CHECKLIST ANALYSIS OF SEWAGE TREATMENT PLANT IN AN EDUCATIONAL INSTITUITION

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***Abstract*— Knowledge Institute of Technology Salem is one of the most important Educational institutes in the state of Tamilnadu with a large number of people residing in its campus consisting of a number of laboratories of various departments, residential units and academic blocks. A sewage treatment plant is quite necessary to receive the domestic and commercial waste and removes the materials which pose harm for general public. Its objective is to produce an environmentally-safe fluid waste stream (or treated effluent) and a solid waste (or treated sludge) suitable for disposal or reuse (usually as farm fertilizer). Checklist analysis is a systematic evaluation against pre-established criteria in the form of one or more checklists.**

Achievement of a safe and healthful workplace is the responsibility of an organization, the people residing in the place and the workers who are given the charge to protect the environment. Waste disposal and minimization and pollution prevention should be the preferred approach.

Stringent penalties for the improper disposal of wastes should be adopted.

Keywords-checklist analyis; sewage treatment plant; criticality rating; Educational instituition.

INTRODUCTION

Pollution in its broadest sense includes all changes that curtail natural utility and exert deleterious effect on life. The crisis triggered by the rapidly growing population and industrialization with the resultant degradation of the environment causes a grave threat to the quality of life.

Degradation of water quality is the unfavorable alteration of the physical, chemical and biological properties of water that prevents domestic, commercial, industrial, agricultural, recreational and other beneficial uses of water. Sewage and sewage effluents are the major sources of water pollution. Sewage is mainly composed of human fecal material, domestic wastes including wash-water and industrial wastes.

The growing environmental pollution needs for decontaminating waste water result in the study of characterization of waste water, especially domestic sewage. In the past, domestic waste water treatment was mainly confined to organic carbon removal. Recently, increasing pollution in the waste water leads to developing and implementing new treatment techniques to control nitrogen and other priority pollutants

Sewage Treatment Plant is a facility designed to receive the waste from domestic, commercial and industrial sources and to remove materials that damage water quality and compromise public health and safety when discharged into water receiving systems. It includes physical, chemical, and biological processes to remove various contaminants depending on its constituents. Using advanced technology it is now possible to re-use sewage effluent for drinking water. The principal objective of waste water treatment is generally to allow human and industrial effluents to be disposed of without danger to human health or unacceptable damage to the natural environment. An environmentally-safe fluid waste stream is produced. No danger to human health or unacceptable damage to the natural environment is expected.

Sewage includes household waste liquid from toilets, baths, showers, kitchens, sinks and so forth that is disposed of via sewers. Sewage also includes liquid waste from industry and commerce.

TREATMENT PROCESSES:

PRETREATMENT: Large solids (i.e. those with a diameter of more than 2cm) and grit (heavy solids) are removed by screening. These are disposed of in landfills.

PRIMARY TREATMENT: The water is left to stand so that solids can sink to the bottom and oil and grease can rise to the surface. The solids are scraped off the bottom and the scum is washed off with water jets. These two substances are combined to form sludge. A primary sedimentation will remove 50-70 percent total suspended solids and 30-40 percent BODR5R.

SECONDARY TREATMENT: The sludge is further treated in 'sludge digesters': large heated tanks in which its chemical decomposition is catalysed by microorganisms. The sludge is largely converted to 'biogas', a mixture of CH_4 and CO_2, which is used to generate electricity for the plant.

The liquid is treated by bacteria which break down the organic matter remaining in solution. It is then sent to oxidation ponds where heterotrophic bacteria continue the breakdown of the organics and solar UV light destroys the harmful bacteria.

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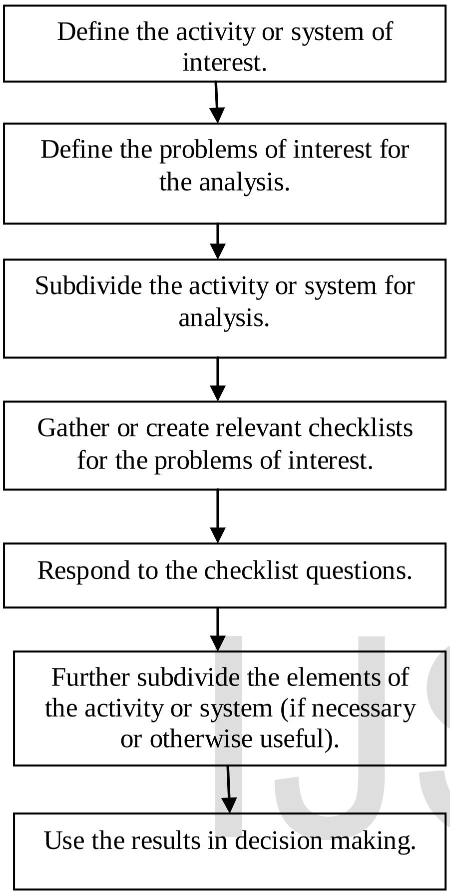
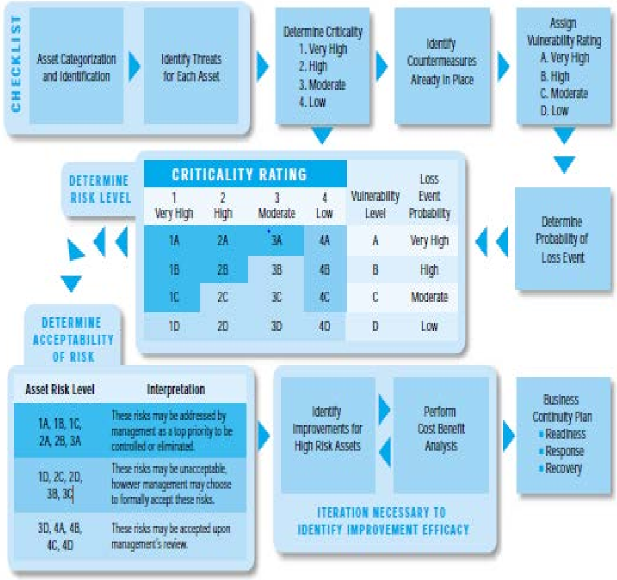
secondary treatment may remove than 85 percent of the BODR5 Rand suspended solids, it does not remove significant amount of nitrogen, phosphor heavy metals, no degradable organics, bacteria and viruses.

METHODOLOGY:

Procedure for Checklist Analysis:



VULNERABILITYANALYSIS:



ITEMS TO BE IDENTIFIED	CHECKLIST		COMMENTS
	YES	NO	
1. Property is fenced and gated.?			
2. Are all tanks and chambers above the safe flood level?			
3. Are there any buried pipelines or cables under buildings within the treatment facility and is it clearly indicated on the layout drawings?			
4. Is the facility located near to a public road to allow immediate access to the plant/facility?			
5. Adequate signage provided?			
6. Location of sludge desludging area is suitable for tankers to access and empty the			

sludge into the chamber.			
7. Have safety handrails or grating been installed at walkways and around open holes at the plant?			
8. Is adequate street lighting provided around the plant and what is the number of lamp post provided?			
9. Are all buildings and major units at the treatment facility lighted adequately?			
10. Where the location of effluent discharge is point for the facility and is it clearly indicated on the layout drawings with relation to existing receiving water bodies?			
11. If tankers and desludging activities take place, is there provision for stand pipes for cleaning purposes?			
12. All screen chamber sumps to be fully open at the top for good ventilation?			
13. Emergency overflow pipe to by-pass the influent sewage during power failure (away from residents) and location of overflow pipe discharge?			
14. Is dry well provided with			

force ventilation and air outlet shall be located adjacent to pump motors to assist cooling?			
15. Dry well adequately lit and it should be weather proof, vapor proof and Provision of grit storage bin or skip with rollers, perforated tray and covers explosion proof?			
16. Easy access to the grit removal facility?			
17. Provision of drain pipe to drain water into the pump sump to avoid ponding?			
18. Provision of acoustic enclosures for blowers including acoustic door?			
19. Provision of exhaust fan with silencer to circulate air around the blower room?			
20. Provision of rotating strobe light at the control room to indicate malfunction of blower or other equipment?			
21. Provision of adequate space for blower removal or installation during maintenance?			
22. Water storage tank to be located in such a way that water will not splash on the control panels?			
23. Provision of			

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potable/clean water for regular cleaning of the overflow weir Provision of force main type of pipe from the thickener to the sludge holding tank?			
24. Each sludge holding tank to have separate feeding pipes with individual isolating valves?			
25. Is the safety provisions adequate?			

Table General standards for Discharge of Environmental Pollutants, Part A: Effluents as per Schedule VI of the Environmental (Protection) Rules 1986 and National River Conservation Directorate Guidelines for Faecal Coliforms, (Values in mg/l unless stated)

No	Characteristics	Standards			
		Inland Surface Water	Public Sewers, (A)	Land for Irrigation	Marine Coastal Areas
1	Colour and odour	(B)		(B)	(B)
2	SS	100	600	200	(C), (D)
3	Particle size of SS	(E)	-	-	(F), (G)
4	pH value	5.5 to 9.0			
5	Temperature	(H)	-	-	(H)
6	Oil and grease	10	20	10	10
7	Total residual chlorine	1.0	-	-	1.0
8	Ammoniacal nitrogen (as N)	50	50	-	50
9	Total Kjeldahl Nitrogen, (TKN) (as N)	100	-	-	100
10	Free ammonia (as NH_3)	5.0	-	-	5.0
11	Biochemical Oxygen Demand	30	350	100	100
12	Chemical Oxygen Demand	250	-	-	250
13	Arsenic (as As)	0.2			
14	Mercury (as Hg)	0.01	0.01	-	0.01
15	Lead (as Pb)	0.1	1.0	-	2.0
16	Cadmium (as Cd)	2.0	1.0	-	2.0
17	Hexavalent Chromium (as Cr 6+)	0.1	2.0	-	1.0
18	Total Chromium (as Cr)	2.0	2.0	-	2.0
19	Copper (as Cu)	3.0	3.0	-	3.0
20	Zinc (as Zn)	5.0	15.0	-	15.0
21	Selenium (as Se)	0.05	0.05	-	0.05
22	Nickel (as Ni)	3.0	3.0	-	5.0
23	Cyanide (as CN)	0.2	2.0	0.2	0.2
24	Fluoride (as F)	2.0	15.0	-	15.0
25	Dissolved phosphates (as P)	5.0	-	-	-
26	Sulphide (as S)	2.0	-	-	5.0

Table General Treatment Efficiencies of Conventional Treatment Processes

	Process	Percentage Reduction		
		SS	BOD	Total Coliform
1	Primary treatment (sedimentation)	45-60	30-45	40-60
2	Secondary treatment			
	(i) Activated sludge plants	85-90	85-95	90-96
	(ii) Stabilisation ponds (single cell)	80-90	90-95	90-95
	(iii) Stabilization ponds (two cells)	90-95	95-97	95-98

RECOMMENDATIONS & CONCLUSION

This study will be helpful for identifying the significant environmental aspect that causes an adverse effect on the environment. This assessment process document becomes a reference for understanding the standards of an HSE programs evolution-process and for future assessments.

The pH value lies between the permissible limit.

The solid wastes from kitchen is used as animal feeds which can be treated with saw dust and dried can be used as fertilizers.

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