12	0.72
H3	9.3	122	20	19	0.8
H3A	8.2	96	20	17	0.98
H4	9.4	149	30	16	0.98
H5	5.4	64	8.5	11	0.8
H6	3.1	58	8.5	12	0.82
H7	5.2	58	8.5	11	0.94
H8	6.1	96	15	19	0.98
H9	6.1	48	8.5	14	0.51
H10	8.2	53	8.5	14	0.62
H11	5.1	69	16	17	0.53

4-5 m Depth

Sample No.	Dissolved Oxygen (mg/l)	COD (mg/l)	BOD (mg/l)	Total Nitrogen (mg/l)	Total Phosphorous (mg/l)
H-7-I	4.2	58	<10	13	0.8
H-10-I	3.2	58	12	16	0.6

More than 5m Depth

Sample No.	Dissolved Oxygen (mg/l)	COD (mg/l)	BOD (mg/l)	Total Nitrogen (mg/l)	Total Phosphorous (mg/l)
H2-D	3.2	90	20	16	0.51
H3-D	5.2	128	25	12	0.51
H3A-D	3.2	112	25	19	0.74
H4-D	1.2	165	30	17	0.68
H5-D	3.2	69	8.5	15	0.51
H6-D	2.2	58	8.5	14	0.44
H7-D	4.2	64	8.5	14	0.68
H8-D	4.2	74	12	19	0.68
H9-D	4.2	58	8.5	13	0.33
H10-D	5.2	69	15	13	0.51
H11-D	3.2	85	20	21	0.48

No Sediment on January 6, Sampling.

ENVIRONMENTAL HYDROLOGY GROUP
NATIONAL GEOPHYSICAL RESEARCH INSTITUTE
(Activity: (iv) Anthropogenic pollution under CSIR Network Project)
HUSSAINSAGAR LAKE – Water and Sediment samples collected on April 5, 2004

At the Surface

Sample No.	Dissolved Oxygen (mg/l)	COD (mg/l)	BOD (mg/l)	Total Nitrogen (mg/l)	Total Phosphorous (mg/l)
H1	0.6	64	<10	17.3	1.81
H2	0.4	101	27	6.3	1.44
H3	0	101	29	5.9	2.24
H3A	1.3	80	18	5.0	3.21
H4	0.7	85	<10	5.9	2.93
H5	1.3	75	<10	1.8	0.94
H6	1.7	69	<10	1.7	1.46
H7	1.9	69	<10	2.0	2.23
H8	3.2	59	<10	2.0	2.41
H9	2.0	64	<10	1.3	1.86
H10	1.7	59	<10	2.5	2.21
H11	2.6	64	<10	1.3	1.96

4-5 m Depth

Sample No.	Dissolved Oxygen (mg/l)	COD (mg/l)	BOD (mg/l)	Total Nitrogen (mg/l)	Total Phosphorous (mg/l)
H-7-1	1.9	69	<10	1.9	2.46
H-10-1	2.1	64	<10	2.2	2.60

More than 5m Depth

Sample No.	Dissolved Oxygen (mg/l)	COD (mg/l)	BOD (mg/l)	Total Nitrogen (mg/l)	Total Phosphorous (mg/l)
H2-D	1.3	85	14	3.7	1.63
H3-D	1.2	91	30	3.9	2.68
H3A-D	0.7	91	21	4.2	3.66
H4-D	0	155	39	1.4	2.93
H5-D	1.8	107	18	1.3	1.43
H6-D	2.0	69	<10	1.2	1.47
H7-D	0.7	69	<10	3.0	2.26
H8-D	1.5	69	<10	1.7	2.79
H9-D	2.5	64	<10	1.8	1.92
H10-D	2.6	80	<10	1.9	2.68
H11-D	1.9	85	<10	2.2	1.99

No Sediment sample could be collected due to on April 5, Sampling.

ENVIRONMENTAL HYDROLOGY GROUP
NATIONAL GEOPHYSICAL RESEARCH INSTITUTE
(Activity: (iv) Anthropogenic pollution under CSIR Network Project)
HUSSAINSAGAR LAKE – Water and Sediment samples collected on June 8, 2004

At the Surface

Sample No.	Dissolved Oxygen (mg/l)	COD (mg/l)	BOD (mg/l)	Total Nitrogen (mg/l)	Total Phosphorous (mg/l)
H1	4.0	56	<10	1.0	0.56
H2	6.4	82	15	0.8	0.66
H3	9.2	98	10	0.6	0.71
H3A	5.5	78	<10	0.2	0.82
H4	9.5	76	<10	0.2	0.56
H5	11.3	76	20	0.3	0.98
H6	9.9	76	15	0.3	0.98
H7	7.2	62	<10	0.7	0.82
H8	7.7	56	15	0.62	0.66
H9	10.5	62	<10	0.11	0.42
H10	8.0	75	12	0.12	0.56
H11	8.3	75	18	0.40	0.56

4-5 m Depth

Sample No.	Dissolved Oxygen (mg/l)	COD (mg/l)	BOD (mg/l)	Total Nitrogen (mg/l)	Total Phosphorous (mg/l)
H-1	4.3	82	<10	0.3	0.98
H-10-1	5.2	82	25	0.36	0.42

More than 5m Depth

Sample No.	Dissolved Oxygen (mg/l)	COD (mg/l)	BOD (mg/l)	Total Nitrogen (mg/l)	Total Phosphorous (mg/l)
H1-D	3.4	91	15	0.5	0.66
H2-D	5.6	105	18	0.15	0.66
H3A-D	1.9	86	50	1.8	0.98
H4-D	1.6	101	25	1.5	0.56
H5-D	5.4	91	20	0.75	0.86
H5-D	6.7	76	20	0.6	0.66
H7-D	4.2	76	<10	0.27	0.82
H8-D	5.5	62	18	0.35	0.56
H9-D	5.6	76	20	0.45	0.56
H10-D	4.3	82	32	0.11	0.42
H11-D	4.5	95	32	0.32	0.86

Sediment g/kg

Sample No.	Total Nitrogen	Total Phosphorous
H1	1.2	24
H2	6	32
H3	7	36
H3A	6	34
H4	4	26
HX	9	36

WATER QUALITY ANALYSES -HUSSAINSAGAR CATCHMENT
Surface water-All Values in mg/l except pH
AUGUST, 2003

Sample No.	pH	TDS	Chloride	Sulfate	Nitrate as N	Bi-Carbonate	Fluoride	Sodium	Potassium	Calcium	Magnesium	Total Hardness	SAR
HSW-1	7.41	1024	250	59	55.25	180	1.73	130	20	96	63	500	0.89
HSW-2	7.88	864	200	57	29.5	230	1.45	99	20	80	58	440	0.73
HSW-3	7.93	941	260	50	39.25	180	1.39	119	19	104	49	460	0.85
HSW-4	7.56	1043	290	60	41	190	1.17	100	20	104	78	580	0.64
HSW-5	7.26	931	240	60	45.25	160	1.45	105	20	88	63	480	0.74
HSW-6	7.49	1489	440	104	39	300	1.05	173	30	123	107	760	0.96
HSW-7	8.09	858	250	64	9.25	220	1.22	80	18	112	49	480	0.56
HSW-8	8.45	896	270	52	19.5	170	1.31	94	17	128	39	480	0.66
HSW-9	7.86	2470	820	430	14.6	270	1.54	535	52	160	78	720	3.06
HSW-10	7.01	1120	480	117	1.5	60	5	236	39	80	29	320	2.03
HSW-11	7.76	896	220	106	24.25	180	0.98	167	19	64	39	320	1.4
HSW-12	8.07	736	140	88	24.7	190	0.86	109	18	43	49	320	0.93
HSW-13	7.8	829	180	62	56.13	120	0.83	161	20	52	49	280	1.48
HSW-14	8.37	858	200	120	4.91	220	1.1	145	17	64	44	340	1.21
HSW-15	7.56	698	140	55	42	130	0.52	97	15	48	49	320	0.83
HSW-16	8.29	580	100	70	13.15	180	0.47	75	12	32	49	280	0.69
HSW-17	8.18	321	60	52	3.26	90	0.25	38	9	16	29	160	0.46
HSW-18	7.61	731	160	72	38.1	130	0.66	145	17	43	29	240	1.44
HSW-19	7.81	878	200	70	31.15	210	1.18	127	14	80	49	400	0.97
HSW-20	7.1	1023	260	120	42.65	150	1	185	20	72	49	380	1.46
HSW-21	8.06	671	150	44	33.95	140	0.52	87	17	56	44	320	0.75
HSW-22	8.4	392	80	32	3.02	120	0.65	46	8	40	24	200	0.5
HSW-23	8.07	440	90	30	5.21	160	0.43	34	10	56	29	260	0.32
HSW-24	8.15	394	90	32	2.72	130	0.62	28	8	32	39	240	0.28
HSW-25	8.2	989	270	86	35.43	170	0.97	156	16	80	53	420	1.17

WATER QUALITY ANALYSES -HUSSAINSAGAR CATCHMENT
Surface water-All Values in mg/l except pH
AUGUST, 2003

Sample No.	pH	TDS	Chloride	Sulfate	Nitrate as N	Bi-Carbonate	Fluoride	Sodium	Potassium	Calcium	Magnesium	Total Hardness	SAR
H-1	8.6	844	180	116	4.39	220	0.87	122	16	56	58	380	0.96
H-2S	8.6	812	210	110	4.44	160	0.83	139	15	64	39	320	1.19
H-2D	8.55	834	180	122	3.19	230	0.89	119	16	80	44	380	0.94
H-3A-S	8.5	808	210	112	7.69	160	0.76	129	14	56	49	340	1.07
H-3A-D	8.53	818	200	115	7.24	160	0.84	160	14	32	49	280	1.47
H-3S	8.29	608	120	74	12.6	170	0.6	104	10	48	29	240	1.03
H-3D	8.25	669	160	84	11.49	160	0.63	126	11	32	39	240	1.25
H-4S	8.55	816	200	126	4.36	160	0.82	122	15	48	58	360	0.99
H-4D	8.41	817	130	140	4.85	190	0.9	159	15	32	49	280	1.46
H-5S	8.53	840	180	110	4.93	220	0.87	149	15	48	49	320	1.28
H-5D	8.21	867	200	170	1.6	200	0.98	177	16	48	39	280	1.62
H-6S	8.57	849	180	120	6.36	210	0.91	133	16	48	58	360	1.08
H-6D	8.6	852	200	124	6.32	180	0.89	171	17	32	49	280	1.57
H-7S	8.51	846	180	117	4.82	220	0.85	168	18	32	49	280	1.54
H-7D	8.55	845	210	120	6.07	170	0.92	138	20	80	34	340	1.15
H-8S	8.58	850	210	116	5.32	180	0.88	133	17	80	39	360	1.08
H-8D	8.63	852	210	106	6.13	170	0.91	130	8	80	44	380	1.02
H-9S	8.44	857	220	116	6.14	190	0.94	112	10	80	53	420	0.84
H-9D	8.66	856	220	116	6.2	170	0.92	140	8	80	39	360	1.13
H-10S	8.56	852	220	120	5.2	160	0.93	143	16	80	34	340	1.19
H-10D	8.58	851	220	118	5.76	160	0.91	134	16	80	39	360	1.09
H-11S	8.55	855	190	105	4.66	220	0.88	136	15	80	39	360	1.1
H-11D	8.58	855	210	110	5.36	190	0.95	126	16	80	44	380	0.99

WATER QUALITY ANALYSES -HUSSAINSAGAR CATCHMENT

Groundwater-All Values in mg/l except pH

AUGUST, 2003

BanjaraHills

Sample No.	PH	TDS	Chloride	Sulfate	Nitrate as N	Bi-Carbonate	Fluoride	Sodium	Potassium	Calcium	Magnesium	Total Hardness	SAR
HB-1	7.82	755	180	73	5.54	60	0.62	124	5	32	58	320	1.07
HB-2	8.26	525	100	36	4.12	210	0.89	75	8	32	39	240	0.74
HB-3	8.2	506	100	38	12.36	160	1.46	71	3	16	49	240	0.7
HB-4	8.28	<u>749</u>	110	60	<u>37.35</u>	220	0.39	130	22	80	19	280	1.2
HB-5	8.4	461	100	32	4.97	140	1.82	92	3	32	19	160	1.12
HB-6	7.8	736	180	112	13.93	140	0.85	153	7	64	19	240	1.52
HB-7	7.7	640	120	100	14.2	170	1.23	120	4	48	29	240	1.19
HB-8	7.85	467	100	62	14.74	100	1.08	92	6	32	19	160	1.12
HB-9	8.07	666	120	40	13.1	250	0.64	123	14	64	19	240	1.23
HB-10	7.74	595	140	84	1.37	170	1.17	121	5	32	29	200	1.32
HS-10	8.11	<u>736</u>	170	80	<u>25.5</u>	160	0.43	77	11	48	68	440	0.59
HY-17	7.77	<u>708</u>	160	80	<u>29.1</u>	130	0.61	80	7	72	24	280	1.14

Kukatpally

Sample No.	PH	TDS	Chloride	Sulfate	Nitrate as N	Bi-Carbonate	Fluoride	Sodium	Potassium	Calcium	Magnesium	Total Hardness	SAR
HK-1	8.2	<u>1408</u>	400	82	14.85	390	1.95	371	4	24	58	300	3.3
HK-2	7.98	<u>934</u>	250	65	<u>44.35</u>	140	0.58	135	3	48	78	440	0.99
HK-3	7.6	922	340	150	12.89	20	0.74	48	3	128	73	620	0.3
HK-4	8.01	685	240	68	5.54	100	0.32	54	3	56	68	420	0.41
HK-5	7.61	<u>1088</u>	360	80	<u>35.55</u>	120	0.25	163	3	96	63	500	1.12
HK-6	7.91	934	240	78	21.06	230	1.47	144	3	56	68	420	1.08
HK-7	7.77	685	160	60	28.25	140	0.69	108	4	64	34	300	0.96
HK-8	7.96	<u>800</u>	160	59	<u>47.85</u>	160	1.63	105	3	80	49	400	0.81
HK-9	7.7	<u>1594</u>	410	320	<u>85.9</u>	20	1.02	254	4	120	97	700	1.48
HK-10	8.02	813	240	90	3.7	190	0.96	155	4	56	39	300	1.37
HK-11	7.78	806	230	120	7.3	150	0.85	68	6	104	53	480	0.48
HY-7	7.49	547	80	66	13.79	190	1.38	66	6	64	19	240	0.85
HY-8	7.97	595	120	86	<u>25.83</u>	100	1.95	86	6	48	49	320	0.56

BH-5	7.71	1830	630	400	22.6	40	0.48	46	4	240	180	1340	0.19
BH-7	8.14	1882	700	190	3.45	270	0.89	414	3	32	122	580	2.64
BH-4	8.04	480	100	40	8.15	160	0.73	24	6	64	39	320	0.21
BH-3	7.99	570	150	70	2.95	150	0.76	76	3	48	39	280	0.7
HY-9	8.11	505	100	60	7.88	160	1.02	60	6	32	29	200	0.96
HY-10	7.64	521	100	70	12.73	140	1.19	70	6	64	19	240	0.75
BH-6	7.92	845	180	260	2.4	130	1.05	130	3	64	53	380	1.03
BH-1	8.19	1581	530	180	7.7	270	1.1	360	3	56	78	460	2.58
BH-2	7.96	1088	330	150	2.1	220	1.17	163	3	80	73	500	1.12
BH-8	7.8	1107	360	130	3.85	210	1	114	5	176	44	620	0.7
HY-14	7.79	874	200	120	33.45	150	0.42	120	6	64	68	440	0.81
HY-13	7.84	765	180	80	38.1	110	0.63	80	6	32	58	320	1.09
HY-15	7.98	428	90	40	37.3	20	1.45	40	6	24	29	180	0.79
BH-41	8.11	648	170	82	7.35	150	1.03	48	6	40	73	400	0.37
BH-9	7.6	813	170	107	17.6	210	0.92	109	4	48	68	400	0.84
BH-27	7.8	947	260	160	6.55	170	1	175	5	32	68	360	1.42
BH-40	8.56	317	30	17	4	150	1.57	11	6	32	34	220	0.11
BH-10	8.29	493	90	34	1.71	210	1.14	21	3	32	63	340	0.18
BH-28	7.4	480	40	60	9.67	210	1.18	62	1	16	49	240	0.61

Hasmathpet

Sample No.	pH	TDS	Chloride	Sulfate	Nitrate as N	Bi-Carbonate	Fluoride	Sodium	Potassium	Calcium	Magnesium	Total Hardness	SAR
BH-11	8.26	582	110	38	14.75	200	0.81	90	3	16	53	250	0.86
BH-12	8.14	806	170	92	23.35	200	1.36	134	4	24	68	340	1.12
BH-13	8.4	877	250	45	1.98	250	2.55	178	4	24	58	300	1.58
BH-14	8.03	1178	410	140	13.68	140	0.93	177	4	48	102	540	1.17
BH-15	7.87	608	160	66	21.88	100	0.58	34	1	72	49	180	0.35
BH-16	7.9	621	130	72	21	150	0.41	21	1	96	49	180	0.15
BH-17	7.92	3187	1360	430	20.58	40	1.85	447	3	112	306	1540	1.75
BH-18	7.4	3219	710	500	<u>259.3</u>	60	0.34	42	7	200	272	2440	0.13
BH-19	7.74	1126	260	115	<u>45.53</u>	220	0.47	130	5	144	58	600	0.82
BH-20	7.4	1107	280	90	<u>11.53</u>	330	2.15	160	5	112	58	520	1.08

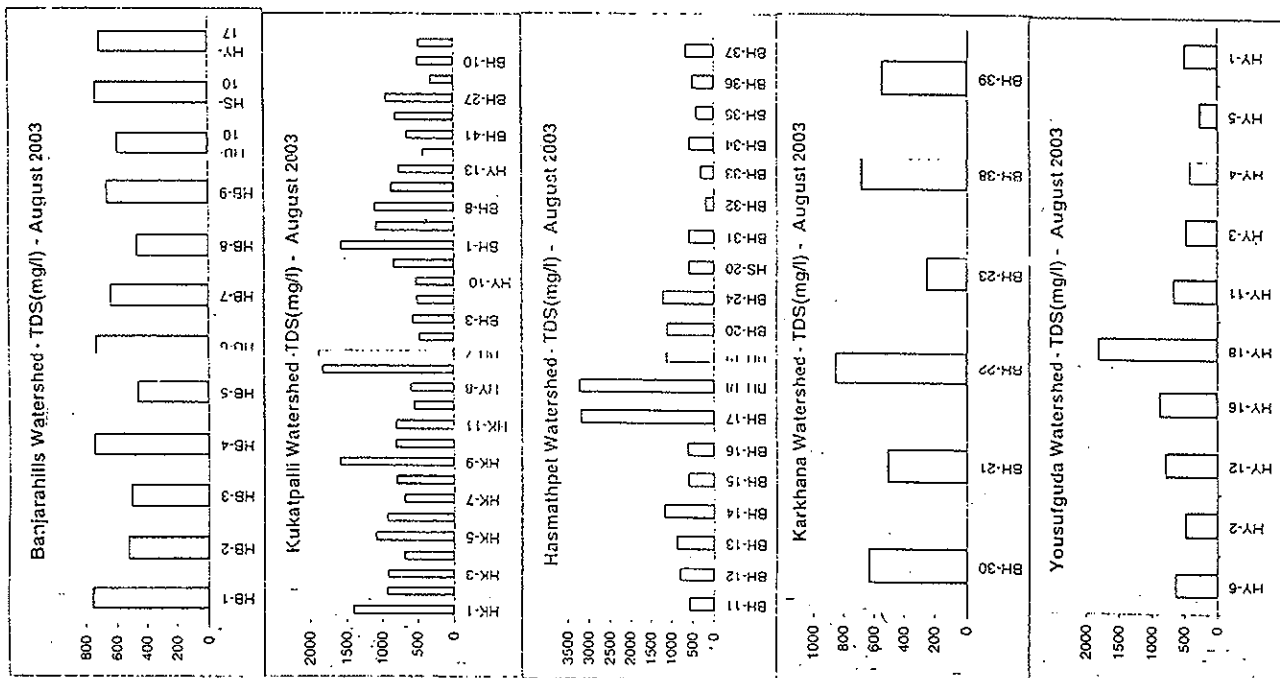
BH-24	8.18	1216	380	90	11.07	270	1.65	254	5	32	78	400	1.95
HS-20	8.22	602	170	31	8.8	160	0.5	49	7	32	68	360	0.4
BH-31	7.73	603	160	70	25.25	80	1.42	68	6	64	39	320	0.58
BH-32	7.76	202	30	35	0.7	80	0.3	17	7	32	10	120	0.24
BH-33	8.26	307	70	49	7.75	60	1.26	25	6	56	10	180	0.29
BH-34	7.8	580	150	94	14.7	90	0.95	42	6	64	49	360	0.34
BH-35	7.96	420	90	50	13.3	100	1.48	11	6	72	29	300	0.1
BH-36	7.81	517	150	36	0.4	150	1.73	73	8	72	15	240	0.72
BH-37	7.82	675	190	110	13.75	90	2.15	76	6	72	44	360	0.61

Karkana

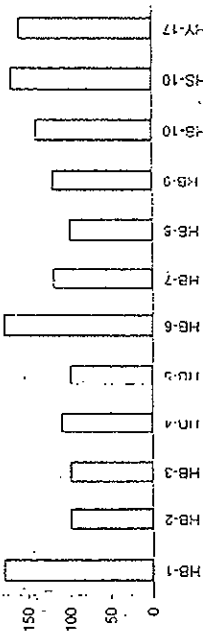
Sample No.	pH	TDS	Chloride	Sulfate	Nitrate as N	Bi-Carbonate	Fluoride	Sodium	Potassium	Calcium	Magnesium	Total Hardness	SAR
BH-30	7.69	635	180	100	13.5	90	1.05	25	6	80	58	440	0.18
BH-21	8.13	512	120	40	9.01	150	1.93	55	4	16	58	280	0.51
BH-22	8.28	858	140	75	11.35	340	2.1	162	4	16	68	320	1.39
BH-23	8.12	256	40	20	10.2	80	0.72	36	3	16	19	120	0.51
BH-38	8.03	685	190	80	14.3	130	0.76	15	6	64	83	500	0.1
BH-39	8.08	551	110	70	12.18	150	1.59	40	6	48	53	340	0.33

Yousufguda

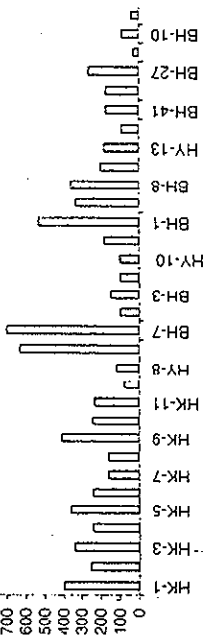
Sample No.	pH	TDS	Chloride	Sulfate	Nitrate as N	Bi-Carbonate	Fluoride	Sodium	Potassium	Calcium	Magnesium	Total Hardness	SAR
HY-6	8.15	535	120	70	26.4	150	1.33	70	6	48	39	280	0.9
HY-2	7.95	485	120	50	19.5	80	1.43	35	6	72	29	300	0.31
HY-12	7.76	785	180	92	29.75	150	0.45	92	6	32	58	320	1.13
HY-16	7.87	881	190	140	27.1	170	1.53	140	6	56	58	380	1.11
HY-13	7.51	1816	610	390	26.7	50	0.45	390	6	192	126	1000	0.95
HY-11	8.11	662	120	84	24.08	170	2	84	6	64	10	200	1.57
HY-3	8.25	482	120	55	0.94	140	0.98	55	6	40	34	240	0.61
HY-4	8.07	426	80	68	10.29	110	1.06	68	6	56	29	260	0.31
HY-5	8.36	260	50	46	4.93	40	0.51	46	6	32	19	160	0.21
HY-1	8.51	503	80	90	2.56	150	1.07	40	7	80	24	300	0.36



Banjarahills Watershed - Chloride(mg/l) - August 2003



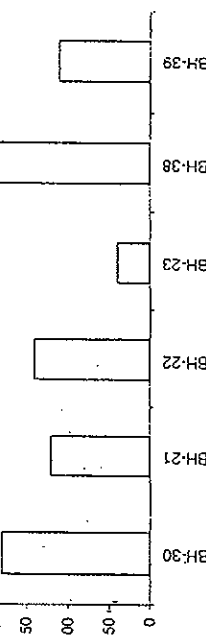
Kukatpalli Watershed - Chloride(mg/l) - August 2003



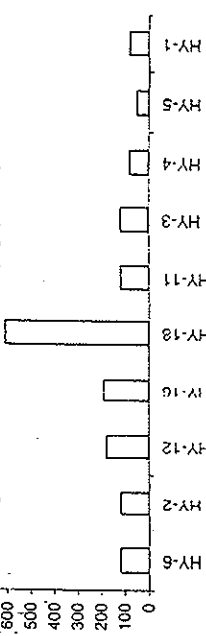
Hasmathpet Watershed - Chloride(mg/l) - August 2003



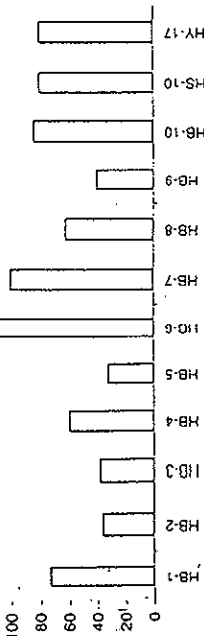
Karkhana Watershed - Chloride(mg/l) - August 2003



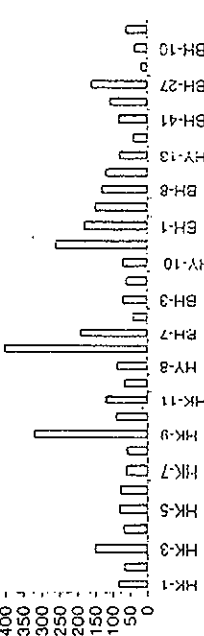
Yousufguda Watershed - Chloride(mg/l) - August 2003



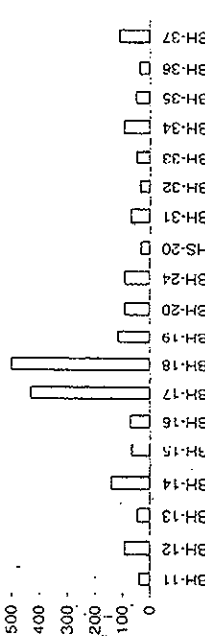
Banjarahills Watershed - Sulfate(mg/l) - August 2003



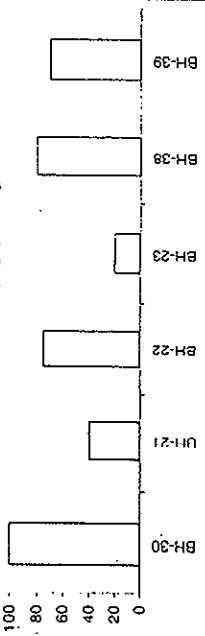
Kukatpalli Watershed - Sulfate(mg/l) - August 2003



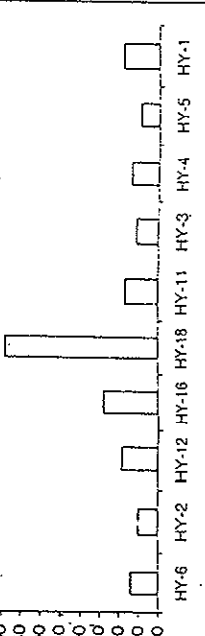
Hasmathpet Watershed - Sulfate(mg/l) - August 2003

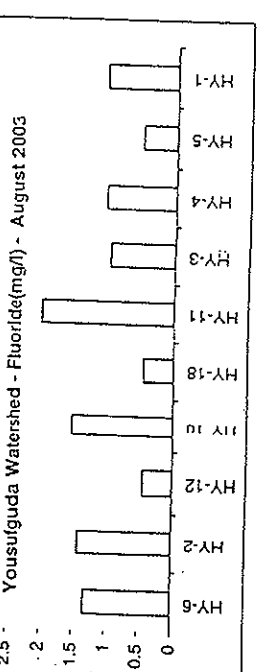
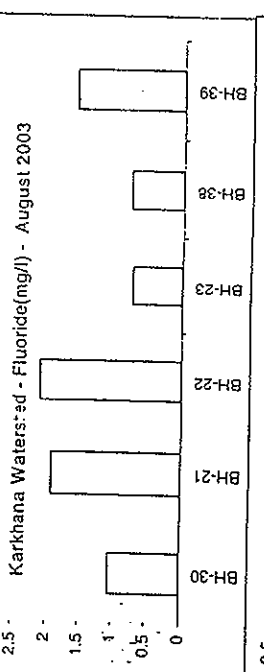
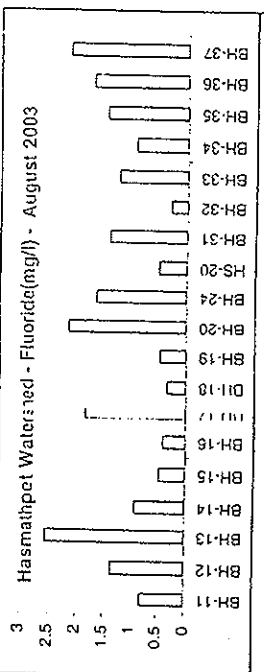
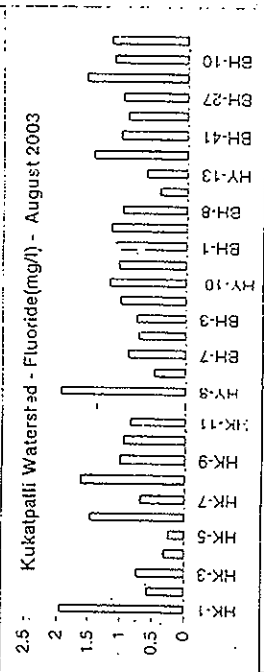
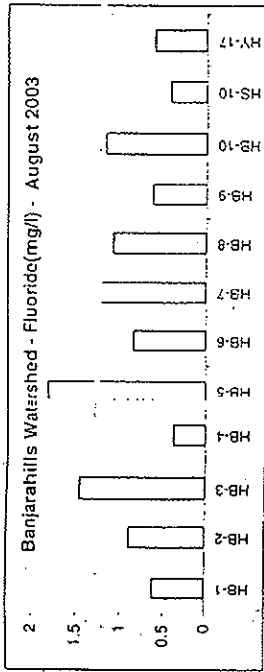
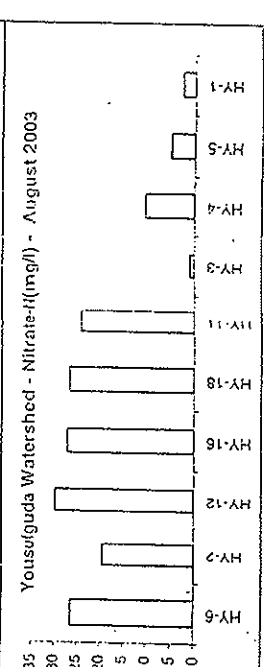
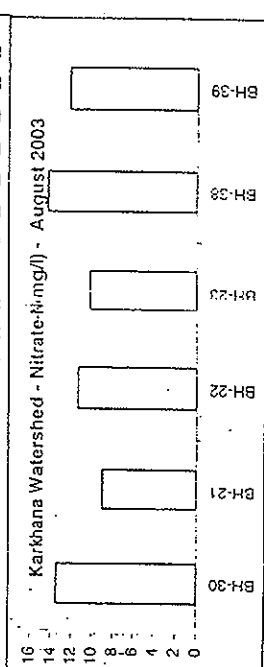
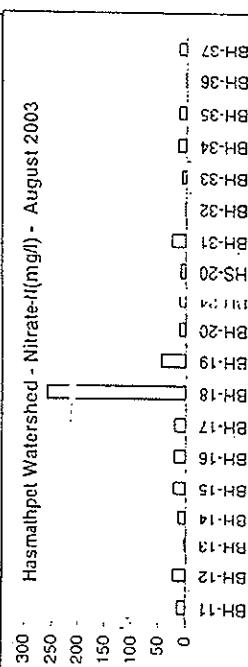
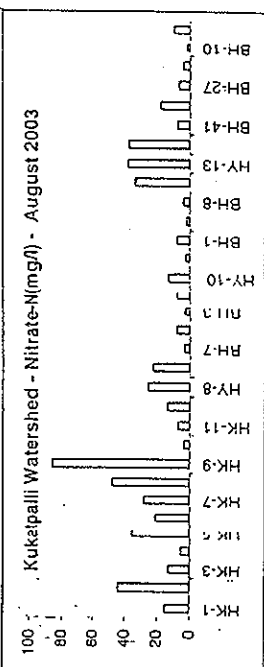
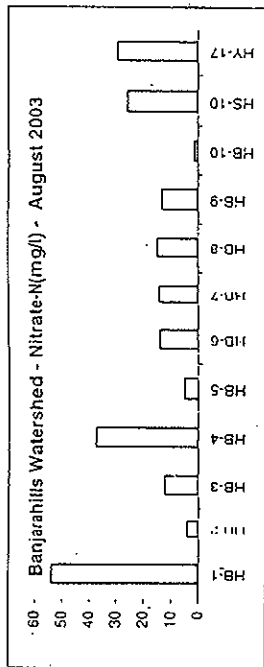


Karkhana Watershed - Sulfate(mg/l) - August 2003



Yousufguda Watershed - Sulfate(mg/l) - August 2003





ENVIRONMENTAL HYDROLOGY GROUP
NATIONAL GEOGRAPHICAL RESEARCH INSTITUTE
 (Activity: (iv) Anthropogenic pollution under CSIR Network Project)
HUSSAINSAGAR LAKE - Water and Sediment samples collected on August 8, 2004

At the Surface

Sample No.	Dissolved Oxygen (mg/l)	COD (mg/l)	BOD (mg/l)	Total Nitrogen (mg/l)	Total Phosphorous (mg/l)
H1	3.4	64	8.4	0.7	0.97
H2	3.8	91	8.6	0.3	0.86
H3	3.1	80	24.6	0.5	0.64
H3A	3.8	117	40.3	0.15	0.97
H4	0.7	133	39.6	18.5	0.44
H5	4.7	80	30.4	0.4	0.64
H6	3.5	69	14.6	0.3	0.86
H7	2.6	75	14.2	0.2	0.97
H8	3.4	75	13.3	0.2	0.44
H9	4.0	80	14.2	0.3	0.64
H10	3.8	10.6	10.6	0.2	0.56
H11	3.6	59	9.6	0.15	0.64

4-5 m Depth

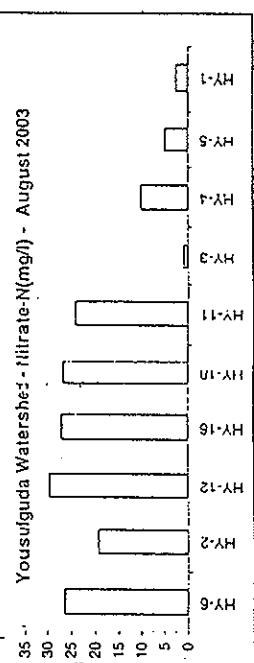
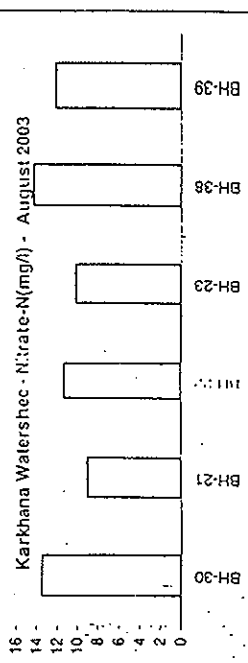
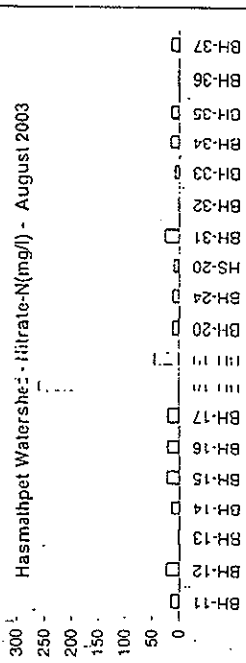
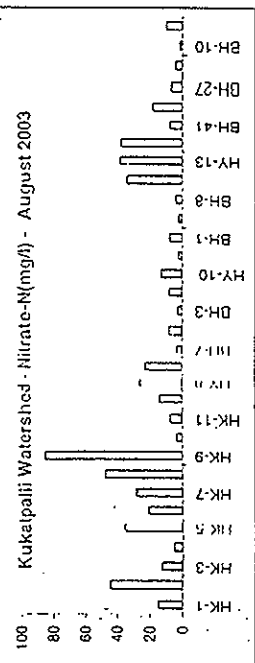
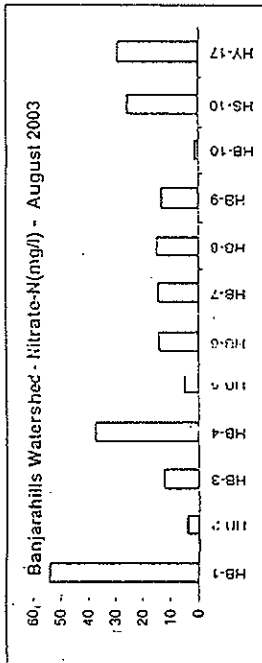
Sample No.	Dissolved Oxygen (mg/l)	COD (mg/l)	BOD (mg/l)	Total Nitrogen (mg/l)	Total Phosphorous (mg/l)
H1-K1	3.2	96	15.6	0.2	0.86
H1-K1	3.3	96	24.3	0.25	0.56

More than 5m Depth

Sample No.	Dissolved Oxygen (mg/l)	COD (mg/l)	BOD (mg/l)	Total Nitrogen (mg/l)	Total Phosphorous (mg/l)
H2-D	2.4	245	33.6	0.6	0.86
H3-D	1.9	139	42.9	1.0	0.9
H3A-D	2.2	379	86.4	0.7	0.86
H4-D	1.4	240	50.6	8.5	0.56
H5-D	2.6	619	166.3	1.2	0.72
H6-D	3.3	352	91.4	0.5	0.86
H7-D	3.4	91	15.4	0.3	0.97
H8-D	3.9	112	24.6	0.2	0.56
H9-D	4	85	16.8	0.2	0.72
H10-D	2.4	181	56.2	0.9	0.64
H11-D	3.4	293	79.4	0.2	79.4

Sediment g/kg

Sample No.	Total Nitrogen	Total Phosphorous
H1	103.8	24.0
H2	84.66	27.97
H3	68.71	51.86
H3A	98.6	21.89
H4	156.3	33.98



**ANDHRA PRADESH POLLUTION CONTROL BOARD**

HUDA Complex, II Floor, Maitrivanam, S.R.Nagar, Hyderabad – 038

CENTRAL LABORATORYAnalysis Report

Reg. No. SR/02/APPCB/HO/R00/LAB/2004 Collected by: APPCB & HUDA
 Collected on: 16.06.2004 Received on: 16.06.2004
 Source: Sludge samples collected from the inlets of Hussain sagar lake, Hyderabad

S.No.	Parameter (s)	Inlet 1: Near opposite existing STP	Inlet 2: Near peoples plaza	Inlet 3: Near Necklace Road	Inlet 4: Near proposed Rock garden	Inlet 5: Near opposite old Deccan Continental	Standards	
							Hazardous Wastes	Irrigation purpose
1.	Moisture content at 105°C (% w/w)	38.8	55.96	30.99	26.02	46.75	--	--
2.	pH (20% aqueous solution)	8.16	8.33	8.17	5.03	8.35	<2.0 or >12.5	6.5 to 8.5
3.	Electrical Conductivity (20% aqueous solution) (µs/cm)	313.0	325.0	355.0	533.0	346.0	--	<4000.0
4.	Volatile Solids at 550°C (% w/w)	7.73	11.16	4.72	4.27	12.69	--	--
5.	Fixed Solids at 550°C (% w/w)	92.27	88.84	95.28	95.73	87.3	--	--
6.	TOC (Total Organic Carbon) (% w/w)	2.1	4.1	1.4	1.17	4.2	--	--
7.	Nitrate as N (mg/kg)	15.0	15.0	15.0	20.0	20.0	--	--
8.	Phosphate as P (mg/kg)	778.0	1538.0	742.0	1610.0	2440.0	20000.0	--
9.	Percent Sodium (% Na)	12.6	8.0	6.9	10.0	6.8	--	60.0 (IS 2296-1963)
10.	Sodium Absorption Ratio	2.68	1.76	1.14	1.42	1.28	--	26.0 (IS11824- 1986)
11.	Total Kjeldahl Nitrogen as N (mg/kg)	3360.0	4480.0	3360.0	BDL	2240.0	20000.0	--
12.	Potassium as K (mg/kg)	250.0	200.0	100.0	100.0	200.0	--	--
Metal concentrations as per Hazardous Wastes (Management & Handling) Amendment Rules, 2003 in mg/kg:								
13.	Total Chromium as Cr	BDL	31.1	17.2	2.4	33.6	5000.0	--
14.	Iron as Fe	4400	35000	15780	11620	36725	--	--
15.	Lead (Pb) as Pb	19.1	79.4	37.5	16.8	118	5000.0	--
16.	Nickel as Ni	35.2	62.0	31.6	17.1	58.6	5000.0	--
17.	Cadmium as Cd	BDL	BDL	BDL	BDL	BDL	50.0	--
18.	Copper as Cu	10.7	83.8	49.6	16.9	95	5000.0	--
19.	Zinc as Zn	186	251	1.6	0.37	252	20000.0	--
20.	Manganese as Mn	328	525	179	105	393	--	--
Metal concentrations as per USEPA - Toxicity Characteristics Leaching Procedure (TCLP) In mg/L :								
21.	Total Chromium as Cr	BDL	BDL	BDL	BDL	BDL	5.0	--
22.	Iron as Fe	4.13	2.41	2.4	2.29	1.51	--	--
23.	Lead (Pb) as Pb	0.17	0.32	0.19	0.15	0.24	5.0	--
24.	Nickel as Ni	0.18	0.22	0.17	0.11	0.12	5.0	--
25.	Cadmium as Cd	BDL	BDL	BDL	BDL	BDL	1.0	--
26.	Copper as Cu	BDL	BDL	BDL	BDL	BDL	5.0	--
27.	Zinc as Zn	2.6	0.68	1.21	0.23	0.47	500.0	--
28.	Manganese as Mn	7.68	7.62	5.44	4.0	6.69	--	--

Remarks: 1. Results related to sample as received.
 2. Results reported on dry basis.
 3. These sludge wastes are non-hazardous with respect to the above parameters.

A. P. Sankar
 16/7/04
 Senior Environmental Scientist
 Senior Environmental Scientist
 A.P. Pollution Control Board
 HUDA Complex, S.R. Nagar,
 HYDERABAD-500 038.

Water quality data for different seasons during 2002 in Hussainsagar Lake

S No.	Important characteristics of water	Lake	During summer	During rainy season	During winter	CPCB Outdoor Bathing
II Mid layer						
1	Dissolved oxygen mg/l		9.5	0.38	2.36	5
2	BOD mg/l		36	44	60	3
3	Colour (Platinum cobalt units)		100	120	100	300
4	PH		7.4	7.3	7.4	6.5-8.5
5	Arsenic mg/l		0.0013	BDL	BDL	0.2
6	Fluorides mg/l		0.78	1.03	0.86	1.5
7	Total Coliforms MPN/100ml		≥1600	≥1600	≥1600	500
II Mid layer						
1	Dissolved Oxygen mg/l		0.4	Nil	2	5
2	BOD mg/l		72	72	50	3
3	Colour (Platinum Cobalt units)		130	130	150	300
4	PH		7.4	7.1	7.3	6.5-8.5
5	Arsenic mg/l		BDL	BDL	BDL	0.2
6	Fluorides mg/l		1	1	0.8	1.5
7	Total Coliforms MPN/100ml		≥1600	≥1600	≥1600	500
III At Bottom of Lake						
1	Dissolved Oxygen mg/l		0.3	Nil	1.62	5
2	BOD mg/l		65	100	76	3
3	Colour (Platinum Cobalt units)		200	140	120	300
4	Ph		7.4	7.1	7.4	6.5-8.5
5	Arsenic mg/l		0.0048	BDL	BDL	0.2
6	Fluorides mg/l		0.8	1.06	0.74	1.5
7	Total Coliforms MPN/100ml		≥1600	≥1600	≥1600	500

Water quality data in different seasons

Quantity and quality of wastewater flow into Hussainsagar lake from five Nallahs

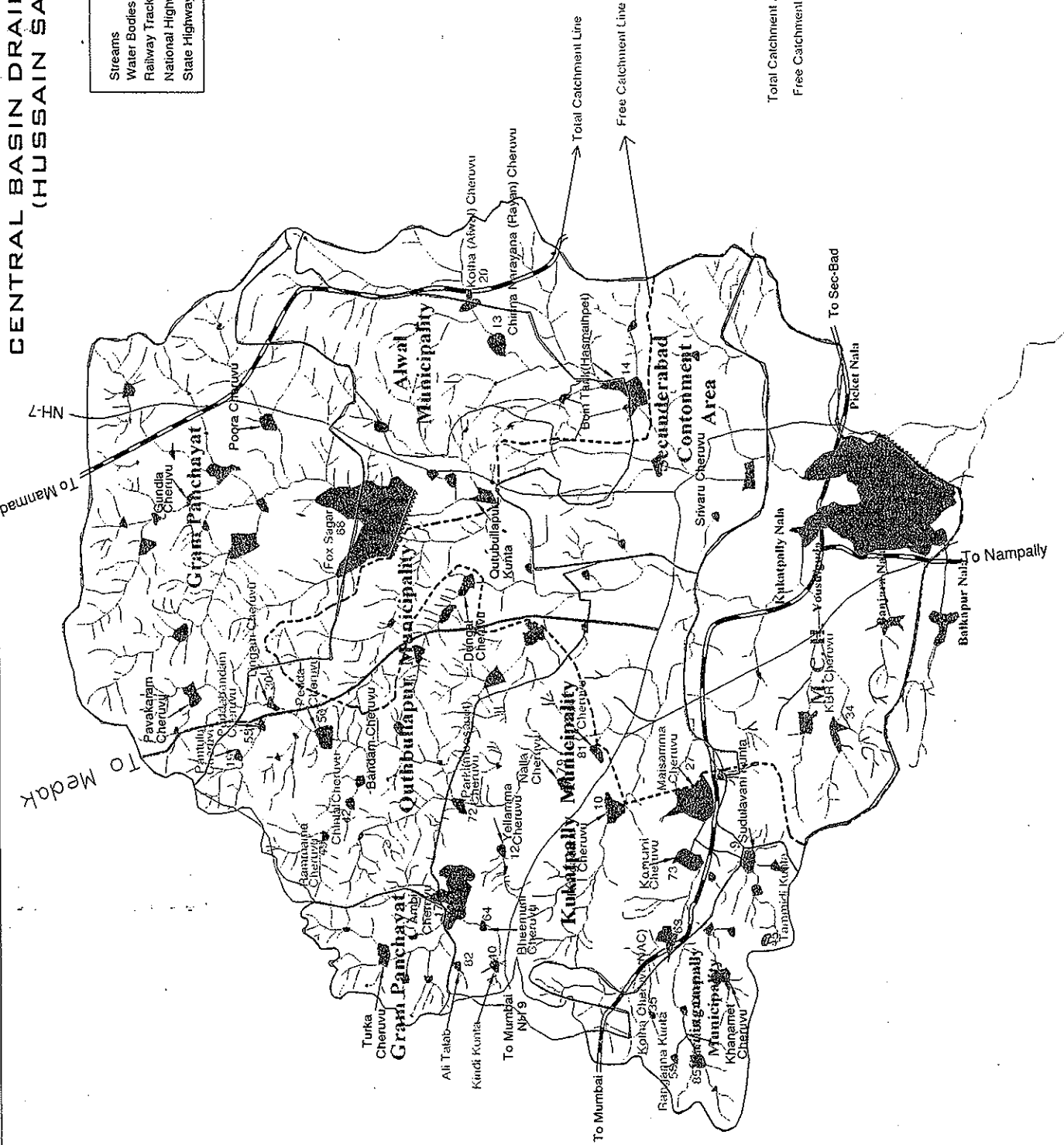
Name of Nallah	Waste-water Overflow into the Lake MLD	Phosphorous Load transported to Lake Kg/day		Nitrogen load transported to Lake Kg/day (TKN)		Annual Load of nutrients from DWF	
		Concentration mg/l	Total load in Kg/day	Concentration mg/l	Total load in Kg/day	Phosphorous as P Kg/annum	Nitrogen TKN Kg/annum
Kukatpally nallah	7	5.5	38.5	25	175	14052.5	63,875
Yousufguda nallah	1.7	4.5	7.65	25	42.5	2792.25	15512.5
Banjara nallah	7.8	4.5	35.1	25	195	12811.5	71175
Balkapur nallah	5.4	4.5	24.3	25	135	8869.5	49275
Picket nallah	7.07	4.5	31.815	25	175.25	11612.475	63966.25
Total Load	28.97		137.365		722.75	50138.225	2,63,803.75

Drainage Map of Hussainsagar lake

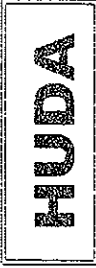
CENTRAL BASIN DRAINAGE PATTERN (HUSSAIN SAGAR)

LEGEND

- Streams
- Water Bodies
- Railway Track
- National Highways
- State Highways



Total Catchment Area 240 Sq. Km
Free Catchment Area 67 Sq. Km



RESTORATION OF HUSSAINSAGAR LAKE

