ENVIRONMENTAL STANDARDS

STANDARDS APPLICABLE TO THE COAL MINES

1) Air Quality – (i) Work zone –Standards for Coal Mines issued by MoEF, GSR-742 E dt. 25.09.2000
(ii) Residential category – National Ambient Air Quality standards issued by CPCB, GSR 176 dt. 02.04.1996.

2) Water Quality – (i) Mine discharge / Workshop / Colony effluents – Standards for Coal Mines issued by MoEF, GSR-742 E dt. 25.09.2000 and GSR-801 (E), EPA, 1986, dt.31.12.1993.
(ii) Ground Water – BIS 105000 : 1991
(iii) Surface Water – BIS 2296 : 1982

A. STANDARDS FOR COAL MINES (Stipulated by Ministry of Environment and Forests (MoEF), Vide Notification No. GSR 742(E), Dt: 25.09.2000)

I. AIR QUALITY STANDARDS:

(a) Standards

Pollutant	Time weighted Average	Concentration in Ambient Air	
		New Coal Mines (commenced after 25.09.2000)	Existing Coal Mines (commenced prior to 25.09.2000)
Suspended Particulates Matter (SPM)	Annual Average 24 hours	360 µg/m^3 500 µg/m^3	430 µg/m^3 600 µg/m^3
Respirable Particulate Matter (size less than 10 µm) (RPM)	Annual Average 24 hours	180 µg/m^3 250 µg/m^3	215 µg/m^3 300 µg/m^3
Sulphur Dioxide (SO_2)	Annual Average 24 hours	80 µg/m^3 120 µg/m^3	80 µg/m^3 120 µg/m^3
Oxides of Nitrogen as NO_2	Annual Average 24 hours	80 µg/m^3 120 µg/m^3	80 µg/m^3 120 µg/m^3

Micro Gram / Cubic meter (µg/m^3)

Note : -(i) Annual arithmatic mean of 24- hourly / 8- hourly values shall be met 92% of the time in a year. However, 8% of the time it may exceed but not on two consecutive days.

(ii) In case of residential or commercial or industrial place falls within 500 metres of any dust generating sources, the National Ambient Air Quality Standards shall be made applicable.

(b) Frequency

(1) Air quality monitoring at a frequency of once in a fortnight (24 hourly sampling) at the identified locations near the dust generating sources.
(2) As a result of monthly monitoring, if it is found that the concentration of the pollutants is less than the 50% of the specified standards for three consecutive months, then the sampling frequency may be shifted to two days in a quarter year.
(3) In case the value has exceeded the specified standards, the air quality sampling shall be done twice in a week. If the results of four consecutive weeks indicate that the concentration of pollutants is within the specified standards, then fortnightly monitoring may be reverted to.

II. EFFLUENT WATER QUALITY STANDARDS :

(a) Standards

pH	-- 5.5 to 9.0
Chemical Oxygen Demand (COD)	-- 250 mg/l
Total Suspended Solids (TSS)	-- 100 mg/l
	-- 200 mg/l (Land for irrigation)
Oil & Grease (O & G)	-- 10 mg/l

Note: Milligrams / litre (mg/l)

(b) Frequency

Monitoring of these parameters shall be done at a frequency of once in a fortnight.

All the 33 Parameters as given in Part-A of General Standards for discharge of Environmental Pollutants, GSR 801 (E) EPA 1993, prescribed by CPCB shall be monitored once in a year.

III. NOISE LEVEL STANDARDS:

(a) Standards

Time duration:	6.00 A.M.- 10.00 P.M.	10.00 P.M. - 6.00 A.M
Noise Level:	Leq 75 dB(A)	Leq 70 dB(A)

Note : decibel (dB)

(b) Frequency

Monitoring frequency for noise levels shall be once in a fortnight.

Occupational exposure limit of noise specified by Director General of Mines Safety (DGMS) shall be complied with by the coalmines.

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B. NATIONAL AMBIENT AIR QUALITY STANDARDS

Pollutants	Time-weighted average	Concentration in ambient air			Method of measurement
		Industrial Areas	Residential, Rural & other Areas	Sensitive Areas	
Sulphur Dioxide (SO_2)	Annual Average*	80 µg/m^3	60 µg/m^3	15 µg/m^3	-Improved West and Geake Method - Ultraviolet Fluorescence
	24 hours**	120 µg/m^3	80 µg/m^3	30 µg/m^3	
Oxides of Nitrogen as (NO_2)	Annual Average*	80 µg/m^3	60 µg/m^3	15 µg/m^3	-Jacob & Hochheiser Modified (Na-Arsenite) Method -Gas Phase Chemiluminescence
	24 hours**	120 µg/m^3	80 µg/m^3	30 µg/m^3	
Suspended Particulate Matter (SPM)	Annual Average*	360 µg/m^3	140 µg/m^3	70 µg/m^3	- High Volume Sampling, (Average flow rate not less than 1.1 m3/minute).
	24 hours**	500 µg/m^3	200 µg/m^3	100 µg/m^3	
Respirable Particulate Matter (RPM) (size less than 10 microns)	Annual Average*	120 µg/m^3	60 µg/m^3	50 µg/m^3	-Respirable particulate matter sampler
	24 hours**	150 µg/m^3	100 µg/m^3	75 µg/m^3	
Lead (Pb)	Annual Average*	1.0 µg/m^3	0.75 µg/m^3	0.50 µg/m^3	-ASS Method after Sampling using EPM 2000 or equivalent Filter paper
	24 hours**	1.5 µg/m^3	1.00 µg/m^3	0.75 µg/m^3	
Ammonia1	Annual Average*	0.1 mg/ m^3	0.1 mg/ m^3	0.1 mg/m^3	
	24 hours**	0.4 mg/ m^3	0.4 mg/m^3	0.4 mg/m^3	
CarbonMonoxide (CO)	8 hours**	5.0 mg/m^3	2.0 mg/m^3	1.0 mg/ m^3	- Non Dispersive Infra Red (NDIR) Spectroscopy
	1 hour	10.0 mg/m^3	4.0 mg/m^3	2.0 mg/m^3	

Note:
* Annual Arithmetic mean of minimum 104 measurements in a year taken twice a week 24 hourly at uniform interval.
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24 hourly/8 hourly values should be met 98% of the time in a year. However, 2% of the time, it may exceed but not on two consecutive days.

NOTE:

1. National Ambient Air Quality Standard: The levels of air quality with an adequate margin of safety, to protect the public health,, vegetation and property.
2. Whenever and wherever two consecutive values exceeds the limit specified above for the respective category, it would be considered adequate reason to institute regular/continuous monitoring and further investigations. [EPA Notification: GSR 176 (E), April 02, 1996]

(C) GENERAL STANDARDS* FOR DISCHARGE OF ENVIRONMENTAL POLLUTANTS

Part - A :

Effluents

S. No.	Parameter	Inland surface water	Public sewers	Land for irrigation	Marine/coastalareas
	2		3		
	.	(a)	(b)	(c)	(d)
1	Colour and odour	See 6 of Annexure-1I		See 6 of Annexure-1I	See 6 of Annexure-1I
2	Suspended solids mg/l, max.	100	600	200	(a) For process waste water (b) For cooling water effluent 10 per cent above total suspended matter of influent.
3	Particle size of suspended solids	shall pass 850 micron IS Sieve	-	-	(a) Floatable solids, solidsmax. 3 mm (b) Settleable solids, max 856 microns
4	pH value	5.5 to 9.0	5.5 to 9.0	5.5 to 9.0	5.5 to 9.0
5	Temperature	shall not exceed 5^{o}C above the receiving water temperature			shall not exceed 5oCabove the receiving water temperature
6	Oil and grease, mg/l max,	10	20	10	20
7	Total residual chlorine, mg/l max	1.0	-	-	1.0
8	Ammonical nitrogen (as N),mg/l, max.	50	50	-	50
9	Total kjeldahl nitrogen (as N);mg/l, max. mg/l, max.	100	-	-	100
10	Free ammonia (as NH3), mg/l,max.	5.0	-	-	5.0
11	Biochemical oxygen demand (3 days at 27^{o}C), mg/l, max.	30	350	100	100

12	Chemical oxygen demand, mg/l, max.	250	-	-	250
13	Arsenic(as As).	0.2	0.2	0.2	0.2
14	Mercury (As Hg), mg/l, max.	0.01	0.01	-	0.01
15	Lead (as Pb) mg/l, max	0.1	1.0	-	2.0
16	Cadmium (as Cd) mg/l, max	2.0	1.0	-	2.0
17	Hexavalent chro-mium (as Cr + 6),mg/l, max.	0.1	2.0	-	1.0
18	Total chromium (as Cr) mg/l, max.	2.0	2.0	-	2.0
19	Copper (as Cu)mg/l, max.	3.0	3.0	-	3.0
20	Zinc (as Zn) mg/l, max.	5.0	15	-	15
21	Selenium (as Se)	0.05	0.05	-	0.05
22	Nickel (as Ni) mg/l, max.	3.0	3.0	-	5.0
23	Cyanide (as CN) mg/l, max.	0.2	2.0	0.2	0.2
24	Fluoride (as F) mg/l, max.	2.0	15	-	15
25	Dissolved phos-phates (as P),mg/l, max.	5.0	-	-	-
26	Sulphide (as S) mg/l, max.	2.0	-	-	5.0
27	Phenolic compounds (as C6H50H)mg/l, max.	1.0	5.0	-	5.0
28	Radioactive materials: (a) Alpha emitters micro curie mg/l, max. (b)Beta emittersmicro curie mg/l	10^{-7} 10^{-6}	10^{-7} 10^{-6}	10^{-8} 10^{-7}	10^{-7} 10^{-6}
29	Bio-assay test	90% suivival of fish after 96 hours in	90% suivival of fish after 96 hours in	90% suivival of fish after 96 hours in 100%	90% suivival of fish after 96 hours in 100% effluen

		100% effluent	100% effluen	effluen	
30	Manganese	2 mg/l	2 mg/l	-	2 mg/l
31	Iron (as Fe)	3mg/l	3mg/l	-	3mg/l
32	Vanadium (as V)	0.2mg/l	0.2mg/l	-	0.2mg/l
33	Nitrate Nitrogen	10 mg/l	-	-	20 mg/l

These standards shall be applicable for industries, operations or processes other than those industries, operations or process for which standards have been specified in Schedule of the Environment Protection Rules, 1989.

ANNEXURE-I

The state boards shall fallow the following guidelines in enforcing the standards specified under Schedule IV.

1. The wastewater and gases are to be treated with the best available technology (BAT) in order to achieve the prescribed standards.
2. The industries need to be encouraged for recycling and reuse of waste materials as far as practicable in order to minimize the discharge of wastes into the environment.
3. The industries are to be encouraged for recovery of biogas, energy and reusable materials.
4. While permitting the discharge of effluents and emissions into the environment, State Boards have to taken into account the assimilative capacities of the receiving bodies, especially water bodies so that quality of the intended use of the receiving waters is not affected. Where such quality is likely to be affected, discharges should not be allowed into water bodies.
5. The central and state boards shall put emphasis on the implementation of clean technologies by the industries in order to increase fuel efficiency and reduce the generation of environmental pollutants.
6. All efforts should be made to remove color and unpleasant odour as far as practicable.
7. The standards mentioned in this Schedule shall also apply to all other effluents discharged such as mining, and mineral processing activities and sewage.
8. The limit given for the total concentration of mercury in the final effluent of caustic soda industry, is for the combined effluent from (a) cell house; (b) brine plant; (c) chlorine handling; (d) hydrogen handling; and (e) hydrochloric acid plant.
9. All effluents discharged including from the industries such as cotton textile, composite woolen mills, synthetic rubber, small pulp & paper, natural rubber, petrochemicals, tanneries, paint, dyes, slaughter houses, food & fruit processing and dairy industries into surface waters shall conform to the BOD limit specified above, namely, 30 mg/l. For discharge of an effluent having a BOD more than 30 mg/l, the standards shall conform to those given above for other receiving bodies, namely, sewers, coastal waters and land for irrigation.
10. Bio-assay shall be made compulsory for all the industries, where toxic and nonbiodegradable chemicals are involved.

11. In case of fertilizer industry, the limits in respect of chromium and fluoride shall be complied with at the outlet of chromium and fluoride removal units respectively.
12. In case of pesticides.

a. The limits should be complied with at the end of the treatment plant before dilution.

b. Bio-assay test should be carried out with the available species of fish in the receiving water, the COD limits to be specified in the consent conditions should be correlated with the BOD limits.

c. In case metabolites and isomers of the pesticides in the given list are found in significant concentrations, standards should be prescribed for these also in the same concentration as the individual pesticides.

d. Industries are required to analyze pesticides in wastewater by advanced analytical methods such as GLC/HPLC.

13. The chemical oxygen demand (COD) concentration in a treated effluent, if observed to be persistently greater than 250 mg/l before disposal to any receiving body (public sewer, land for irrigation, inland surface water and marine coastal areas), such industrial units are required to identify chemicals causing the same. In case these are found to be toxic as defined in the Schedule-I of the Hazardous Rules, 1989, the state boards in such cases shall direct the industries to install tertiary treatment stipulating time limit.
14. Standards specified in Part A of Schedule VI for discharge of effluents into the public sewer shall be applicable only if such sewer leads to a secondary treatment including biological treatment system otherwise the discharge into sewers shall be treated as discharge into inland surface waters.

[GSR 801 (E), EPA, 1986, dated Dec. 31, 1993]

D. INDIAN STANDARDS FOR DRINKING WATER - SPECIFICATION (BIS 10500 : 1991)

Sl.No	Substance or Characteristic	Requirement (Desirable Limit)	Permissible Limit in the absence of Alternate source
Essential characteristics			
1.	Colour, (Hazen units, Max)	5	25
2.	Odour	Unobjectonable	Unobjectionable
3.	Taste	Agreeable	Agreeable
4.	Turbidity (NTU, Max)	5	10
5.	pH Value	6.5 to 8.5	No Relaxsation
6.	Total Hardness (as $CaCo_3$) mg/lit.,Max	300	600
7.	Iron (as Fe) mg/lit,Max	0.3	1.0
8.	Chlorides (as Cl) mg/lit,Max.	250	1000
9.	Residual,free chlorine,mg/lit,Min	0.2	--

Desirable Characteristics			
10.	Dissolved solids mg/lit,Max	500	2000
11.	Calcium (as Ca) mg/lit,Max	75	200
12.	Copper (as Cu) mg/lit,Max	0.05	1.5
13	Manganese (as Mn)mg/lit,Max	0.10	0.3
14	Sulfate (as SO_4) mg/lit,Max	200	400
15	Nitrate (as NO_3) mg/lit,Max	45	100
16	Fluoride (as F) mg/lit,Max	1.9	1.5
17	Phenolic Compounds (as C_6H_5OH) mg/lit, Max.	0.001	0.002
18	Mercury (as Hg)mg/lit,Max	0.001	No relaxation
19	Cadmiun (as Cd)mg/lit,Max	0.01	No relaxation
20	Selenium (as Se)mg/lit,Max	0.01	No relaxation
21	Arsenic (as As) mg/lit,Max	0.05	No relaxation
22	Cyanide (as CN) mg/lit,Max	0.05	No relaxation
23	Lead (as Pb) mg/lit,Max	0.05	No relaxation
24	Zinc (as Zn) mg/lit,Max	5	15
25	Anionic detergents (as MBAS) mg/lit,Max	0.2	1.0
26	Chromium (as Cr^{6+}) mg/lit,Max	0.05	No relaxation
27	Polynuclear aromatic hydro carbons (as PAH) g/lit,Max	--	--
28	Mineral Oil mg/lit,Max	0.01	0.03
29	Pesticides mg/l, Max	Absent	0.001
30	Radioactive Materials		
	i. Alpha emitters Bq/l,Max	--	0.1
	ii. Beta emitters pci/l,Max	--	1.0
31	Alkalinity mg/lit.Max	200	600
32	Aluminium (as Al) mg/l,Max	0.03	0.2
33	Boron mg/lit,Max	1	5

E.TOLERANCE LIMITS FOR INLAND SURFACE WATERS SUBJECT TO POLLUTION (IS: 2296-1982)

TOLERANCE LIMITS FOR INLAND SURFACE WATERS, CLASS C
(Clause 3.3)

SL.NO (1)	CHARACTERISTIC (2)	TOLERANCE LIMIT (3)	Method of test (4)	(5)
			Ref to Cline in IS:3025-1964 #	Other Method of Test
I)	pH value	6.5-8.5	8	--
ii)	Dissolved Oxygen, mg/l, Min	4	50	--
iii)	Biochemical oxygen demand (5 days at 20^o C), mg/l, Max	3	53	--
iv)	Total Coli form Organisms, MPN/100 ml, Max	5000*	--	3.3 of IS: 1622-1981**
v)	Color, Hazen units, Max	300	5	--
vi)	Fluorides (as F), mg/l, Max	1.5	23	--
vii)	Cadmium (as Cd), mg/l, Max	0.01	--	9 of IS:2488 (Part II)-1968##
viii)	Chlorides (as Cl), mg/l, Max	600	24	--

ix)	Chromium (as Cr^{6+}), mg/l, Max	0.05	38	--
x)	Cyanides (as CN), mg/l, Max	0.05	27	--
xi)	Total dissolved solids, mg/l, Max	1500	12	--
xii)	Selenium (as Se), mg/l, Max	0.05	28	--
xiii)	Sulphates (as SO_4), mg/l, Max	400	20	--
xiv)	Lead (as Pb), mg/l, Max	0.1	37	--
xv)	Copper (as Cu), mg/l, Max	1.5	36	--
xvi)	Arsenic (as As), mg/l, Max	0.2	40	--
xvii)	Iron (as Fe), mg/l, Max	50	32	--
xviii)	Phenolic Compounds (as C_6H_5OH), mg/l, Max	0.005	54	--
xix)	Zinc (as Zn), mg/l, max	15	39	--
xx)	Insecticides, mg/l, Max	Absent	--	8 of IS:2488 (Part III)-1968*@
xxi)	Anionic detergents (as MBAS), mg/l, Max	1	--	Methylene blue-extraction method
xxii)	Oils and grease, mg/l, Max	0.1	--	13 of IS:2488 (Part I 1966 $)
xxiii)	Nitrates (a NO_3), mg/l, Max	50	48	--
xxiv)	Alpha emitters, µc/ml, Max	10^{-9}	58	--
xxv)	Beta emitters, µc/ml, Max	10^{-8}	58	--

Methods of sampling and test (physical and chemical) for water used in industry.

* If MPN count is noticed to be more than 5000 MPN then regular tests shall be carried out. The criteria shall be satisfied if during a period of time not more than 5 percent of the samples show more than 20000 MPN and not more than 20 percent of the samples show more than 5000 MPN. Further the faucal coliforms should not be more than 40 percent of the total coliforms.

** Methods of sampling and microbiological examination of water (first revision)

$ Methods of sampling and test for industrial effluents, **Part I**

##Methods of sampling and test for industrial effluents, **Part II**

@Methods of sampling and test for industrial effluents, **Part III**

F. BIO- MEDICAL WASTE (MANAGEMENT AND HANDLING) (SECOND AMENDMENT) RULES, 1998

STANDARDS FOR TREATMENT AND DISPOSAL OF BIO-MEDICAL WASTES

STANDARDS FOR INCINERATORS:

All incinerators shall meet the following operating and emission standards

A. Operating Standards

1. Combustion efficiency (CE) shall be at least 99.00%.

2. The Combustion efficiency is computed as follows:

$$C.E. = \frac{\%C0_2}{\%C0_2 + \%\ CO} \times 100$$

3. The temperature of the primary chamber shall be 800 ± 50 deg. C°.

4. The secondary chamber gas residence time shall be at least I (one) second at 1050 ± 50 C°, with minimum 3% Oxygen in t he stack gas.

B. Emission Standards

Parameters	Concentration mg/Nm^3 at (12% CO_2 correction)
(1) Particulate matter	150
(2) Nitrogen Oxides	450
(3) HCI	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 in incineration ash shall be limited within the regulatory quantities as defined under the Hazardous Waste (Management and Handling Rules,) 1989.

• Only low sulphur fuel like L.D.0dLS.H.S.1Diesel shall be used as fuel in the incineraton.

STANDARDS FOR WASTE AUTOCLAVING:

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

(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 pr essure of 31 psi for an autoclave residence time of not less than 45 minutes; or

(iii) a temperature of not less than 149 C° and a p ressure 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 a 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 per an autoclave residence time of not less than 45 minutes; or

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

(III) Medical waste shall not be considered properly treated unless the 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 or 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 $1X10^4$ 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 press ure less than 15 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

STANDARD FOR LIQUID WASTE:

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

PARAMETERS	PERMISSIBLE LIMITS

PH	6.3-9.0
Susponded 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 car casses, 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 limit.

3. The microwave should completely and consistently kill the bacteria and other pathogenic organisms that is ensured by approved biological indicator 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 x 101 spores per milliliter.

STANDARDS FOR DEEP BURIAL

1. A pit or trench should he dug about 2 meters 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 em 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.

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