ENVIRONMENTAL AUDIT REPORT

HARCOURT BUTLER TECHNICAL UNIVERSITY KANPUR

Prepared by

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100 YEARS
1921 - 2021

Environmental Audit

CERTIFICATE

This Environmental Audit for **Harcourt Butler Technical University** Located Nawabganj, Kanpur pin code -208001 was conducted in Month of Jan- 2025 to assess the Environmental practices as well as execution of existing Environmental Management System implemented in the University Campus for Water Management, Air Quality, Green Area Cover, Solid Waste Management and Knowledge of Environmental Legislation, Energy Consumption, Student Welfare Facilities, Housekeeping Practices, Existence of Carbon Foot Print and Green Wealth, Green Credit etc.

This Environmental audit has been carried out for the second consecutive time to assess the impact of major factors of Environmental practices and related issues inside the University. The recommendations made in this audit shall be helpful for further planning for environmental practices inside & outside the University campus to safeguard the environment & thus the human health.

For-**Jupiter Enviro Safe Consultants**

(Dr Ashutosh Tandon)
External Lead Auditor

ACKNOWLEDGEMENT

The Environmental Audit for **Harcourt Butler Technical University**, Located Nawabganj, Kanpur pin code -208001 has been conducted in Month of Jan- 2025.

M/s Jupiter Enviro-Safe Consultants Team is pleased to convey thanks to the management of Harcourt Butler Technical University especially Honorable Prof. Shamsher Singh, Vice Chancellor, Dr. Rajiv Ganguly, Prof. Deepesh Singh, Prof. J.K. Dwivedi, Er. Ashutosh Kumar Singh and all Staff members of HBTU, Kanpur. We appreciate the cooperation to our team for completion of Environmental audit successfully. This Environmental audit has been carried out for the Third consecutive time to assess the impact of major factors of Environmental practices and green initiatives inside the University. The recommendations made therein the audit report shall be helpful in much better planning to further improve the Environmental practices inside the University.

For-**Jupiter Enviro-Safe Consultants**

(Dr A Tandon)

Harcourt Butler Technical University Green Audit Team

Sr. No.	Name	Designation	Role
1.	Dr Rajiv Ganguly	Chairman Central Maintenance Committee	Coordinator
2.	Prof. Deepesh Singh	HOD Civil Engineering Department and Environmental Engineering	Internal Auditor
3.	Prof. J.K. Dwivedi	Electrical Engineering Department	Internal Auditor
4.	Er. Ashutosh Kumar Singh	SE HBTU Central Maintenance	Internal Auditor
5.	Dr. Ashutosh Tandon	Environmental Management Consultant	External Lead Auditor

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1. PREAMBLE

1.1 PROLOGUE

Clean & green systems are considered to be one of the best developed strategies to provide the paradigm to put society on the path to sustainability. Environmental management planning and environmental risks are inherent in basic thoughts of any educational body, any major failure in the system due to negligence on any environmental part may lead to loss of human life and/or property and thus damage to the environment. Environmental protection is the responsibility which is to be taken care by every mankind to save the natural diversity and to conserve natural resources for the upcoming generations. The thrust of rapid follow-up of the rules & regulations due to global competition have made Indian educational bodies as an emblem of a new India as reflected in the mandate of **National Assessment And Accreditation Council** (NAAC) for making quality assurance an integral part of the functioning of Higher Education Institutions, but simultaneously environmental problems are escalating due to increased natural resources and unsustainable consumption patterns, which deplete resources, materials and energy. The unsustainable use of renewable resources and toxic substances in such process in a indiscriminate manner reduces biodiversity and poses a threat to the environment and human health. **HARCOURT BUTLER TECHNICAL UNIVERSITY, KANPUR** retained **M/s JUPITER ENVIRO-SAFE**

CONSULTANTS, Kanpur to conduct environmental audit for their both east & west campus.

Since 1921 Harcourt Butler Technical University (Formerly HBTI Kanpur) has always been a paragon and a source of inspiration in the field of science and technology. It has maintained its conspicuous presence in the technical world. H.B.T.I. has a history of realization, fulfillment of necessities and advancement in the field of science and technology. It is dedicated for the cause of rapid industrial development, creating a healthy environment for applied researches and above all to carve out men and women, having a truly rational and scientific demeanor 'Attitude' is the watchword – taking care of which the personality of every Harcourtian is molded. Its roots are as deep as its outlook. "Government Research Institute, Cawnpore" was established in 1920, which was renamed as "Government Technological Institute" in 1921. Finally in 1926 it got the name by which we know it today "Harcourt Butler Technological Institute". Now as per Act No. 11 of 2016 by the Government of Uttar Pradesh it becomes university, i.e., **Harcourt Butler Technical University Kanpur.**

The University is spread across two campuses, the east campus (77.84 acres) and the west campus (248.64 acres) situated about 3 km apart. The university campus is divided in two different sections East and West Campus. The East campus is the main institutional area and the West campus is mainly designated for residential and Hostel Area.

The institute completed its Centenary on November 25, 2021 and the historical function was attended by the then Hon'ble President of India.

Harcourt Butler Technical University Kanpur has been established in year 2016 by the Government of Uttar Pradesh with a view for making it a leading Residential University to become a Centre of Excellence with focus on Research and Development and Incubation in the field of Engineering, Technology, Basic & Applied Sciences, Humanities, Social Science & Management Architecture and other professional courses. HBTU aims to promote studies, research & innovation in engineering areas of higher education, to enhance skill development through continuing educational programmes and imparting knowledge to achieve excellence in higher Technical education.

On academic front, the University is running Four Schools with thirteen Undergraduate Programmes in Chemical Engineering, Civil Engineering, Computer Science & Engineering, Electrical Engineering, Electronics Engineering, Information Technology, Leather Technology , Mechanical Engineering, Biochemical Engineering, Food Technology , Oil Technology, Paint Technology and Plastic Technology along with M.C.A, full time & part time M.Tech. Programme in various disciplines and going to start full time Ph.D. programme in number of disciplines as part of Quality Improvement Programme of MHRD and TEQUP-II. In view of the emerging need of the time, the University is planning to start number of Programmes at Undergraduate and Post Graduate level in the near future.

The University provides a congenial environment for the holistic growth and all round development of the students such that they become globally acceptable personalities with communication skills, proper attitudes, aptitudes, problem solving capabilities and to work as a team.

HBTU Kanpur(Formerly HBTI) has received aid from the World Bank(Phases TEQIP-I , TEQIP-II) for various developmental projects. This aid will be spent for:

- Development of the Infrastructure.
- New Laboratory equipment.
- Maintenance and repair of old laboratory equipment.
- Funding for research and lectures attended by faculty in foreign Universities.
- Aim towards community development and overall growth.

The faculty members have contributed large numbers of research papers in Indian as well as International journals. Besides, many R&D Schemes sponsored by D.S.T, U.G.C, I.C.A.R, D.R.D.O.,U.P.C.S.T., C.S.I.R., D.A.E., I.C.M.R.,D.O.E. and Ministry of Civil supplies have been successfully completed. All these accomplishments definitely prove it to be a fecund ground for nurturing intellects.

Vision:

"To achieve excellence in technical education, research and innovation."

Mission:

1. Imparting Knowledge to develop analytical ability in science and technology to serve the industry and society at large.
2. Equip and enable students with conceptual, technical and managerial skills to transform the organization and society.

3. Inculcating entrepreneurial philosophy and innovative thinking to promote research, consultancy and institutional social responsibility.
4. Serving people, society and nation with utmost professionalism, values and ethics to make development sustainable and quality of life.

Major Initiatives Taken To Speed-Up Research Activities In the University :

A. University has a full-fledged Innovation & Incubation Centre which works under the control of the Dean, Incubation Hub.

B. University has collaborated with IIT, Kanpur by signing a MOU for the implementation of "National Initiative for Setting up of Design Innovation Centre" scheme. Some projects for the development of prototype in the following areas are already running

Education- Learning content for disadvantaged communities

Healthcare- Assistive technology and Designing of low cost medical equipment

Livelihood- Sustainable agricultural technologies, Precision manufacturing at affordable costs, Appropriate Technology for SMEs and Cottage industry

Environment- Taking proper care for various components of environment,

Disposal-Segregation and Recycling of waste.

C. Faculty & Students of the University as well as budding entrepreneurs of Kanpur and nearby areas are provided necessary assistance for entrepreneurship, startup, innovation and incubation.

D. In order to encourage entrepreneurship, startup, innovation and incubation, the Innovation & Incubation Centre use to organize various motivational events from time to time.

Research Policy of the University

- The research of the university aims to invent and develop new body of knowledge compatible to address industry and commerce issues in order to develop a better country.
- The research of the university also enables the system to provide equal opportunity to all people of the country irrespective of class category or religion.
- The university aims to facilitate our students to incubate their ideas and promote entrepreneurial thinking.
- The research activities considered to expedite its action's plan keeping in view the professional social ethics.

The university to impart the education as per the need has been divided into different sub-schools as briefed under:

School of Engineering comprises of the following branches:

- Computer science & Engineering
- Civil Engineering
- Electrical Engineering
- Electronics Engineering
- Information Technology
- Mechanical Engineering

- Masters in Computer Applications
- Central Workshop

School of Chemical Technology comprises of the following branches:

- Bio-Chemical Engineering
- Chemical Engineering
- Food Technology
- Leather Technology
- Oil Technology
- Paint Technology
- Plastic Technology

School of Basic & Applied Sciences comprises of the following branches:

- Chemistry Department
- Mathematics Department
- Physics Department

School of Humanities & Social Sciences comprises of the following branches:

- Humanities & Social Sciences Department

The Academic Programmes which are presently available at the university are as follows:

- Bachelors Programmes
- Masters Programmes
- Ph.D Programmes

HBTU has a willingness to share the growing concern on issues related to environment and is committed to safe guard the Environment in and around its establishment for providing safe and healthy living to all its students, staff and people concerned. Thus, to full-fill these obligations an Environmental Policy has been formulated through management systems.

FOCUS AREA OF STUDY

- Water management
- Air Pollution Management
- Noise Pollution Management
- Energy use & conservation
- Waste Management
- Green Belt area & Bio-diversity
- Environmental Initiative

1.2 SCOPE OF THE STUDY

The ideal way to look at environmental Audit is to regard it as a pragmatic management tool. Prevention of waste generation and

excessive consumption of raw materials, water and energy, Creation of an environment in university complex conducive to achieving high efficiency and aesthetic look, and a hormonal relationship with the students, staff, public and regulatory authorities, are some of the objectives which are sought to be achieved by EA. Under the scope of EA, it was envisaged:

- To study air, water, noise, health of safety scenarios within the HBTU complex.
- To study possible scope for reuse / recirculation techniques to minimize pollution and waste generation.
- To identify the possible health and environmental Hazards
- To formulate guidelines for emergency preparedness plan.

1.3 METHODOLOGY

Keeping in view the nature of the activities, the environmental audit programme was carried out at HBTU in three phases.

Phase 1 : Pre - audit activities

Phase 2 : on site activities

Phase 3 : Post audit activities

1.3.1 PRE AUDIT ACTIVITIES

The pre audit activities of the project were commenced with the development of an audit plan, which included the scope of audit, priority topics to be selected, and explanation of the audit procedure. Then audit team made a visit to HBTU in order to gather background information and administer questionnaires. The main objective at

this stage was to minimise the time requirements for on-site audit and maximize team productivity.

1.3.2 ON SITE ACTIVITIES

This phase began with a meeting of the audit team with the concerned personnel of the university. The maintenance engineer of HBTU, in brief, presented the activities regarding the performed activities and pollution control measures undertaken by HBTU. The audit team familiarized themselves with different departmental activities within HBTU. Sources of liquid and solid wastes and their causes were identified. Audit team identified the wastewater sampling locations, ambient and noise monitoring locations and professional judgment was used in selecting the type and size of sample required to verify the key controls in HBTU. All observations were documented.

The on-site phase was concluded with a close out meeting between audit team and management of HBTU.

1.3.3 POST AUDIT ACTIVITIES

The draft report was prepared incorporating the air, water noise, health and safety scenarios, which was sent to HBTU for comments. An action plan is also drawn for implementation of the recommendations. Final report has been submitted to HBTU authorities for on-ward transmission to the concerned authorities.

2. WATER & WASTE WATER AUDIT

2.1 PROLOGUE

The water (prevention and control of pollution) act 1974 provides the legal framework for prevention control, and abutment of water pollution in India. The pollution boards have prescribed minimal national standards (MINAS) in terms of measures such as BOD, COD, PH and T.S.S. etc for quantification of generated waste water.

Water and waste water audit conducted at HBTU was aimed at evaluation of existing water consumption for different purposes and development of water balance scenario, highlighting the water conservation measures. The implementation possibilities for waste minimization/ pollution control through raw material recovery within the process for recycle/reuse were aimed, alongwith performance evaluation of existing waste water disposal system.

2.2. CONSENT ORDERS

After the passing of the water act in 1974, any industrial, operation or process or any treatment and disposal system likely to discharge sewage or trade effluents or a new or altered outlet for the discharge of sewage or trade effluent into a stream or well or public sewer or on land could be brought into existence only with the prior consent of the state pollution control board. [Section 25(i) as amended in 1988]. The system of consent orders is based on the principle that there could not be fixed or rigid standards for putting polluted matter in the streams and that the problem of each industry may be peculiar and variable from time to time. In granting consent

orders, the board may lay down conditions which have to be full-filed within the given time otherwise the board has powers to refuse or withdraw the consent already given.

HBTU is planning to take the required steps for seeking air & water consent from pollution authorities.

2.3 WATER & SEWERAGE TAX

Since, HBTU comes under the specified list of such govt. taxes is regularly paying its water & sewerage tax as and when the bill is raised by the Kanpur Nagar Nigam.

2.4. METHODOLOGY

The essential steps used in conducting "water and wastewater audit" were :-

1. Records and documentation review, to establish the trend of water usage w.r.t usage in both campus of HBTU.
2. Recording water quantities supplied for each campus.
3. Locating water and wastewater sampling points and analysing the water quality along with flow measurements.
4. Development of water balance sheets.
5. Identification of areas of water losses (if any) and weak areas of operation / maintenance.
6. Planning conservation / corrective measures, depending upon water costs and economics achievable.

7. Performance evaluation of existing wastewater treatment facilities and Identification of possibilities for waste minimisation recycle / reuse.

2.5 RAW WATER INTAKE

HBTU presently draws 700 Kl of water per day (approx.) on full capacity utilization, through existing 5 nos. of bore wells in the premises. To facilitate the lifting and drawing ground water for filling the over head tanks, pumps of 25 HP capacities each are installed in the institutional and residential premises. The details water usage sources, OHT, pumps and their efficiency is shown is table 2.1 and 2.2, table 2.3 lists the water consumption & discharge break-up. Table 2.4 & 2.5 depicts the raw water characteristics.

2.5.1 RAW WATER STORAGE

There is one nos. of Over Head Tanks (OHT) situated in the HBTU east campus & two at the west campus. The capacity of each OHT is 300 KL with a total storage capacity of 900 KL. The Inflow and outflow of water is continuous and is maintained through three Nos. of 25 HP capacity pumps. The details of OHT`s is given in table 2.2.

2.6 WATER USAGE

The activities that are being presently carried out at HBTU for fresh water consumption mainly comprises for drinking, toilets, canteen facilities, Laboratory, R&D activities & Green-Belt development requirements. The major water consumption is for domestic and gardening purposes though some quantity of water is

also used in room coolers during summers. The water consumption break-up is shown in table 2.3.

2.7 RAW AND WASTE WATER SCENARIO

The raw water is mainly ground Water which is used at both the east & west campus of HBTU The fresh water consumption mainly includes requirements for domestic & residential staff colonies purposes. It was seen that some consumption of water is for gardening/agriculture purposes since approx two third of the total area of both the campus is maintained as green belt. Table 2.4 shows the break-up of total water requirements of HBTU. The quantum of discharge from the both east & west campus as computed is approx.560 KL/D and is mainly domestic in nature.

2.7.1 WASTE WATER MONITORING

Process survey and simultaneous monitoring of sectional and combined wastewater discharges were carried out within the HBTU institutional & residential campus at planned sampling locations. The waste water concentration which is being discharged is shown in tables 2.6 & 2.7 and total pollution load discharged per unit of output is given in tables 2.8 & 2.9.

2.8 EXISTING EFFLUENT TREATMENT FACILITIES

The daily generated discharge from both the campus is only domestic in nature & is presently being discharged in the main trunk sewer line of the municipal corporation. It was revealed by the internal audit team from HBTU that a Sewage Treatment Plant is to be installed in the near future.

2.9 Auditor's Note / Suggestions

1. Strict control should be exercised in use of chemicals in each such dept.
2. It is advisable to promptly plan for installation of STP at both the campus of university.
3. On evaluation of surplus low lying land at the west campus of the university, it is suggested that an Oxidation Pond can be easily installed for treatment of the generated domestic effluents & thereby the treated effluents can be used for irrigation & gardening purposes consequently reducing the fresh water consumption.
5. The vegetation cover should not grow wild, instead, maintained properly to reduce erosion and raindrop impacts.
6. It should be seen that there should be no water logging at the west campus, since it is an exclusive residential campus & such water logging in the low lying areas may create breeding ground for insects & flies.
7. Periodic analysis of treated and untreated water should be practiced with all the concerned parameters.
8. 'V' notches may be installed at the final outlet drain to record the quantum of discharge.
9. Awareness camp should be organized at intervals for wise usage of water to stop any misuse or wastage of fresh water.
10. All taps & toilet fixtures should be checked on regular basis for prompt replacement/repair of any leakages.

TABLE:2.1

WATER USAGE SOURCES

S.NO.	USAGE
1	Institutional areas for drinking purposes
2	Labs & R& D activities
3	Toilets
4	Canteens
5	Green-Belt Development
6	Cleaning of internal Drains & Toilets
7	Hostels & residential areas
8	Construction & maintenance work

TABLE:2.2

DETAILS OF OVER HEAD TANKS

S.No.	Over Head Tank Location	Nos.	Capacity (M^3)	Pump Capacity for water extraction (HP)	Efficiency of Pump
1	East Campus	1	300	25	85%
2	West Campus	2	300 Each	25 Each	80 & 90%

TABLE : 2.3 WATER REQUIREMENT AND WASTE WATER GENERATION

S. No.	Purpose	Consumption rate (Ltr./D)	Usage persons/D	Total requirement (KL/D)	Waste water (Generation @ 80% D)
1	Institutional East Campus	35	4440(Students & 436 staff)	170.6	136.4
2	Hostel East campus (8 Nos.)	125	1034	129.25	103.4
3	Hostel West campus (8Nos.)	125	1232	154	123.2
4	Residential Staff flats (East campus)	150	365	54.75	43.8
5	Residential Staff flats (West campus)	150	1150	172.5	138
6	Labs & R & D activities	50	100	5	4
7	Green-Belt development	Say 50 KL/D	-	50	Totally consumed
8	Canteens	20	700	14	11.2
9	Security guards	35	12	0.42	0.33
	Total		**9469**	**700.52 Say 700**	**560.33 Say 560**

TABLE:2.4

RAW WATER CHARACTERISTICS (WEST CAMPUS)-Jan-25

S.No.	Parameter	Unit	Result	Specification/Limit (As per IS:10500:2012)	
				Desirable	Permissible
1	Color	Hazen	<5.0	5.0	15
2	pH	-	7.43	6.5-8.5	No Relaxation
3	Turbidity	NTU	<1	1.0	5.0
4	TDS	Mg/lt	342.6	500	2000
5	Chloride	Mg/lt	42.8	250	1000
6	Fluoride	Mg/lt	0.27	1.0	1.5
7	Total Alkalinity	Mg/lt	129.5	200	600
8	Total Hardness	Mg/lt	166.2	200	600
9	Sulphate	Mg/lt	24.8	200	400
10	Iron	Mg/lt	0.16	1.0	No Relaxation
11	Arsenic	Mg/lt	<0.01	0.01	No Relaxation
12	E.Coli	MPN/100Ml	<2	Shall not be detectable in 100 ml sample	Shall not be detectable in 100 ml sample
13	Total Coliform	MPN/100Ml	<2	Shall not be detectable in 100 ml sample	Shall not be detectable in 100 ml sample

Note: Detailed report from NABL accredited Lab for other parameters annexed

TABLE:2.5

RAW WATER CHARACTERISTICS (EAST CAMPUS)-Jan-25

S.No.	Parameter	Unit	Result	Specification/Limit (As per IS:10500:2012)	
				Desirable	Permissible
1	Color	Hazen	<5.0	5.0	15
2	pH	-	7.69	6.5-8.5	No Relaxation
3	Turbidity	NTU	<1	1.0	5.0
4	TDS	Mg/lt	403	500	2000
5	Chloride	Mg/lt	41.5	250	1000
6	Fluoride	Mg/lt	0.19	1.0	1.5
7	Total Alkalinity	Mg/lt	157.1	200	600
8	Total Hardness	Mg/lt	185	200	600
9	Sulphate	Mg/lt	30.2	200	400
10	Iron	Mg/lt	0.19	1.0	No Relaxation
11	Arsenic	Mg/lt	<0.01	0.01	No Relaxation
12	E.Coli	MPN/100Ml	<2	Shall not be detectable in 100 ml sample	Shall not be detectable in 100 ml sample
13	Total Coliform	MPN/100Ml	<2	Shall not be detectable in 100 ml sample	Shall not be detectable in 100 ml sample

Note: Detailed report from NABL accredited Lab for other parameters annexed

TABLE: 2.6

Concentration of waste water discharged

(East campus)-Jan-25

S.No	Parameter	Concentration (Mg/lts)
1	pH	7.70
2	BOD_3 at 27^0C	22.5
3	COD	126
4	TSS	52.2
5	TDS	1062
6	O & G	5.8

TABLE: 2.7

Concentration of waste water discharged

(West campus)-Jan-25

S.No	Parameter	Concentration (Mg/lts)
1	pH	7.82
2	BOD_3 at 27^0C	26.6
3	COD	189
4	TSS	68.5
5	TDS	1195
6	O & G	6.5

Note: Report from NABL accredited Lab annexed

TABLE:2.8

Pollutants discharged to Environment/Unit of output Sampling Date: Jan, 2025 (East Campus)

Pollutants	Quantity of pollutants discharged (Kg/Day)	Concentration of pollutants discharged (Mg/L)	Percentage of variation form prescribed standards
(A) WATER (FINAL OUTLET OF EAST CAMPUS DRAIN)			
pH	-	7.70	within the limit rage of 5.5-9.0
B.O.D_3. 27^0C	6.7	22.5	within the limit of 30 mg/lts. (24% below the limit)
C.O.D.	37.8	126	within the limit of 250 mg/lts. (49.6% below the limit)
T.S.S.	15.6	52.2	within the limit of 100 mg/lts. (47.8% below the limit)
TDS	318.6	1062	within the limit of 2100 mg/lts. (49.4% below the limit)
Oil & Grease	1.7	5.8	within the limit of 10 mg/lts. (42% below the limit)

- Effluents discharged per day at 100% capacity utilization is max. Say 300 KLD for east campus of the university

TABLE:2.9

Pollutants discharged to Environment/Unit of output Sampling Date: Jan, 2025 (West Campus)

Pollutants	Quantity of pollutants discharged (Kg/Day)	Concentration of pollutants discharged (Mg/L)	Percentage of variation form prescribed standards
(A) WATER (FINAL OUTLET OF WEST CAMPUS DRAIN)			
pH	-	7.8	within the limit rage of 5.5-9.0
B.O.D_3. 27^0C	7.3	26.6	within the limit of 30 mg/lts. (11.3% below the limit)
C.O.D.	46.6	189	within the limit of 250 mg/lts. (24.4% below the limit)
T.S.S.	16.2	68.5	within the limit of 100 mg/lts. (31.5% below the limit)
TDS	309	1195	within the limit of 2100 mg/lts. (43.0% below the limit)
Oil & Grease	1.8	6.5	within the limit of 10 mg/lts. (35% below the limit)

- Domestic effluents discharged per day at 100% capacity utilization is max. 261 KLD for west campus of the university

Table : 3.0 Equipments /Facilities Available In The University Environmental Lab

(a)	pH Meter
(b)	TDS Meter
(c)	Conductivity Meter
(d)	Electronic Balance
(e)	Mixing Assembly
(f)	COD Assembly
(g)	BOD Incubator
(h)	AAS
(i)	Glass Wares

3. ENVIRONMENTAL QUALITY AUDIT

3.1 INTRODUCTION

The air (prevention and control of pollution) act 1981 provides the legal framework for prevention, control and abatement of air pollution in India. The act describes air pollutants as any solid, liquid or gaseous substance present in the atmosphere in such a concentration as may be or tend to be injurious to human beings or other living creatures or plants or property or environment.

HBTU has now taken initiatives for seeking air & water consent from U P Pollution Control Board.

The basic purpose of Environmental Quality Audit (EQA) is to evaluate the status of the environmental management systems and Ambient Air Quality at HBTU, Vis-a-vis the regulatory requirements. Proper operation and maintenance practices help in reducing the vehicular emissions from both the campus of the university to check environmental quality deterioration.

Environmental quality can be improved if the following aspects are properly considered in management, treatment and disposal :-

(1) Vehicular Traffic Movement

(2) Solid / Hazardous Waste

(3) Noise Levels

3.2 VEHICULAR EMISSIONS

Vehicular emissions play an important role towards environmental quality management and are significant sources of

pollutant emissions. The major sources of emissions that were identified at HBTU, are from the vehicle movement in the campus and D.G. sets. The major pollutants include suspended particulate matter (SPM), SO_2 and NO_x.

During audit studies, AAQ was monitored at different locations of both the university campus & the data were interpreted to quantify the pollution load. The locations identified for AAQ are are shown in table 3.1 & the details of AAQ monitoring results are tabulated in table 3.2.

The analysis results of AAQ monitored at different locations of the university east & west campus reveal that the SO_2 emissions were found to be varying from 8.5-10.8 PPM , NO_x 16.5-26.0 PPM & for $PM_{2.5}$ were in the range of 30.5-49.5 PPM & for PM_{10} in the range of 66.8-90.2 PPM. The ambient air quality monitoring results revealed that the values meet the prescribed standards laid down by CPCB for both east & west campus of the university.

The variation in concentration of ambient air quality results is attributed to vehicular activities in and around the area. To improve the air quality and to give an aesthetic look to both the campus about two third of the total area of both the campus has been designated for green belt. The pictorial view of the greenery maintained in the premises is shown pictorial view gallery.

The university also consumes Diesel Oil for generation of electricity during power failure. The total storage capacity is 0.8 KL for HSD. The month wise diesel consumption is given in table 3.3.

3.3. SOLID / HAZARDOUS WASTES

Hazardous waste management is a new and developing field. The relatively recent concerns by pollution boards and other regulatory authorities with the danger presented by the disposal of Hazardous waste has evoked new efforts in the scientific and engineering community to develop new technologies that are capable of recycling treating and safely disposing of these materials. The pollution boards want to encourage innovations in Hazardous waste management by the way of devising regulations, therefore it is important to avoid rigid approaches that stifle the development of new technologies.

When the disposal of certain waste materials is done in a improper manner various toxic components are leached from them. These toxics are then able to find their way into surface or ground water which in return contaminates them. Solidification technique reduces the surface area of the waste, thereby dramatically reduces the leachates fractions, even if the material is not chemically destroyed.

The migration of harmful chemical constituents through ground and surface water increases contaminants in drinking water sources which in turn affect human health. The improper management of hazardous wastes may result in variety of health hazards, the severe amongst these include mutagenic, carcinogenic and tetratogenic effects.

The characteristics that measures the hazard potential of a waste are corrosivity, reactivity ignitability and toxicity. The parameters which define these characteristics are summarized in

table 3.4. The approx. generation of domestic solid waste is tabulated in table 3.5

3.3.1 HAZARDOUS WASTE GENERATION:

HBTU institutional east campus generates solid / Hazardous wastes from its labs and is in process to seek Authorization of Hazardous waste generation & disposal under rule 5 of Hazardous Waste Management & Handling rules 1989 (as amended). The waste generated fall under category 33.1 and 33.2 of Hazardous waste management and handling rules 1989. The other wastes generated are construction & Demolition waste, Municipal Solid Waste & the university should also comply with the Plastic Waste Management Rules-2022. The data analysis revealed, the following category of Hazardous waste are generated :-

- Category No. 33.1
- Category No. 33.2

The main sources of Hazardous Waste generation are :

(a) Discarded lead batteries

(b) Waste lube oil

(e) Sludge from Lab drains

(f) Discarded empty chemical containers.

Table 3.6 shows the generation and subsequently usage/disposal of generated wastes.

3.3.2 SOLIDIFICATION TECHNIQUES:

There are at least six categories for solidification agents. These category are :

- Cement or silicate based

- Lime based
- Thermoplastic based
- Organic polymer based
- Ceramic based
- Encapsulation

3.3.3 AUDITORS NOTE / SUGGESTIONS

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1. Land farming or land treatment of oily sludge is a recent disposal method and may be adopted at HBTU or it may be sent to authorized safe landfill site.
2. It is suggested that the sludge generated from the drains of Labs should be transported to Treatment Storage Disposal Facility (TSDF)
3. The treatment of sludge if done in-house, then prior to landfill in exclusive demarked area it should include (a) mixing with concrete in 1:4 ratio. (b) Incineration at not less than 400^0C in a special incinerator (c) atmospheric weathering at a controlled landfill site and (d) chemical solidification.
4. A high standard of personal hygiene is essential when handling Lab generated waste. Persons involve in handling such wastes should wear suitable impervious protective clothing, especial gloves and good washing facilities should be available at site.
5. Diesel driven vehicles may be replaced with E-Vehicles.
6. The existing green-belt may be further extensified by the way of adopting **"Miyawaki Technique"** of plantation.

3.4.4 IMPROVING HOUSEKEEPING PRACTICES

Improving housekeeping practices can be made rapidly with little capital investment. Successfully implemented, these changes can result in increased aesthetic look of the university campus and improved workplace safety, as well as reduction in hazardous waste generation. Reducing hazardous waste generation can yield significant savings in raw material usage and wastewater treatment. The following list of housekeeping practices, although not all-inclusive, could save thousands of rupees a year.

- Repair all leaking tanks, pumps, valves, etc.
- Inspect all leaking water fixtures
- Install high-level alarms on over head storage tanks.
- Minimize the volume of water used during the cleanup operations.

3.5 NOISE LEVELS AND COMPLIANCE

Sound is generated by many activities associated with the university operations. Sound is perceived as noise when it impinges on human activities through close proximity of people to sound sources and inadequate shielding which can cause both physiological and psychological damage to human beings. The noise may produce mental stress,, fatigue, dizziness and loss of balance and effect work, recreation, sleep communication and rest. There are two major categories of noise, continuous and intermittent. Continuous noises usually have a rather stable level while intermittent noises are any fluctuating, repetitive sounds.

The intensity of noise depends upon the design noise levels of the machines and its operation and maintenance practices. The major sources of noise at HBTU are D.G. sets, lecture halls, hostel mess, canteens and work shop.

The sources of noise at HBTU and their levels as provided are shown in table 3.7 & table 3.8 shows the permissible noise exposure levels for such institutional campus.

3.5.1 Auditor's note / Suggestions

1. Noise levels are within the stipulated criteria
3. Noise awareness programmes may be conducted among the students/staff
4. HBTU has already launched a massive tree plantation programme within its premises and outside its boundary.
5. It is suggested to acoustically insulate the lecture halls & DG sets.
6. staff/students working in high noise areas should be provided with Protective devices such as ear - muffs, ear-plugs and should be instructed to use these devices religiously.

Table: 3.1 Ambient Air Quality Monitoring Locations

S.No.	Location
1.	Near main gate (East Campus)
2.	Near Auditorium (East Campus)
3.	Near Lake View Hostel(East Campus)
4.	Near main gate (West Campus)
5.	Near staff quarters (West Campus)
6.	Near Hostel area (West Campus)

Table: 3.2 Ambient Air Quality Monitoring Results-Jan-25

Location	Parameter				
	$PM_{2.5}$ ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	CO ($\mu g/m^3$)
Near main gate (East Campus)	49.5	90.2	10.8	26.0	0.75
Near Auditorium (East Campus)	34	72	9.8	16.5	0.45
Near Lake View Hostel(East Campus)	33	73.5	10.2	22.8	0.40
Near main gate (West Campus)	38.3	74.8	9.5	18.0	0.30
Near staff quarters (West Campus)	36.5	76.8	10.8	24	0.52
Near Hostel area (West Campus)	30.5	66.8	8.5	16.2	0.30

Table:3.3 Details Of Diesel Consumption (East & West campus) in DG Sets

S.No.	Month	Approx.Consumption (Lts)
1.	Apr. 24	90
2.	May-24	60
3.	June-24	75
4.	July-24	65
5.	Aug-24	70
6.	Sept-24	70
7.	Oct-24	80
8.	Nov-24	60
9.	Dec- 24	60
	Total	**630**

Note:

Diesel consumption in official vehicles was @275 Lts/M
Petrol consumption in official vehicles was @325 Lts/M

Table 3.4 : Parameters Of Hazard Potential

S.NO.	Parameters	Characteristics
1.	Corrosivity	Wastes which have a pH of less than 2 or greater than 12, or which corrode steel at rate greater than 6.35 mm per year at 55^0C
2.	Reactivity	Wastes, which are unstable and spontaneously react with water or air generate toxic gases and explode due to shock or heat.
3.	Ignitability	Wastes, which spontaneously ignite in dry or moist air or heat.
4.	Toxicity	Wastes which release toxic materials on leaching in sufficient amou nts to pose a substantial hazard to human health or environment as measured by the toxicity characteristics leaching procedure (US, EPA)

Table:3.5 Municipal Solid Waste Generation from Human and Commercial Activities from east & West campus of University

S.No.	Description	Population	Total Waste generation
1.	Total Residential (Staff) East & West campus	1515	Say 606@ 0.4 kg/capita/day
2.	Total students Hostels	2266	Say 227@ 0.1 kg/capita/day
2.	Utilities / facilities and Commercial (30% of total residence)	1134	Say 284@ 0.25 kg/capita/day
	Total	**5304**	**Say 1117 Kg/D**

Table : 3.6 Solid Waste

(As specified under Hazardous waste/management and Handling Rules, 1989)

Hazardous Waste	Total Quality (T)		
	Item	Generation	
		During the previous financial year 2023-2024	During the current financial year 2024-2025(Till Jan-25)
i) From east & west campus	Empty chemical containers	250 Kg.	280 Kg.
	Used Oil / lube Oil	120 lts	130 lts
	Battery Scrap & E-waste	75 Kg	60 Kg
ii) Sludge from internal waste water drains			
a) East campus	Sludge	4 tractor trolleys	6 tractor trolleys
b) West campus	Sludge	7 tractor trolleys	8 tractor trolleys
c) Hostel & residential areas	Kitchen waste	Not measured	Not measured
iii) Uses of Solid Waste & Disposal			
a) Drain sludge	Sludge from drain cleaning	100% as land fill	100% as land fill
b) Empty chemical containers	Empty chemical containers	Stored/partially reused	Stored/partially reused
c) commercial valued scrap items	Metal Scrap	100% sold to authorized vendors	100% sold to authorized vendors
d) Used Lube oil	Waste oils	100% sold to authorized vendors	100% sold to authorized vendors
e) Battery Scrap & E-waste	Worn out batteries & E-waste	Presently stored in departments itself	Presently stored in departments itself
f) Kitchen/ canteen waste	Kitchen/canteen waste	As cattle feed	As cattle feed

Table 3.7 : Noise Level At Different Locations of university-Jan-25

S.No.	Source		Noise Level dB (A)
1.	D.G. Set Area	:	81
2.	Inside Academic Areas	:	50
3.	Fabrication Shop	:	78
4.	Near Auditorium	:	66
5.	Near Parking Area	:	65
6.	Administrative Block	:	58
7.	At main gate	:	72
8.	Inside Canteen	:	74
9.	East campus Near Lake view Hostel	:	68
10.	East campus inside Lake view Hostel Mess	:	72
11.	West Campus Main Gate		76
12.	West Campus Near Hostel Area		68
13.	West Campus Near Residential Staff Blocks		60
14.	West Campus Hostel Mess		72

Table:3.8 Permissible Noise Exposure (Working Areas)

Exposure Time (hrs/day)	Limit in dB (A)
8	90
4	93
2	96
1	99
1/2	102
1/4	105
1/8	108
1/16	111
1/32 (2 min. or less)	114

Exposure to continuous or intermittent noise louder than 115 dB (A) should not be permitted. Exposure to pulse or impact noise should not exceed 140 dB (Peak acoustic pressure)

ANY OTHER PARTICULARS IN RESPECT OF ENVIRONMENTAL PROTECTION AND ABATEMENT OF POLLUTION

(i) Fast & high growing trees will be planted in Areas still lying vacant in and around the university boundary & owned areas.

(ii) The frequency of Awareness programmes for environmental protection may be increased.

(iii) The university authorities have planned to install a Sewage Treatment Plant (STP) for east & west campus.

(iv) The university has planned to fulfill the stipulated compliances/consents as needed by the pollution abatement authorities in near future.

4. HEALTH AND SAFETY AUDIT

4.1 PROLOGUE

The broad objectives of the health and safety Audit studies undertaken at HBTU, Kanpur , was to critically evaluate the safety and health programmes ; particularly the systems provided to identify and control hazards; and ensure that they not only comply with the minimum statutory standards but also meet the standard codes of practices.

4.2 SCOPE

Audit studies undertaken covered the following aspects of HBTU:-

(i) Safety in storage and transportation of chemicals used in HBTU Labs

(ii) Safe handling of chemicals during lab work

(iii) Chemical Hazards and their control - covering ventilation and exhaust systems, work zone environment monitoring and personal protective equipments.

(iv) Fire prevention and protection

(v) Safety management

(vi) Emergency preparedness

The following aspects were covered under "Safety management":

(i) Safety policy

(ii) Involvement of all departmental heads

(iii) Assignment of responsibility and Accountability

(iv) Safety department

(v) Safety manual

(vi) Safety training of some academic & office staff.

(vii) Accident reporting, investigation and analysis

(viii) Safety promotion and publicity

(ix) Medical Department first-aid, periodical medical examinations etc.

4.3 METHODOLOGY

"Methodology" adopted for conducting Health and Safety Audit at HBTU is enumerated as follows:

1. Preliminary information was collected through questionnaire to assess the existing systems.
2. Audit exercises including the time frame, special focus areas, collection and study of relevant records, safety manuals were planned
3. Pre-Audit meeting was conducted with concerned personnel of HBTU and objectives and methodology was explained to obtain their support.
4. All Academic areas / lecture rooms were visited, following the class schedule.
5. Inspection of all supporting services of HBTU like sub-station, , chemical stores, workshop was undertaken during "on-site" and discussed with HOD`s supervisors and workers regarding the safety and health aspects.

6. Perusal of records and study of key documents was undertaken

7. Fire and medical departments were visited.

HBTU has given high priority to safety and has a relatively good record. The potential hazard, financial cost and losses as well as growing awareness about the above dangers require HBTU to spend considerable efforts for loss prevention and reducing risk of accidents.

4.4 SAFETY MANAGEMENT

During our audit studies, it was observed that the university has always given its full concern towards implementing and compliance of safety standards as stipulated.

Documentation review was undertaken during our studies which spoke about their high safety standards. The university holds a record of maximum working days of safe academic activities.

4.4.1 SAFETY POLICY

HBTU believes that the safety of each student/staff is the fundamental responsibility of the university and hence safety must be thoroughly integrated with efforts to produce high quality education & placement. It was observed that the safety policy which is recently approved by the university concerned is well defined. A copy of the policy is being made available to all concerned HOD`s, it should further be displayed at prominent locations. It was observed that there is an effective routine flow of health / safety & other relevant information at all appropriate levels through formal

mechanism i.e. line management and framed committees for the purpose.

AUDITOR'S NOTE SUGGESTIONS

1. The internal audit of the university is presently carried out by designated group with HOD of the concerned department once in two years as per their existing practice. It is suggested that the same should be conducted by a multi-disciplinary team and frequency should be increased.
2. It is required to strengthen the awareness among the students/staff regarding the safety aspects through proper motivation like arranging safety slogan contest, quiz contest etc.

4.4.2 SAFETY DEPARTMENT

The university has a designated safety system as required for maintaining discipline & to meet out any security threat. The safety personnel have adequate equipments for safety and monitoring process. Safety functions needs to be further reinforced to give special emphasis on unauthorized entry in the university campus.

4.4.3 SAFETY MANUALS

Safety manuals, fire emergency manuals, may be published and distributed once a year. Manuals on safety & health aspects are to be procured both in English and regional language and should be made available to all HOD`s & DSW.

4.4.4 SAFETY TRAINING

Training in fire prevention and safety related topics should also be a designated activity of the university. The training on the following topics may be arranged:

(i) Basics of fire prevention and fire fighting.

(ii) Usage and limitations of safety equipments.

(iii) Role of HOD`s & all concerned in Safety.

AUDITOR'S NOTE / SUGGESTION

The following should also be included in training programmes :

(i) First-aid training

(ii) Safety aspects during chemical handling.

(iii) It is observed that presently only few staff are trained to use fire - extinguishers. The number of such trained staff & student volunteers may be increased.

(iv) Fire escape routes should be identified and clearly indicated especially in student hostels.

4.4.5 MEDICAL FACILITIES AVAILABLE AT HBTU

1. A well equipped dispensary with qualified doctor and staff is available in the university east campus the serious injured or sick are referred to the collaborated nursing homes in the vicinity. The first aid centre works during day time for primary first aid services and serious cases are sent to hospitals. First

aid boxes are also provided in each department. The general illness cases treated at the first aid centre is shown in table 4.1

2. Periodical medical test of students/staff may also be practiced.

AUDITOR'S NOTE / SUGGESTIONS

1. It was observed that in most of the cases, the root cause of accidents was not generally stated in the reports. It is suggested that it is a must to establish the root cause to arrive at correct scenario.

2. It is observed that students/staff handling the chemicals are not using personal protective equipments like acid / alkali proof gloves, force shield, PVC apron, gum boots to the tune of 100%. It is felt that safe procedures for handling the chemicals should be explained and displayed to ensure the optimum usage of safety equipments.

3. During the study it was observed that ventilation in some Labs is not good and adequate air circulation has to be maintained by providing exhaust fan and forced draft system. The fume respirators and air masks shall be periodically inspected by the safety personnel.

4. "Goggles use" in required labs should be made compulsory.

4.4.6 SAFETY PROMOTION AND PUBLICITY

Communication system should be developed between students and staff on safety aspects through some Safety procedure.

4.4.7 Equipments Requirement for in-house safety promotion within university campus

(i) External Telephone

(ii) Internal Telephone

(iii) Cell Phone

(iv) Site Plan with details

(v) Municipal map of surroundings showing concentration of population as appropriate with major safety and fire fighting facilities available.

(vi) Format display containing names of key personnel in the university and outside authorities along with their names, telephone numbers and residential addresses.

(vii) Public address system

4.4.7.1 COMMUNICATION SYSTEM

In case of emergency the effective functioning of communication system plays a vital role. It helps for an early action and lot of time could be saved for communication. At HBTU the facilities for communication, internal and external, are as follows:

- Internal telephone sets
- Cellular phones.

4.5 SAFETY IN STORAGE, HANDLING AND TRANSPORTATION OF CHEMICALS

The university has an on - site emergency plan which is satisfactory for an university of its size.

The chemicals are stored in separate storage areas the solvent used are stored in specially designed area within the university east premises. The department store obtains the required material from the main store and effect supply to the user departments according to their requirements.

4.5.1 AUDITOR'S NOTE / SUGGESTIONS

i) Cautionary notices with the precautions to be taken during any spillage or any bodily contacts due to mishandling should be displayed near the storage and user department areas.

ii) The university staff & students should be made aware of the planned colour codes which will be used within the university in near future.

iii) It should be ensured that maximum staff member/student shall be well-versed in handling any emergency situation and their roles in team work should be well defined.

4.5.2 ANALYSIS OF STORAGE SAFETY

Identification of hazards is of prime significance in safety and health audit. A classical definition of hazard states that hazard is in fact the characteristics of system / chemical storage that presents potential for an accident. Hence, all the chemicals / fuels stored need to be thoroughly examined to assess their potential for initiating an unplanned event / sequence of events which can be termed as an accident.

Estimation of probability of occurrence of an unexpected event and its consequences form the basis for quantification of risk in terms of damage to property, environment or personnel.

The following two methods for hazard identification have been employed in this study:

1. Based on manufacture, storage and import of Hazardous chemical rules, 1989 of government of India (GOI rules 1989)
2. Identification of storage areas based on relative ranking technique, viz; fire explosion and toxicity index (FETI)

Table 4.2 highlights lists the hazardous properties of major chemicals used or stored at HBTU. Table 4.3 depicts the applicable GOI rules for storage of hazardous chemicals.

The risk and consequence analysis report provided by HBTU reveal that safe distances are available for Lab gases, O_2 ,LPG, and HSD storage in case of explosion or fire.

4.6 LAB & WORKSHOP SAFETY

At HBTU it was observed that the equipments, machines and control systems are modern and based on fail safe principles in operation and are of reputed make. It is suggested that the process operating manuals should be regularly reviewed and updated as required. However it is recommended that procedures are to be formalised and maintenance of separate registers for safety interlock / trips giving their status whenever these are bypassed is a must. It is advised to introduce MIS on the status of trips and interlocks bypassed to enable management to take appropriate actions as deemed necessary.

4.7 CHEMICAL HAZARD AND THEIR CONTROL

In order to ensure safety of the students/staff personal safety equipments as listed in table 4.4 are to be issued to students/staff. The HOD`s should be instructed to have a close watch on the usage of these equipments by the students/staff. The students should also be well trained in using the personal protective equipments. Table 4.5 lists the major hazard areas and probable causes of fire in the university.

4.8 FIRE PREVENTION FACILITIES

4.8.1 FIRE WATER NETWORK

A well maintained internal cement lined fire water static tank is present at the west campus as per fire insurance regulations. Thereafter, the hydrants and monitors should be checked as per schedule and the records should be maintained. The fire water network should always be kept charged at a maximum pressure of 5 kg / cm^2. It is suggested for installation of low pressure alarms at fire control room and at High lift pump house. These alarms actuate when the pressure falls to 3 kg/cm^2 so that the marked pressure can be boosted up by running another fire water pump without loss of time.

4.8.2 REQUIREMENT OF WATER MONITORS

There should be 2" water monitors to meet out any case of eventuality. The fire hydrants should be located as such to cover the

full university premises, it should also be seen that they also follow the TAC guidelines.

4.8.3 DCP AND CO_2 EXTINGUISHERS / HALON SYSTEM

All the installed fire extinguishers were inspected and tested & it was found that they are as per schedule and records are maintained through CARDEX system, the history of each fire tender is logged in the history cards.

4.8.7 AUDITOR'S NOTE / SUGGESTIONS

As per procedure, one mobile equipment vehicle and one more ambulance are also required to reach the accident site in any case of emergency. It is suggested that regular mock drill shall be conducted at least every year and disaster mock drill once in six months.

4.9 ELECTRICAL SAFETY

4.9.1 RELAYS

All electrical relays are checked at intervals and records are being maintained. It is suggested that the frequency of checking should be one year.

4.9.2 PREVENTIVE / PREDICTIVE MAINTENANCE OF MOTORS, BREAKERS AND TERMINAL BOXES

Most of these equipments are attended as and when required. It is suggested that predictive and preventive maintenance for all equipment should be carried out and records maintained.

4.9.3 PREVENTIVE MAINTENANCE OF TRANSFORMERS

All transformers are checked on a yearly schedule for acidity, dielectric strength, earth-pit resistances and records are maintained.

4.9.4 EARTH RESISTANCE OF OTHER EQUIPMENT AND STORAGE TANKS

The earth resistance is checked whenever earthling strip is found broken/disengaged. HBTU maintenance dept. may review this practice. It would be advisable to check earthling resistance once a year and records maintained.

4.9.5 PREDICTIVE /PREVENTIVE MAINTENANCE FOR ELECTRICAL EQUIPMENTS

Regarding predictive / preventive maintenance, testing of electrical relays is done for limited equipment. All equipment are to be covered under predictive / preventive maintenance and the critical relays shall be tested and calibrated once a year. The test records have to be well documented.

4.9.6 PRESSURISATION SYSTEM OF ELECTRICAL SUBSTATION

Feasibility of pressurization of electrical substation may be further re-examined to access the vulnerability of substation administrative building, class-rooms etc. from storage area of LPG, Lab used gas cylinders and HSD.

AUDITORS NOTE/SUGGESTIONS

i) Schedule maintenance of the required vulnerable areas should be practiced.

ii) Exhaust fans should be provided to extract fumes and emissions from general & research labs.

iii) No combustible material should be stored in compressed gas cylinder area.

iv) Emergency lights may also be provided in such areas to face any case of eventuality, including solar based also.

Table:4.1 Details Of general Cases Treated At First Aid Centre

Month	General illness cases
Apr. 24	120
May-24	155
June-24	130
July-24	58
Aug-24	47
Sept-24	27
Oct-24	40
Nov-24	30
Dec- 24	20
Total	**627**

Table:4.2 Hazardous properties of major chemicals used or stored

S.No.	Name of Chemical	State	Toxicity	Flammability	Reactivity
1.	H_2SO_4	Liquid	1 mg/m^3	Non-combustible	Moderate
2.	HCL	Liquid	5 ppm	Non-combustible	Non-Reactive
3.	LPG	Liquefied Gas	10 ppm	Flammable (1A)	Slightly
4.	HSD	Liquid	-	Flammable (1C)	-

Table:4.3 Applicable rules for storage of Major Chemicals Used

S.No.	Name of Chemical	Listed in Schedule No.	Stored/ Quantity	Threshold Quantity for Applicability of Rules (T)		Applicable Rules
				5,7-9,13-15	10-12	
1.	LPG	1(II)	200 Kg.	15	200	4(1)(a), 4(2)(i)
2.	HCL	1(II)	100 Kg.	NA	NA	4(1)(a), 4(2)(i), 17
3.	H_2SO_4	1(II)	100 Kg.	NA	NA	4(1)(a), 4(2)(i), 17
4.	Caustic	1(I)(a)	200 Kg.	NA	NA	4(1)(a), 4(2)(i), 7-15
5.	HSD	-	800Lts	1000	5000	4(1)(a), 4(2)(i)

Table 4.4 : Personal Safety Equipments

S.No.	EQUIPMENTS
1.	Safety Helmets
2.	Ear Muffs
3.	Acid Protection Goggles
4.	Gas Cutting Goggles
5.	Plastic Spectacles
6.	Face Shield
7.	Hand Gloves PVC (Acid and Alkali Proof)
8.	Hand Gloves-White Rubber
9.	Hand Gloves – Electrically Tested
10.	Gum Boots – Electrically Tested
11.	Self Contained Breathing Apparatus Sets
12.	Safety Belts
13.	Gas Testers
14.	Fire Entry Suits

Table:4.5 Major Hazard Areas And Probable Cause Of Fire

HAZARD	AREA	PROBABLE CAUSE
Fire	**(a)** LPG Storage	Leakage of LPG Through valves, flanges, pipelines, tanks, etc., and any source of ignition
	(b) HSD Storage Tank	- (a) Tank on fire (b) Leakage oil through valves, flanges, pipelines, tanks etc. or any source of ignition
Explosion	**(a)** LPG& other lab gas Storage	Leakage from the storage tank can form a flammable could and its subsequent ignition.

Table: 4.6 Parameters Of Hazard Potential

S.NO.	Parameters	Characteristics
1.	Corrosivity	Wastes which have a pH of less than 2 or greater than 12, or which corrode steel at rate greater than 6.35 mm per year at 55^0C
2.	Reactivity	Wastes, which are unstable and spontaneously react with water or air generate toxic gases and explode due to shock or heat.
3.	Ignitability	Wastes, which spontaneously ignite in dry or moist air or heat.
4.	Toxicity	Wastes which release toxic materials on leaching in sufficient amounts to pose a substantial hazard to human health or environment as measured by the toxicity characteristics leaching procedure (US, EPA)

TABLE 4.7 : FIRE FIGHTING EQUIPMENT

(A)	**Fire Fighting Vehicles**		**Nil**
	Static Water Tank		**1 Nos**
	Trolley Mounted Emergency Lights		**1 Nos**
	Ambulance	-	1 Nos.
(B)	**Extinguishers**		
	5 to 70 Kg D.C.P. extinguishers	-	1
	3.2 to 2.25 Kg CO_2 extinguishers	-	5
	9 Lts Soda acid extinguishers	-	5
	5 Kg Halon extinguishers	-	1
	9 Lts to 50 Lts foam extinguishers	-	2
	ABC Type extinguishers		10
(C)	**Fire Fighting Equipments**		
	Fire hoses	-	4
	Water nozzles	-	4
	Sand buckets	-	50

Refilling is being done as per schedule

5. ENVIRONMENTAL MANAGEMENT PLAN

This chapter describes the environmental management measures required to minimize the adverse impacts due to academic & else allied activities including pollution control measures and development of green belt to overcome the adverse effects. Long-term environmental management options such as the formation of an environmental management cell are also given.

1 POLLUTION CONTROL MEASURES

Considering the various potential sources of pollution, pollution control measures are suggested at either the source of pollution or the receiving environmental component. Formulation of these measures at the planning stage rather then after the implementation stage of the project development will help to keep the pollution control cost to a minimum. The pollution control measures for the present phase is described below :

(i) Air Pollution Control

Good house-keeping including regular disposal of domestic refuse & air borne dust are measures to preserve the ambient air quality of the surrounding area. The HBTU has already installed stacks of recommended height on gen-sets to minimize air pollution from its premises. The suspended particulate matter emitted from the other actvities still needs proper entrapment device to further minimize the air pollution

from the premises. Ambient air quality / stack monitoring should be practiced at least yearly.

(ii) Noise Pollution Control :

The sources of Noise Pollution are the vehicular traffic coming in and out of the premises & gen-sets. The green belt of 2.5 mtrs. wide inside throughout the campus, adjacent to the boundary wall will act as a barrier to effectively reduce noise level from outside sources.

(iii) Water Pollution Control :

The sources of waste water generated from HBTU is mainly domestic in nature which is being presently discharged in corporation main trunk sewer line. The installation of STP should be planned accordingly.

(iv) Green Belt Development :

HBTU has to further develop 2.5 mtr wide green belt inside the university boundary. Improvement and more plantations of particular species for control of air and noise pollution are recommended. Choice of species shall be based on gaseous exchange capacity of foliage which is ascertained by following characteristic:

(a) The plant shall be fast growing,

(b) It shall have thick canopy cover,

(c) It shall be perennial and evergreen,

(d) It shall have large leaf area index,

(e) If shall be indigenous,

(f) It shall be efficient in absorbing pollutants without.

Significantly effecting plant growth.

For roadside plantation, the following species are generally considered suitable :

(a) Cassia Seamea (Cassia),

(b) Peltophorum SP (Walf),

(c) Samanea Saman (Raintree),

(d) Putrnjiva Maculata (Madurai shade tree),

(e) Saraca India (Ashoka)

(f) Pongamia Glabra (Karaji)

(g) Greviullea robusta (Silver oak)

(h) Bauhinia Varriequata (Bahunia)

(i) Spathodea Comoanualala (Spathodea) and

(j) Gmelina arborea (Gambhar)

Minimum two rows of plants are required for road side plantation to minimize the pollution effects. Care shall be taken to ensure that the plants in the second row are staggered between the plants of first row.

Plant species for protection against gases and particulates :

(a) Butea monosperma (Dhak)

(b) Cassia fistura (Aamaltash)

(c) Cassia siamea (Kassod

(d) Casurina Equiactifolir (Junglisuru)

(e) Citrila Toona (Mahaneem)

(f) Daldergia sissoo (Shisham)

(g) Dillenia indica (Chalta)

(h) Erythrina suber osa (Daldhak)

(i) Ficus religiosa (Pipal)

(j) Handwickia binata (Anjan)

(k) Matchuca indica (Mahua) and

(l) Millingtonia hortensis (Akash nim)

Plant species for reduction against noise level :

(a) Aazadirachta indica (Neem)

(b) Aegle marmelos (Bel)

(c) Cassia Siamia (Chakundi)

(d) Albizzia tracera (Dhala sirisa)

(e) Carissa carandas (Karoundha)

(f) Peltophorum inerme (Perungondrai)

(g) Saraca indica (Ashoka)

(h) Syzgium cimunii (Zaman)

(i) Tamarindus indica (Imli)

(j) Thivetia peruviana (Pilekaner)

(k) Pongania pinnata (Beng)

2. ENVIRONMENTAL MANAGEMENT CELL

HBTU has to setup an Environmental Management Cell (EMC) to address environmental management concerns related to university. The cell will be manned by qualified persons who will be responsible for regular environmental quality monitoring proper operation of pollution control equipments and liaison with regulatory bodies such as Central Pollution Control Board (CPCB) and the Uttar Pradesh Pollution Control Board (UPPCB).

(i) Functions of EMC

The EMC will monitor the environmental aspects of the university. The cell personal will visit the different departments to make sure that EMP is implemented. During the academic session of the university, the EMC of the HBTU will be responsible for the following:

- To monitor and analyze air, noise & water samples on a regular basis.
- To ensure systematic and routine house-keeping at the different departments of the university campus.
- To maintain green belt inside and outside the university campus.
- To create awareness of pollution hazards among all personnel/students.

- Monitor and control water leakage or damage if any during the university academic sessions.

(ii) Personnel & Equipments :

The EMC will be headed by an manager (Environment), who will have overall basic knowledge of Pollution Control Equipment and their maintenance, environmental laws & standards and will be able to manage the cell independently. A chief chemist who will be capable of carrying out analysis and preparing reports and data sheets will support the EMC in-charge. He should have sufficient knowledge of sampling and analysis of environmental parameters. In addition the following staff a recommended in the laboratory :

- One Laboratory In-charge
- One Chemist
- One Field Assistant

The Analytical Laboratory already existing in the university should be involved in the EMC to carry out routine analysis & the lab should be equipped with the following instruments :

- A good quality “Noise Meter”, particularly useful for noise survey which is known as “Survey Noise Meter”, should be purchased.

- A good quality "Noise Dose Meter" to understand the extent of exposure of students/staff during academic hours, should also be procured and used for monitoring.
- Facilities for water quality assessment as available are as follows :
  - Single Pan Balance
  - pH meter
  - Conductivity Meter
  - Turbidity meter
  - Analyser for nitrates, sulphates
  - BOD/COD analyzing system
  - Chlorides and Fluorides Testing kit
- Facilities for air quality assessment to be procured are as follows :
  - High Volume Sampler
  - DG Stack Monitoring equipment

3. SCHEDULE OF MONITORING PLAN

The schedule of monitoring plan will be divided into two sets of activities. Environmental monitoring should be carried at representative locations to ensure that the environmental quality in the surroundings of the HBTU is maintained and enhanced. Presently the monitoring is done on yearly basis.

(i) Environmental Monitoring :

To monitor the extent to environmental impacts due to the ongoing academic & allied activities, it is advisable to periodically monitor the ambient environmental quality surrounding the HBTU. This section describes the environmental quality monitoring detailing number and location of sampling stations, parameters to be monitored, frequency of sampling etc. The following environmental components will be monitored on a regular basis surrounding the university.

- Level of SO_2 and NO_x and PM in surroundings of the university campus will be monitored at three hourly intervals for 24 hours and CO (for a duration of 24 hours at one hour intervals) at least once a year. In addition, one micro metrological station may be installed at HBTU. Data collected will be digitally recorded.
- Noise monitoring will be carried out near the periphery of HBTU once in three months. Portable noise meters will be used for the purpose.

- HBTU being a academic institute so it becomes necessary to monitor the raw water quality at regular intervals.

4. EXPECTED COST INCURRED TO IMPLEMENT EMP

The cost of EMP given here includes only for the laboratory / analysis facilities and green belt development. The cost of laboratory equipment suggested is expected to cost approximately 6 lacs. The cost of green belt development is expected to be Rs. 7.0 lacs. The solid waste that is generated from the HBTU hostel mess/canteens is of food grade. Hence should be totally sold or disposed off as cattle-feed or in-house bio-composting.

6. DEVELOPMENT OF GREEN BELT

The HBTU authorities have always stressed the need of appropriate green belt area within & outside the university boundary. Thus the university has covered the maximum available area for development of green belt. To further increase the green-belt area the scheme is proposed as follows:

As per the movement of the prevailing wind direction at the plant site on yearly average basis, it can be said that the wind can rotate through all the angles and the specific direction movement cannot be considered.

Thus considering the scattered nature of fugitive emissions sources it is proposed to carry out extensive tree plantation along the roads, fuel stockpile and all other areas wherever feasible. In areas where it is not feasible to plant tall trees, shrubs and bushes are to be planted.

The guidelines for development of G.B. around and inside the unit are described in subsequent paragraphs.

GENERAL GUIDE LINES :

Trees growing upto 10 mtr. or more in height should be planted around the installation.

- Planting of trees should be undertaken in appropriate encircling rows around the installation in alternating rows to prevent horizontal pollution dispersion.

- Trees should be planted along the roadsides, to arrest the dust, auto-exhaust and noise pollution in such a way that there is no sight to the installation when viewed from a point outside foliage perimeter.
- Since tree trunks are normally devoid of foliage (upto 2 mtrs.), it would be appropriate to have shrubs in front of such trees to give coverage to this portion.
- Fast growing trees with thick perennial foliage should be grown, as it will take years for trees to grow to their full height.

The suitable plant species for development of green belt are enumerated as shown in the table.

Plant Species Identified for Green Belt Development

S.No.	Plant Species	Vernacular Name
1.	Alibizzia lebbek	Kalsiris
2.	Terminalia arjuna	Arjun
3.	Cassia Fistual	amaltas
4.	Polyalthia longifolia	Asoka
5.	Embelica officianalis	Amala
6.	Bauhinia variegata	Kachnar
7.	Mitragyna parviflora	Kadamb
8.	Pongamia pinnata	Kranj
9.	Cassia siamea	Kasod
10.	Dalbergia sissoo	Sheesham
11.	Delonix regia	Gulmohar

12.	Ficus glomerata	Gular
13.	Acacia nilotica	Keekar
14.	Cacia catechu	Khair
15.	Acacia arabica	Babul
16.	Syzygium cumini	Jamun
17.	Mimusops elangi	Maulsiri
18.	Madhuca indica	Mahua
19.	Ficus bengalensis	Bargad
20.	Ficus religeosa	Peepal
21.	Azadirachta indica	Neem
22.	Casurina equisitifolia	Jhau
SHRUB		
23.	Nerium odourum	Kaner
24.	Parkinsonia aculeate	Vilayati Jhau
25.	Hibiscus rosasinesis	Gudhal
26.	Dracaena	
27.	Callistemon Ianceolatus	Bottle brush
28.	Salvadora oleoids	Peelu
29.	Zizyphus mauritiana	Ber
30.	Lantana camara	Kuri
31.	prosopisjuliflora	Vilayati babul

The plant-to-plant and row-to-row spacing on each greenbelt strip is 5 mtr. Depending upon the width of the greenbelt, the number of plant rows in each green belt varies from 4 to 17.

On roadsides 3 or 2 rows of plants on either side, the tree positions in the first row on either side will be in a staggering fashion with respect to those in the first row. In case of tree positions on the greenbelt strips also, tree positions in each row will be in a staggering fashion with respect to those on either side rows.

7. SUGGESTED KARNAL TECHNOLOGY FOR IRRIGATION/GARDENING FROM DOMESTIC EFFLUENTS

There is substantial generation of domestic streams from East & West campus of the university & the same is being presently discharged without any treatment. Thus, considering the facts & presence of unutilized land within the premises & especially in the West campus area of the university, it is suggested for utilization of the waste water streams by the way of incorporating the "Karnal Technology" for irrigation & gardening.

The Karnal Technology will involve growing trees on ridges 1m wide and 50cm high and disposing of the untreated sewage in furrows. The amount of the sewage/ effluents to be disposed off will depend upon the age, type of plants, climatic conditions, soil texture and quality of effluents. The total discharge of effluent will be so regulated that it is consumed within 12-18 hours and there is no standing water left in the trenches. Through this technique, it will be possible to dispose off 0.3 to 1.0 MLD of effluent per day per hectare. This technique utilizes the entire biomass as living filter for supplying nutrients to soil and plant; irrigation renovates the effluent for atmospheric re-charge and ground storage. Further, as forest plants are to be used for fuel wood, timber or pulp, there is no chance of pathogens, heavy metals and organic compounds to enter into the human food chain system, a point that is a limiting factor when vegetables or other crops are grown with sewage.

Though most of the plants are suitable for utilizing the effluents, we shall use tree species which are fast growing and which transpire high amounts of water and are able to with stand high moisture content in the root environment as best suited for the

present purpose. Eucalyptus is one such species, which has the capacity to transpire large amounts of water, and remains active throughout the year.

Other species suitable for this purpose are Poplar and Leucaena. Out of these three species, eucalyptus will be the best choice as poplar remains dormant in winter and thus cannot bio-drain effluent during winter months. However, if area nearby will be available and considering the volume of effluent, a combination of popular and eucalyptus is planned for propagation. This technology for such nutrient loaded water use is relatively cheap and no major capital is involved. The expenditure of adopting this technology involving the cost of making ridges, cost of plantation and their care shall be the part of the installed ETP.

This system will generate gross returns from the sale of fuel wood. The sludge accumulating in the furrows along with the decaying forest litter will be exploited as an additional source of revenue. As the generated effluents will itself provide nutrients for irrigation & it will ameliorates the sodic soil by lowering the pH. Relatively unfertile wastelands can be used for this purpose. This technology will be economically viable as it will involve only the cost of water conveyance from source to the site for irrigation and does not require highly skilled personnel as well. This technology seems to be most appropriate and economically viable proposition for such campus as this technology will be used to raise forestry, which would aid in re-storing environment and to generate biomass.

8. GUIDELINES FOR EMERGENCY PREPAREDNESS PLAN

8.1 INTRODUCTION

The off-site emergency plan is an integral part of any major hazard control system. It should be based on those accidents identified by the works management, which could affect people and the environment outside the works. Thus, the off-site plan follows logically from the analysis that took place to provide the basis for the on-site plan. The two plans therefore complement each other. The off-site plan in detail should be based on those events which are most likely to occur, but other less likely events which would have very severe consequences but have a small probability of occurrence will be in this category, although there will be certain events which would have severe consequences should also be considered.

The roles of the various parties who may be involved in the implementation of an off-site plan are described below. The responsibility for the off-site plan will be with the local authority. Either way, the plan must identify an emergency coordinating officer who would take overall command of the off-site activities. As with the on-site plan, an emergency control centre will be required with which the emergency coordinating officer can operate.

An early decision will be required in many cases on the advice to be given to people living "within range" of the accident - in particular whether they should be evacuated or told to go indoors. In the latter case, the decision can regularly be reviewed in the event of an escalation of the incident. Consideration of evacuation may include the following factors:

- In the case of a major fire but without explosion risk for example from an oil storage tank, only houses close to the fire are likely to need evacuation, although a severe smoke hazard may require this to be reviewed periodically.
- If a fire is escalating and in turn threatening a store of hazardous material, it might be necessary to evacuate people nearby, but only if there is time; if insufficient time exists, people should be advised to stay indoors and shield themselves from the fire. This latter case particularly applies if the installation at risk could produce a fireball with very severe thermal radiation effects for example from gas storage.

Although a plan should have sufficient flexibility built in to cover the consequences of the range of accidents identified for the on-site plan, it is suggested that it should cover in some detail the handling of the emergency to a particular distance from each major hazard works. This distance may be judged to be similar to the separation zone distance.

8.2 ASPECTS TO BE INCLUDED IN EPP

The following guidelines have been given on some of the aspects to be included in off-site emergency plans.

Organization

Details of command structure, warning systems, implementation procedures, emergency control centres, names and appointments of incident controller, site main controller, their deputies and other key personnel.

Communications

Identification of personnel involved, communication centre, call signs, network, lists of telephone numbers

Specialized Emergency Equipment

Details of availability and location of heavy lifting gear, bulldozers, specified fire-fighting equipment.

Specialized Knowledge

Details of specialist bodies, firms and people upon whom it may be necessary to call, e.g. those with specialized chemical knowledge, laboratories.

Voluntary Organizations

Details of organizers, telephone numbers, resources, etc.

Chemical Information

Details of the hazardous substances stored or processed on each site and a summary of the risks associated with them

Meteorological Information

Arrangements for obtaining details of weather conditions prevailing at the time and weather forecasts

Humanitarian Arrangements

Transport, evacuation centres, emergency feeding, treatment of injured, first aid, ambulances, temporary mortuaries

Public Information

Arrangements for dealing with the media press office, informing relatives, etc.

Assessment

Arrangement for collecting information on the causes of the emergency, reviewing the efficiency and effectiveness of all aspects of the emergency plan

8.3 ROLE OF EMERGENCY COORDINATING OFFICER

The various emergency services will be coordinated by an emergency coordinating officer (ECO) who is likely to be a senior police officer but, depending on the circumstances, could be a senior fire officer. The ECO will liaise closely with the site main controller. Again depending on local arrangement, for very severe incidents with major or prolonged off-site consequences, the external control may pass to a senior local authority administrator or even an administrator appointed by the central or state government.

8.4 ROLE OF MAJOR HAZARD WORKS MANAGEMENT

Where the local authority has the organization to formulate the plan, the role of works management in off-site emergency planning will be to establish liaison with those preparing the plans and to provide information appropriate to such plans. This will include a description of possible on-site accidents with potential for off-site harm, together with their consequences and an indication of the relative likelihood of the accidents.

Advice should be provided by works managements to all the outside organizations which may become involved in handling the emergency off site and which will need previously to have familiarized themselves with some of the technical aspects of the works activities, such as emergency services, medical departments and also water authorities, if water contamination could be a consequence of an accident.

8.5 ROLE OF LOCAL AUTHORITY

In many countries the duty to prepare the off-site plan lies with local authorities. They may have appointed an emergency planning officer (EPO) to carry out this duty as part of the EPO's role in preparing for a whole range of different emergencies within the local authority area. the EPO will need to liaise with the works to obtain the information to provide the basis for the plan. This liaison will need to be maintained to ensure that the plan is continually kept up to date.

It will be the responsibility of the EPO to ensure that all those organizations which will be involved off-site in handling the emergency know about their role and are able to accept it by having, for example, sufficient staff and appropriate equipment to cover their particular responsibilities.

Rehearsals for off-site plans are important for the same reason as on-site plans and will need to be organized by the EPO.

8.5.1 Role of Police

The overall control of an emergency is normally assumed by the police, with a senior officer designated as emergency coordinating

officer. Formal duties of the police during an emergency include protecting life and property and controlling traffic movements. Their functions include controlling by standards, evacuating the public, identifying the dead and dealing with casualties, and informing relatives of death or injury.

8.5.2 ROLE OF FIRE AUTHORITIES

The control of a fire is normally the responsibility of the senior fire brigade officer who would take over the handling of the fire from the site incident controller on arrival at the site. The senior fire brigade officer may also have a similar responsibility for other events, such as explosions and toxic releases. Fire authorities having major hazard works in their area should have familiarized themselves with the location on site of all stores of flammable materials, water and foam supply points, and fire-fighting equipment. They may well have been involved in on-site emergency rehearsals both as participants and, on occasion, as observers of exercises involving only site personnel.

8.5.3 ROLE OF HEALTH AUTHORITIES

Health authorities, including doctors, surgeons, hospitals, ambulances, etc., have a vital part to play following a major accident, and they should form an integral part of any emergency plan.

For major fires, injuries will be the result of the effects of thermal radiation to a varying degree, and the knowledge and experience to handle this in all but extreme cases may be generally available in most hospitals. For major toxic releases, the effects vary according to the chemical in question, and it is important for health

authorities who might be involved in dealing with the aftermath of a toxic release to be familiar with the treatment appropriate to such causalities.

Major off-site incidents are likely to require medical equipment and facilities to those available locally, and a medical "mutual aid" scheme should exist to enable the assistance of neighboring authorities to be obtained in the event of an emergency.

8.5.4 ROLE OF SAFETY AUTHORITIES

Local authorities likely want to satisfy themselves that the university responsible for producing the off-site plan has made adequate arrangements of handling emergencies of all types, including major emergencies. He may wish to see well-documented procedure and evidence of exercises undertaken to test the plan.

In the event of an accident, local arrangements regarding the role of the designated head will apply. These may vary from keeping a watching brief to a close involvement in advising on operations. In cases where toxic gases may have been released, the university authorities may be the only external agency with equipment and resources to carry out tests.

In the aftermath, the designated head may wish to ensure that the affected areas are rehabilitated safely. In addition, they may require items of plant and equipment essential for any subsequent investigation to be impounded for expert analysis, and may also want to interview witnesses as soon as practicable.

8.6 EMERGENCY EXERCISES AND REHEARSALS

Extensive experience for such universities with on-site emergency planning has proved the need and value of rehearsals of emergency procedures. The responsible persons for producing the off-site plan should test its arrangement in conjunction with on-site exercises. Table-top rehearsals have proved extremely useful in such cases, although they need close control to maintain a sufficient element of realism in the exercises.

An essential component of any trial is that of testing fully the various communication links necessary to gather the information needed for overall coordination, e.g. between works and emergency services, and between the works emergency control centre and the incident.

Management of major hazard works are well placed to advise on the setting up of rehearsals, and particularly to advise on the scope for an escalation in the degree of emergency.

8.7 STRUCTURE AND ELEMENTS OF EMERGENCY RESPONSE SYSTEMS

While differing in particulars, depending on the scope of the emergency, all response systems should include the following elements.

8.7.1 THE ALERT SYSTEM

This requires the establishment of suitable alarm systems, and a standard procedure for transmitting the information on the occurrence of an accident to the appropriate focal point. The focal

point may move up in the hierarchy, depending on the level of the accident.

8.7.2 EVALUATION OF SITUATION, CLASSIFICATION OF THE ACCIDENT

Basic information must be provided enabling preliminary classification of the accident, probable consequence and actions required. This initial appraisal would normally be conducted by the person named as the focal point. At the same time, detailed data and information related to the accident are collected and internal, as well as external, expertise may be requested.

8.7.3 DECISION AND ALERTING OF THE EMERGENCY RESPONSE SYSTEM

In most accidents, time is a most important factor in cases of explosions, sudden release of dangerous quantities of toxic chemicals into the environment and decisions must often be based only on preliminary data and insufficient expertise. Decisions should be verified and corrected as soon as possible.

8.7.4 PROVISION OF INFORMATION

Adequate flow of information must be assured to all relevant parties to ensure effective and fast response to the accident. The information should be addressed to the following:

- ✶ University management, and locals in vicinity

- The focal point of a higher level
- Fire brigade
- Police
- Public health services, hospitals
- Construction firms
- Public
- Others

8.7.5 PROVISION OF EXTERNAL HELP

In many instances, accidents involving the release of toxic chemicals into the environment cannot be effectively contained nor can the adverse impacts be minimized without some external help or advice. Some examples of the help or advice required include access to relevant information, particularly to toxicological data, allowing classification of the accident and the provision of qualified advice concerning protective equipment and remedial measures necessary.

8.7.6 DECISION ON IMPLEMENTATION OF PROTECTIVE REMEDIAL MEASURES

Even at an early stage following the accident, the provision of effective repetitive measures is of high priority. Simultaneously, possible future remedial or rehabilitative activities should be considered. This approach may prove itself not only to be more economical, but it may also prevent a number of problems in the future. The following actions may be required :

- ✶ Evacuation of the university premises
- ✶ Evacuation of the population from the affected area
- ✶ Organization of receiving areas for the evacuated populations with adequate supplies and facilities
- ✶ Removal of the material spilled in the accident
- ✶ In the event of a cut in water, gas or power supply, the provision of substitute safe and reliable supplies
- ✶ Changes of routes, for private and public transportation
- ✶ Provision of adequate food supply for emergency workers and evacuated people.

8.7.7 CONTINUOUS MONITORING OF THE POST-ACCIDENT SITUATION, ADOPTION OF RELEVANT DECISION AND MEASURES

Monitoring and evaluation the public and environmental health impacts of the accident, as well as the consequences of changes with time, on the whole affected area, are essential for effective handling of the emergency. The measures adopted initially must be modified as circumstances change in the specific situation.

8.7.8 MAINTENANCE OF COMMUNICATION LINKS

There are a number of parties to whom regular information of the development of the situation must be provided. They include, for instance, governmental authority at the appropriate level, health services, and the general public (preferably through a single

information officer to the mass media to ensure internally consistent reporting).

- Highly qualified assistance, which can provide information based on previous experience, and under the pressure prevailing at the time, and can estimate the probable consequences of the accident under the prevailing conditions.
- Services of qualified, reliable and tested, well-equipped laboratories, to perform the necessary analyses and tests Provision of skilled personnel to deal effectively with the emergency
- Provision of such material and equipment as may be necessary to provide adequate protection and remedial measures

In view of the serious consequences of a major emergency involving dangerous chemicals, a high degree of accuracy and reliability has to be assured in relation to the different classes of information that have to be supplied. The quality of data in relation to the detection and judgment on the seriousness of the emergency is especially important. Effective information systems should provide ready access to information tailored to the explicit needs to their users. In general, however, the existing data and information systems do not contain all the information needed in emergency conditions. Extension and improvement of the information systems is urgently needed.

8.7.9 PREPARATION OF PLANS FOR REHABILITATION

Once the emergency is under control and principal causes and consequences clearly understood, a comprehensive plan should be

prepared to ensure fast and effective restoration of both the environmental quality and the socio-economic activities in the affected area.

8.7.10 POST-ACCIDENT ANALYSIS AND EVALUATION OF RESPONSE ACTIVITIES

When the emergency is over, it is desirable to carry out a detailed analysis of the causes of the accident, evaluate the influence of the various factors involved and propose methods to eliminate or minimize them for the future. At the same time, the adequacy of the contingency plan should be evaluated. Due attention should be paid to the efficiency of the emergency response system as well as the adequacy and timing of the various components of the plan.

8.7.11 PREPARATION OF THE FINAL REPORT ON THE ACCIDENT

The final report on the accident should provide a full picture of the accident, its causes, development, consequences, process of handling of the emergency, implementation of the emergency response system and the results obtained. The shortcomings of the contingency plan, failures experienced and successes achieved in preventive, protective and rehabilitative measures should also be recorded. The main objective of the final report is to record all experience and knowledge gained from the event to provide the basis for further improvement of the contingency plan as well as the development and practical application of emergency response systems.

9. ENVIRONMENTAL AUDIT - THE ISSUES, FOCUS & METHODOLOGY

INTRODUCTION

In today's world of keen demand on financial and economic competitiveness through industrialization and simultaneous strong growing social awareness towards risks and environmental degradation associated with industrialization, the industry is under serious stress as to how to tackle it. Therefore, it is in the interest of every industry to have some formalized procedure, to provide their management, the vital knowledge of its compliance with environmental laws and procedures towards the environmental protection and their social acceptability. The formalized procedure to achieve the aforementioned objective is now popularly known as "Environmental Audit".

The concept of environmental audit is not some thing unheard of, rather it came into operation during the early 1970's in USA and industrialized European countries. However, it had a number of different approaches and names, like environmental reviews, environmental quality controls etc.

In view of the experience of development nations where such procedure have benefited the industries and helped in reducing the environmental degradation there, the developing countries have also started taking initiatives in adopting such methodologies.

DEFINING ENVIRONMENTAL AUDIT

There is no single universally accepted definition of environmental audit, perhaps, because of absence of standard procedure and methodology to conduct this kind of study. However,

the definition accepted by Internal Chamber of Commerce (ICC) is comprehensive and is as follows:

"Environmental Audit" is a management tool comprising a systematic documented, periodic and objectives evaluation of how well organizations, management systems and equipment are performing with the aim of :-

1- Facilitating management control on environmental practices.

2- Assessing compliance with company policies, including meeting regulatory requirements.

Environmental audit, therefore, has two basic components :

a) Management Audit on Environmental philosophy of the organization.

b) Technical Audit of the plant, equipment, facilities and operating practices compliance.

Environmental Audit differs from Environmental Impact Assessment (EIA), in that, the latter is predicative concept, carried out during the planning phase before an operation starts, while the audit is systematic examination of performance during the operational phase of industrial activity, including verification of adequacy of the suggested Environmental Management Plan (EMP) generated during EIA phase.

WHY AUDIT

As the definition of environmental audit suggests, it is required to be carried out by the desire of the company's management either on regulatory pressure or by its own consciousness / anxiety to have an assurance that the company's environmental management phase is adequately and satisfactorily operating. Thus prima facie the audit

programme provides assurance to the company's managements the conformance to the enforced regulatory requirements, the consistency and adequacy of its environmental protection and pollution control systems and effectiveness of information reporting procedures.

BENEFITS OF AUDIT

The benefits of environmental audit to the pursuing industry are as broad as the audit objectives. As an example, a typical audit programme objective could be related to verification for the compliance status of individual facilities only or could be more comprehensive and define the changes necessary to reduce the wastage in production process itself.

The benefit of this study however would not end with just the identification and documentation of compliance status but will result in increased environmental effectiveness through improved compliance record, reduced occupational hazards, fewer legal actions, timely corrective actions for correction of faulty operating equipment / instruments / systems. The benefits influenced by audit are generally quantifiable, tangible and real. The reduced legal actions brought against company and / or individuals, reduced fines / penalties, reduced accidents, reduced incidences of environmental hazards, improved workers health, increase in worker productivity, reduced insurance rate etc., to list only a few. The intangible benefits would include better reputation, favorable publicity, improved relations with regulatory authorities, increased job satisfaction for workers, increased involvement in day to day environmental related activities and greater commitments etc. thus industries have to

realise that a strong environmental performance can help both within the company and outside the company.

AUDIT AS A PART OF ENVIRONMENTAL MANAGEMENT PLAN (EMP)

From the benefits an environmental audit brings to the industry, it is amply clear that audit should not be perceived as just a regulatory requirement, rather it is to the company's own advantage to include auditing in its Environmental Management Plan (EMP). Environmental Management Plan is an overall framework, involving well defined group of personnel assignment with specific responsibilities to develop, installed and monitor environment related plans for the company.

As any other management system, EMP also involves planning, organising, guiding, directing, communicating and finally controlling and reviewing to achieve the goals for which this management system is devised. The audit evidently falls in the controlling and reviewing function of EMP, because this function involves measuring results, comparing performances, diagnosing problems, taking corrective action based on the feedback and finally improving the system.

Although auditing may appear small part of EMP yet it is perhaps the most significant part of EMP. It has direct influence on the other functions of EMP and all other functions have to reviewed / redesigned based on audit recommendations.

FORM V FOR ENVIRONMENT AUDIT REPORT

It has been stated in the beginning that Environmental audit has a number of benefits. This, besides improving the Environmental

Management of an organization, also increases the organization's profitability in tangible as well as intangible terms. India is one of the developing countries, working towards a high economic growth rate by taking certain steps. Most important of these steps would call for further rapid industrialization.

The Government of India has notified the requirement for carrying out Environment Audit for all the operating industries vide their Gazette Notification No. 120 dated March 13, 1992. This is an amendment under the Environment Protection Act 1986. To help the industry in formulating the requisite information regarding its raw material usage, product profile, production process, waste discharge, pollution control system etc. a prescribed proforma is enclosed with the notification. The proforma has been prepared primarily to cover only the regulatory compliance requirements on the basis on data reported and presented by the industry.

The environmental statement is to be submitted in Form V, which has nine parts, namely Part A, B, C, D, E, F, G, H & I.

Part A contains the name and address of the owner and the date of the last environmental audit report submitted.

Part B pertains to the consumption of waste and raw materials. Water consumption is to be given separately for process, cooling, and domestic uses, in m^3 / day and also in terms of water consumption / unit of product, for the various products. Similarly information on raw materials consumption, product-wise per unit of output is to be provided.

Part C relates to the quantities of hazardous wastes generated, separately from the process and from pollution control facilities.

Part D deals with the quantities of solid wastes generated from the process as well as pollution control facilities.

Part E deals which the quantities of solid wastes generated from the process as well as pollution control facilities, and seeks to know also about the quantities recycled or reutilised.

All the Parts from B to E require comparisons of the current years performance with that of the previous year.

Part F seeks information regarding characteristics (in terms of concentration and quantum) of Hazardous and solid wastes and about the practice adopted for the disposal of both these categories of wastes.

Part G calls for information on the impact of pollution measures on the conservation of natural resources an consequently on the cost of production.

The industry is required to indicate in Part H, its future proposals for investment in environmental protection, including abatement of pollution.

In the last Part, I, any other particulars, in respect of environmental protection and abatement of pollution may be given.

CONCLUSIONS

Taking advantage of the requirements of regulatory bodies the industry can take concrete steps now, to derive full benefits of Environmental Audit to become Environmental Friendly and yet more competitive. Environmental Audit, therefore, is not a restrictive requirement, but indeed a very useful and potent tool for building up the competitiveness in the industry.

LEGAL PROVISIONS

Ministry of Environment and Forests, Noti. No. G.S.R. 945 (E), dated February 12, 1992, published in the Gazette of India Extra. Part II, Section 3 (i), dated 12 February, 1992, p.2 (No. Q-14011(1) / 90 - CPA) :-

In exercise of the powers conferred by sections 6 and 25 of the Environment (Protection) Act, 1986 (29 of 1986), the Central Government hereby makes the following rules further to amend the Environment (Protection) Rules, 1986, namely :-

[1] 1. These rules may be called the Environment (Protection) (Amendment) Rules, 1992.

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

[2] In Rule 3 of the environment (protection) Rules, 1986, after sub rule

(5) The following sub rules will be added, namely :-

(6) Notwithstanding anything contained in subrule (3), an industry operation process which commenced production on or before 16th May, 1981 and has shown adequate proof of a least commencement of physical work for establishment of facilities of meeting the specified standards within a time bound programme, to the satisfaction of the concerned state pollution control board, shall comply with such standards latest by the 31st day December, 1993.

(7) Notwithstanding anything contained in Sub-rule (3) or sub rule (6) industry, operation of process which has commenced production after the 16th day of may, 1991 but before the 31st

day of December, 1991 and has shown adequate proof of a least commencement of physical work of establishment of facilities to meet the specified standards within a time bound programme, to the satisfaction of the concerned state pollution control Board, shall comply with such standards latest by the 31st day of December, 1992.

Ministry of Environment and Forests, Noti. No. G.S.R. 329 (e) dated March 13, 1992, published in the Gazette of India, Extra., Part II, Section 3(i), deed 13th March 1992, Sl. No. 120, pp. 3-4 (F. No. q. 15015/1/90-CPA).

In exercise of the powers conferred by Sections 6 and 25 of the Environment (Protection) Act, 1986 (29 of 1986), the Central Government hereby makes the following rules further to amend the Environment (Protection) Rules, 1986, namely :-

[1] (i) These rules may be called the Environment (Protection) (Second Amendment) Rules, 1992.

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

[2] In the environment (protection) Rules, 1986, (a) after rule 13, the following rule 14 shall be inserted, namely:-

Submission of Environment Audit Report:-

Every person carrying on an industry, operation or process requiring consent under section 25 of the water (Prevention and Control of Pollution) Act, 1974 (6 of 1974) or under Section 21 of the Air (Prevention and Control of Pollution) act, 1981, (14 of 1981) or both authorization under the Hazardous wastes (Management and Handling) Rules, 1989, issued under the Environment (Protection)

Act, 1986 (29 of 1986) shall submit an environmental audit report for the financial year ending the 31st March in form V to the concerned state pollution control board on or before the 15th day of May every year, beginning, 1993.

GOVERNMENT OF INDIA

MINISTRY OF ENVIRONMENT AND FOREST

New Delhi : the 28th April, 1994

G.S.R. 329 (E), In exercise of the power conferred by Sections 6 and 25 of the Environment (Protection) Act, 1986 (29 of 1986), the Central Government hereby makes the following rules further to amend the environment (Protection) Rules, 1986, namely :-

[1] (i) These rules may be called the Environment (Protection) Amendment Rules, 1993

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

[2] In the Environment (Protection) Rules, 1986,

(a) In rule 14,

(i) For the word audit report whenever they occur the word "statement" shall substituted.

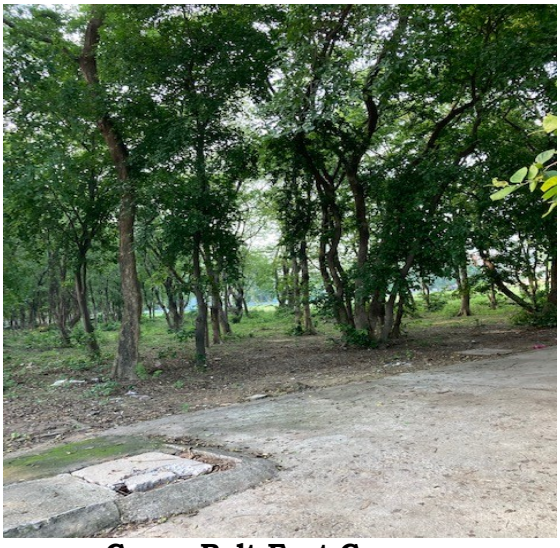
(ii) For the figure letters and word "15th day of May" the word the "30th day of September" shall be substituted.

ANNEXURES

PICTOGRAPHICAL VIEW OF UNIVERSITY

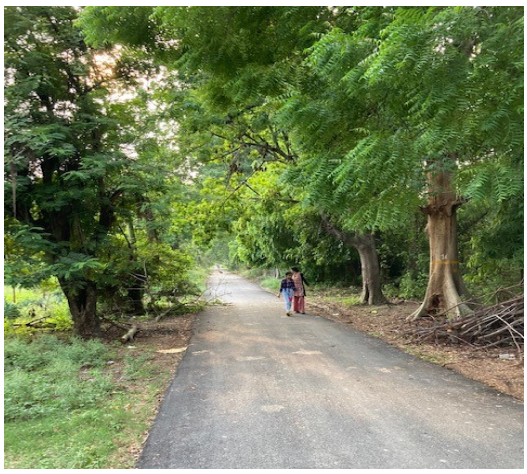
Main Gate

Main Building

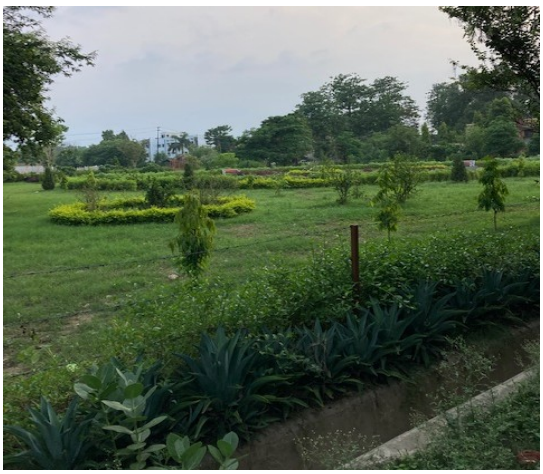


Green Belt East Campus

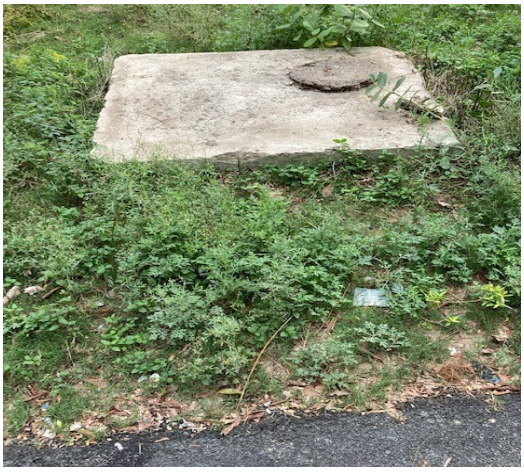
Green Belt East Campus outside plant boundary



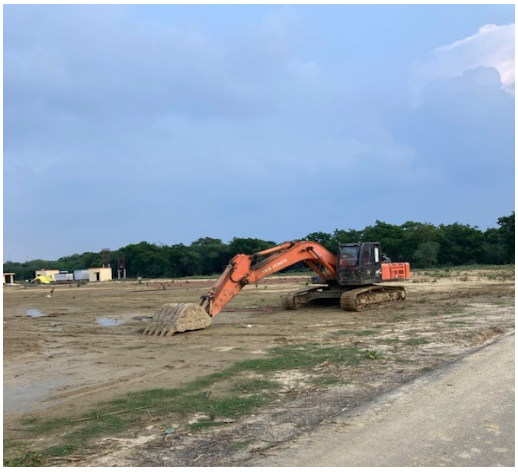
Green Belt West Campus



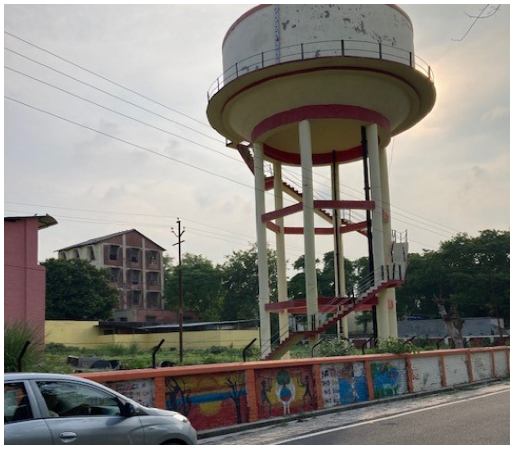
Garden Area West Campus



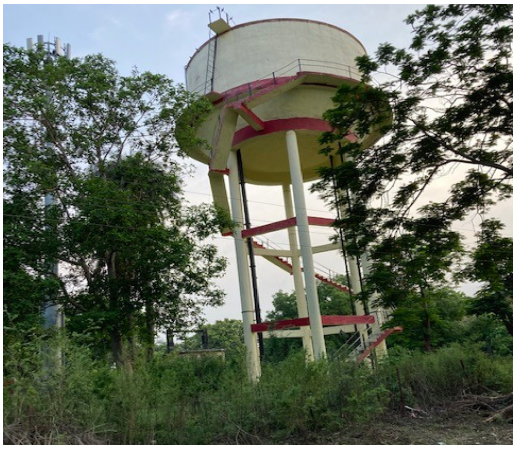
RWH Pit West Campus



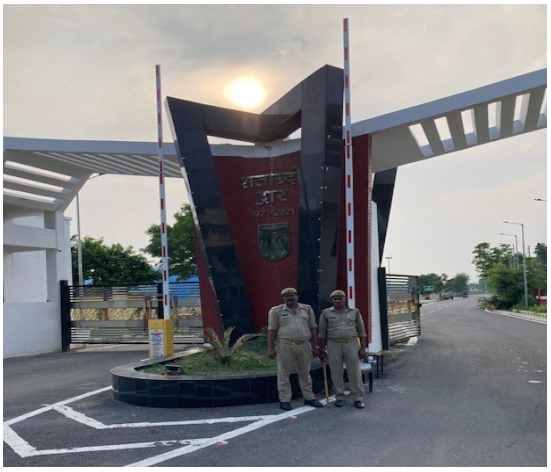
Preparing Ground for New Garden Area West Campus



OHT East Campus

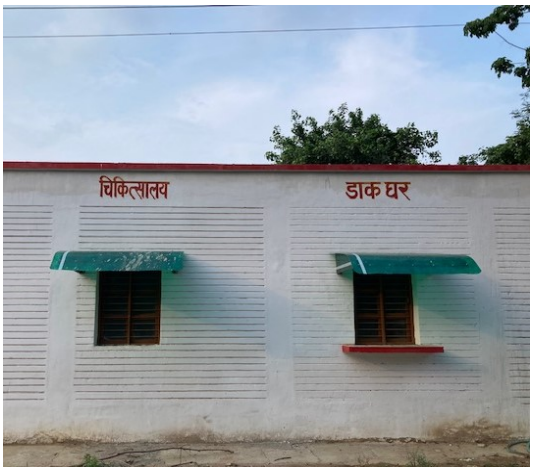


OHT West Campus

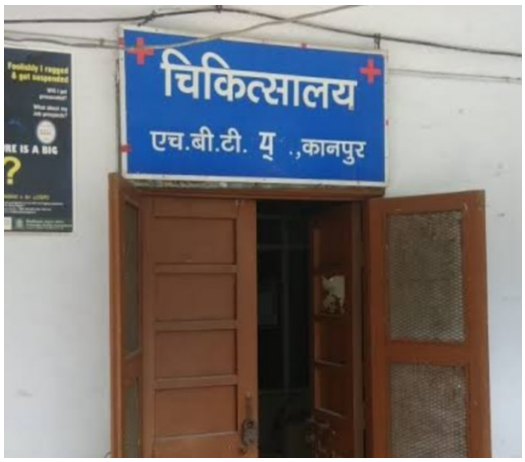


Main Gate West Campus Security

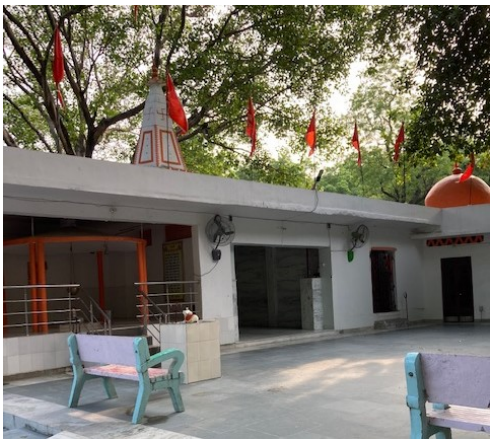
Security Check East Campus



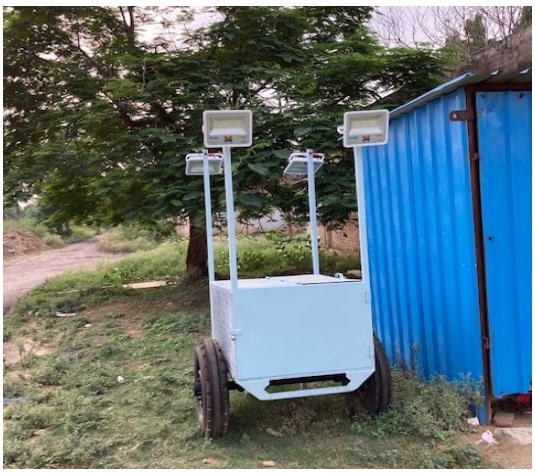
Facilities West Campus



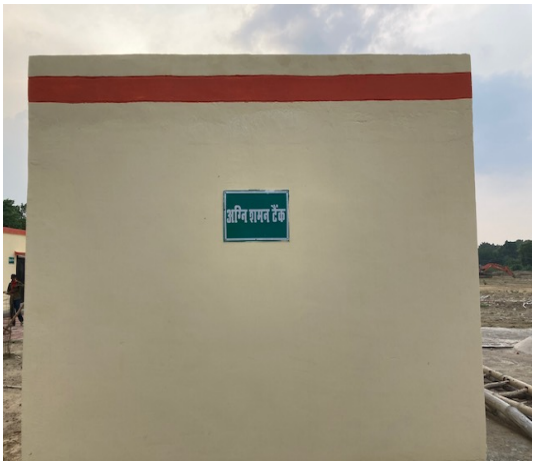
First Aid Centre East Campus



Temple East Campus



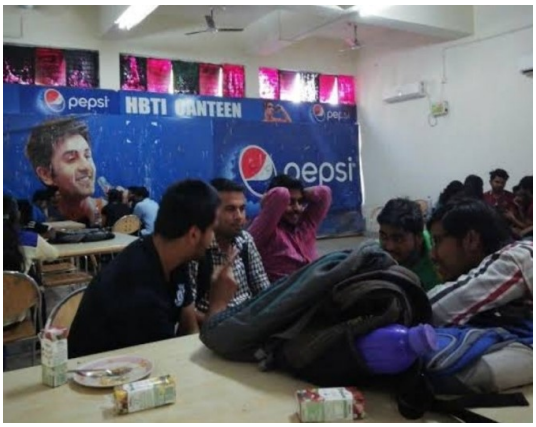
Trolley mounted emergency lights



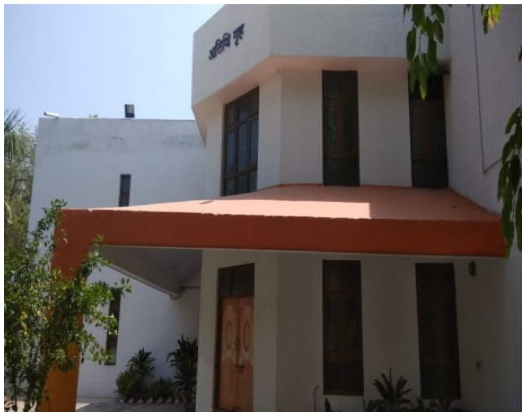
Fire Fighting Water Tank West Campus

Static Water Tank West Campus

Genset with acoustic Enclosure West Campus



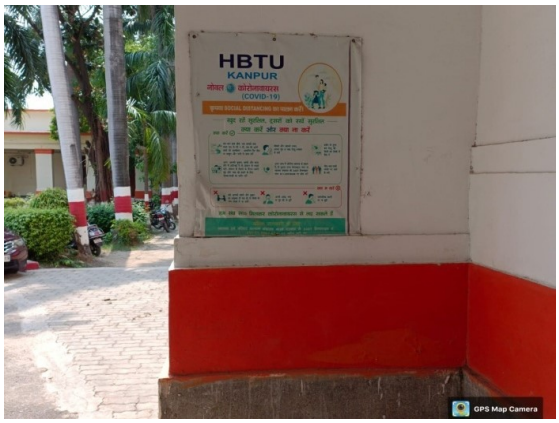
Cafeteria East Campus



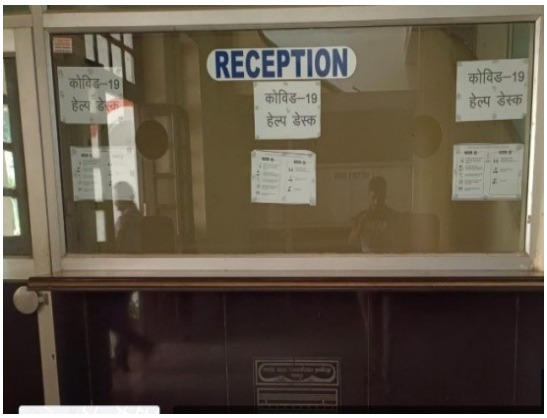
Guest House East Campus

RWH Pits East Campus

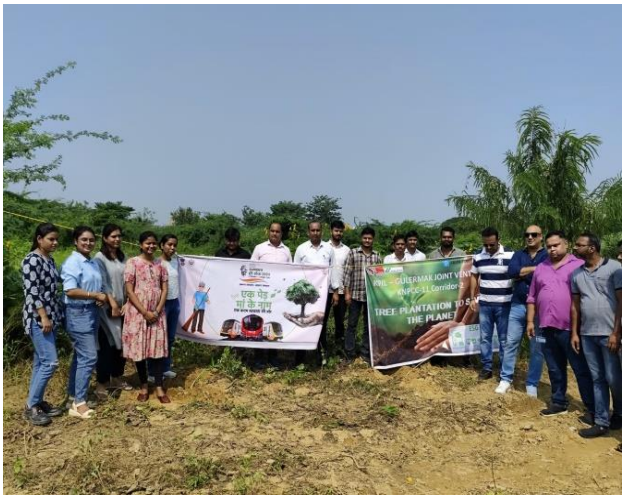
Dustbins East Campus



COVID Awareness



COVID Help Desk



कानपुर जागरण

मंत्री बोले – मां की भावना से जुड़कर लगाएं पौधे, ये बड़े होकर करेंगे रक्षा

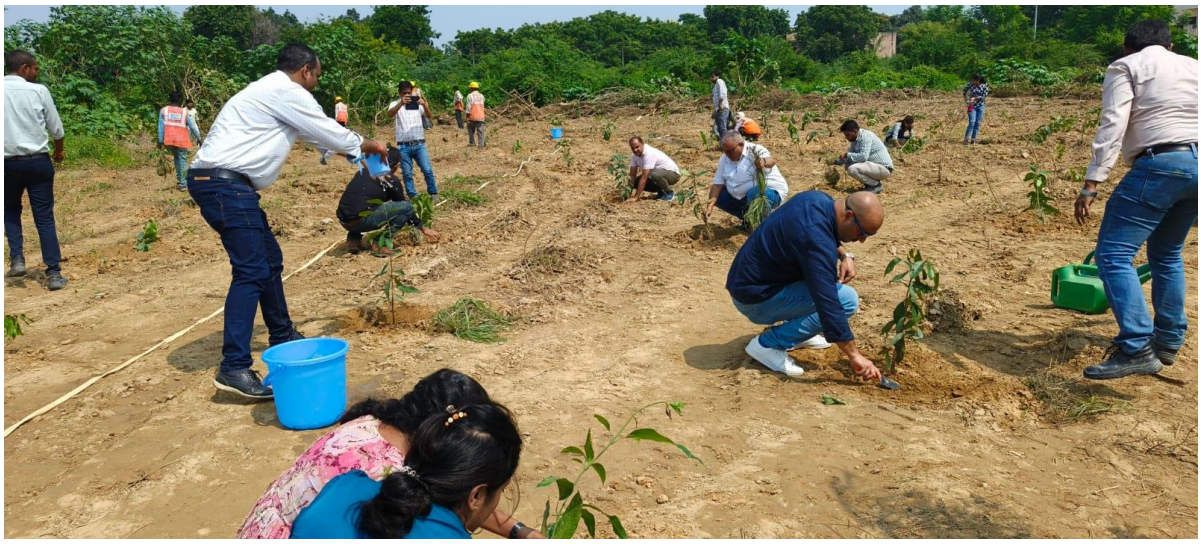
एचबीटीयू में एक पेड़ मां के नाम अभियान का शुभारंभ करने पहुंचे राज्यमंत्री कपिल देव अग्रवाल

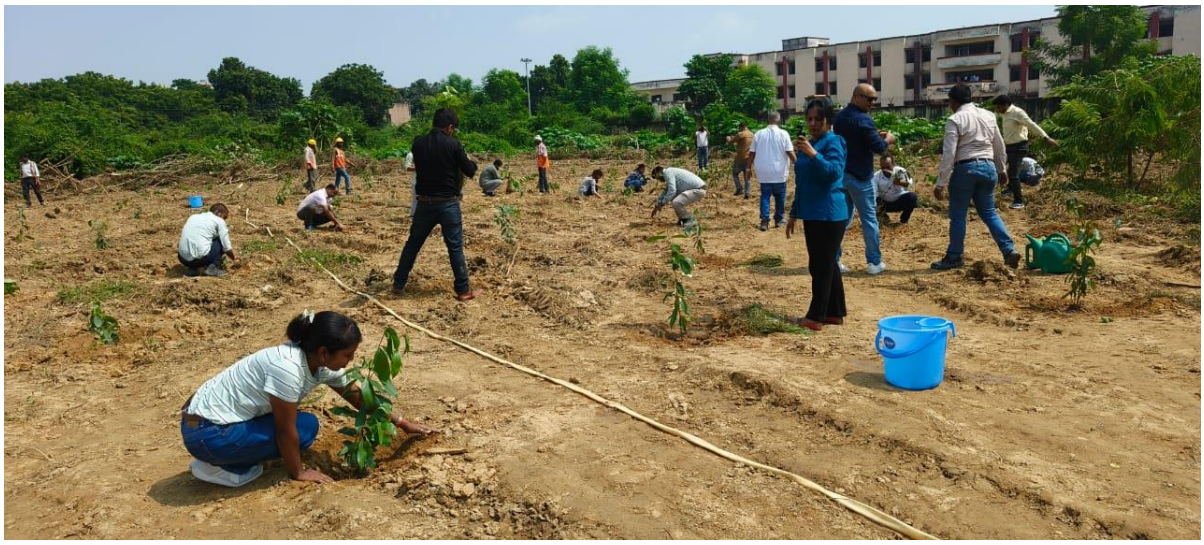
2500

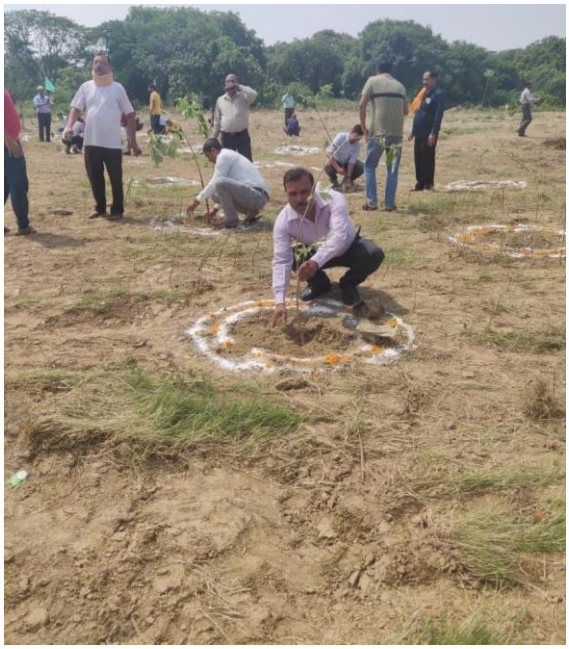
1300

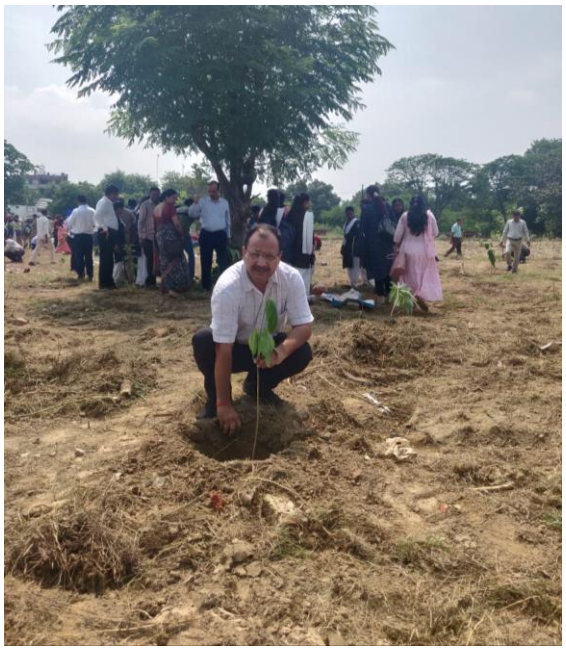
36

औरोगिक उन भी स्थापित कर रहा यूपीसीडा: मयूर माहेश्वरी

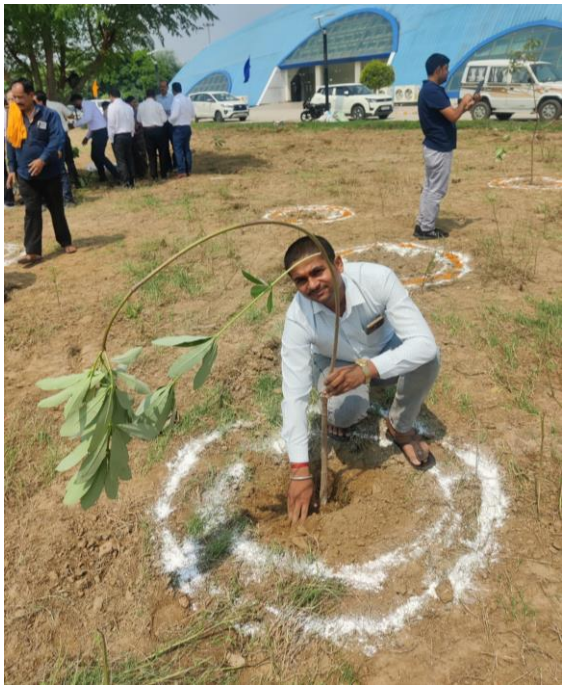









GPS Map Camera
Kanpur, Uttar Pradesh, India
F8V4+652, HBIT East Campus, Nawabganj, Kanpur, Uttar Pradesh 208002, India
Lat 26.492957°
Long 80.305353°
02/10/24 02:36 PM GMT +05:30
Google



ENVIRO-TECH SERVICES

An Analytical Laboratory

(A GOVERNMENT APPROVED LAB)

Plot No. 1/32, S.S. of G.T. Road Industrial Area, Ghaziabad (U.P.) - 201001

email : etslab2012@gmail.com | Website : www.etslab.in | Ph.: 9911516076, 9811736063

TC-13009

TEST REPORT

TEST REPORT NO.: ETS/1016-1/01/2025 ULRNO.TC130092500010161F DATE OF REPORT: 10.01.2025

AMBIENT AIR QUALITY MONITORING AND ANALYSIS REPORT

Name And Address of Customer : M/s HARCOURT BUTLER TECHNICAL UNIVERSITY (HBTU)
NAWABGANJ, DISTT-KANPUR (U.P.) 208002

Date of Monitoring : 02.01.2025
Analysis Start Date : 06.01.2025
Analysis End Date : 10.01.2025
Duration Of Monitoring : 02.01.2025 To 03.01.2025
Time Of Monitoring : 10.10 AM To 10:10 AM (CO for 1.0 Hrs.)
Sample ID No : 1016-1
Sampling Done By : ETS STAFF
Sampling Location : NEAR MAIN GATE (EAST CAMPUS)
Sampling Method : ETS/STP/AIR-01
Sampling Machine Placed At Height : 1.5 METER FROM GROUND LEVEL
Weather Condition : CLEAR **Ambient Temperature:** 15.0 ^{0}C
Wind Direction : E To W
Equipment Used : Respirable Dust Sampler (PM_{10}) + Fine Particulate Sampler ($PM_{2.5}$)

S. No.	Test Parameter	Unit	Result	Specification/Limit (As per CPCB)	Test Method
1	Particulate Matters,(PM_{10})	µg/m^3	90.2	For 24 Hrs.=100	IS 5182 (Part-23)
2	Particulate Matters,($PM_{2.5}$)	µg/m^3	49.5	For 24 Hrs.=60	IS 5182 (Part-24)
3	Sulphur Dioxide, (SO_2)	µg/m^3	10.8	For 24 Hrs.=80	IS: 5182 (Part-2)
4	Nitrogen Dioxide,(NO_2)	µg/m^3	26.0	For 24 Hrs.=80	IS: 5182 (Part-6)

CHECKED BY
SHRADDHA GUPTA

For ENVIRO-TECH SERVICES

AUTHORIZED SIGNATORY
Quality Manager

Note:-

1. Test reports without ETS LAB HOLOGRAM are not issued by our laboratory.
2. The results indicated only refer to the tested samples and listed applicable parameters.
3. No complaint will be entertained if received after 7 days of issue of test report.
4. Our liability is limited to invoice value only.
5. The sample shall be destroyed after 15 days & Biological / Perishable sample shall be destroyed immediately after issue of test report.
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ISO 45001

TEST REPORT

TEST REPORT NO.: ETS/1016-1/01/2025 DATE OF REPORT: 10.01.2025

AMBIENT AIR QUALITY MONITORING AND ANALYSIS REPORT

S. No.	Test Parameter	Unit	Result	Specification/Limit (As per CPCB)	Test Method
5	Carbon Monoxide,(CO)	mg/m^3	0.75	For 1 Hrs.=4	IS 5182 (Part-10)

*****End of Test Report*****

CHECKED BY
SHRADDHA GUPTA

For ENVIRO-TECH SERVICES

AUTHORIZED SIGNATORY
MD / Director /
Quality Manager

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TC-13009

TEST REPORT

TEST REPORT NO.: ETS/1016-2/01/2025 ULRNO.TC130092500010162F DATE OF REPORT: 10.01.2025

AMBIENT AIR QUALITY MONITORING AND ANALYSIS REPORT

Name And Address of Customer : M/s HARCOURT BUTLER TECHNICAL UNIVERSITY (HBTU) NAWABGANJ, DISTT-KANPUR (U.P.) 208002

Date of Monitoring : 02.01.2025
Analysis Start Date : 06.01.2025
Analysis End Date : 10.01.2025
Duration Of Monitoring : 02.01.2025 To 03.01.2025
Time Of Monitoring : 10.29 AM To 10:29 AM (CO for 1.0 Hrs.)
Sample ID No : 1016-2
Sampling Done By : ETS STAFF
Sampling Location : NEAR MAIN GATE (WEST CAMPUS)
Sampling Method : ETS/STP/AIR-01
Sampling Machine Placed At Height : 1.5 METER FROM GROUND LEVEL
Weather Condition : CLEAR **Ambient Temperature:** 15.0 ^{0}C
Wind Direction : E To W
Equipment Used : Respirable Dust Sampler (PM_{10}) + Fine Particulate Sampler ($PM_{2.5}$)

S. No.	Test Parameter	Unit	Result	Specification/Limit (As per CPCB)	Test Method
1	Particulate Matters,(PM_{10})	$\mu g/m^3$	74.8	For 24 Hrs.=100	IS 5182 (Part-23)
2	Particulate Matters,($PM_{2.5}$)	$\mu g/m^3$	38.3	For 24 Hrs.=60	IS 5182 (Part-24)
3	Sulphur Dioxide, (SO_2)	$\mu g/m^3$	9.5	For 24 Hrs.=80	IS: 5182 (Part-2)
4	Nitrogen Dioxide,(NO_2)	$\mu g/m^3$	18.0	For 24 Hrs.=80	IS: 5182 (Part-6)

CHECKED BY
SHRADDHA GUPTA

For ENVIRO-TECH SERVICES

AUTHORIZED SIGNATORY
Quality Manager

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TEST REPORT

TEST REPORT NO.: ETS/1016-2/01/2025 DATE OF REPORT: 10.01.2025

AMBIENT AIR QUALITY MONITORING AND ANALYSIS REPORT

S. No.	Test Parameter	Unit	Result	Specification/Limit (As per CPCB)	Test Method
5	Carbon Monoxide,(CO)	mg/m^3	0.30	For 1 Hrs.=4	IS 5182 (Part-10)

*****End of Test Report*****

CHECKED BY
SHRADDHA GUPTA

For ENVIRO-TECH SERVICES

AUTHORIZED SIGNATORY
MD THUMRAJ
Quality Manager

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TC-13009

TEST REPORT

TEST REPORT NO.: ETS/1016-3/01/2025 ULRNO.TC130092500010163F DATE OF REPORT: 10.01.2025

AMBIENT AIR QUALITY MONITORING AND ANALYSIS REPORT

Name And Address of Customer : M/s HARCOURT BUTLER TECHNICAL UNIVERSITY (HBTU)
NAWABGANJ, DISTT-KANPUR (U.P.) 208002

Date of Monitoring : 02.01.2025
Analysis Start Date : 06.01.2025
Analysis End Date : 10.01.2025
Duration Of Monitoring : 02.01.2025 To 03.01.2025
Time Of Monitoring : 10.14 AM To 10:14 AM (CO for 1.0 Hrs.)
Sample ID No : 1016-3
Sampling Done By : ETS STAFF
Sampling Location : NEAR AUDITORIUM (EAST CAMPUS)
Sampling Method : ETS/STP/AIR-01
Sampling Machine Placed At Height : 1.5 METER FROM GROUND LEVEL
Weather Condition : CLEAR **Ambient Temperature:** 15.0 ^{0}C
Wind Direction : E To W
Equipment Used : Respirable Dust Sampler (PM_{10}) + Fine Particulate Sampler ($PM_{2.5}$)

S. No.	Test Parameter	Unit	Result	Specification/Limit (As per CPCB)	Test Method
1	Particulate Matters,(PM_{10})	$\mu g/m^3$	72.0	For 24 Hrs.=100	IS 5182 (Part-23)
2	Particulate Matters,($PM_{2.5}$)	$\mu g/m^3$	34.0	For 24 Hrs.=60	IS 5182 (Part-24)
3	Sulphur Dioxide, (SO_2)	$\mu g/m^3$	9.8	For 24 Hrs.=80	IS: 5182 (Part-2)
4	Nitrogen Dioxide,(NO_2)	$\mu g/m^3$	16.5	For 24 Hrs.=80	IS: 5182 (Part-6)

CHECKED BY
SHRADDHA GUPTA

For ENVIRO-TECH SERVICES
MD HUMRAJ
Quality Manager
AUTHORIZED SIGNATORY

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AMBIENT AIR QUALITY MONITORING AND ANALYSIS REPORT

S. No.	Test Parameter	Unit	Result	Specification/Limit (As per CPCB)	Test Method
5	Carbon Monoxide,(CO)	mg/m^3	0.45	For 1 Hrs.=4	IS 5182 (Part-10)

*****End of Test Report*****

CHECKED BY
SHRADDHA GUPTA

For ENVIRO-TECH SERVICES

AUTHORIZED SIGNATORY
MD HUMRAJ
Quality Manager

Note:-

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An Analytical Laboratory

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Plot No. 1/32, S.S. of G.T. Road Industrial Area, Ghaziabad (U.P.) - 201001

email : etslab2012@gmail.com | Website : www.etslab.in | Ph.: 9911516076, 9811736063

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TC-13009

TEST REPORT

TEST REPORT NO.: ETS/1016-4/01/2025 ULRNO.TC1300925000010164F DATE OF REPORT: 10.01.2025

AMBIENT AIR QUALITY MONITORING AND ANALYSIS REPORT

Name And Address of Customer : M/s HARCOURT BUTLER TECHNICAL UNIVERSITY (HBTU) NAWABGANJ, DISTT-KANPUR (U.P.) 208002

Date of Monitoring : 02.01.2025
Analysis Start Date : 06.01.2025
Analysis End Date : 10.01.2025
Duration Of Monitoring : 02.01.2025 To 03.01.2025
Time Of Monitoring : 11.34 AM To 11:34 AM (CO for 1.0 Hrs.)
Sample ID No : 1016-4
Sampling Done By : ETS STAFF
Sampling Location : NEAR HOSTEL AREA (WEST CAMPUS)
Sampling Method : ETS/STP/AIR-01
Sampling Machine Placed At Height : 1.5 METER FROM GROUND LEVEL
Weather Condition : CLEAR **Ambient Temperature:** 15.0 ^{0}C
Wind Direction : E To W
Equipment Used : Respirable Dust Sampler (PM_{10}) + Fine Particulate Sampler ($PM_{2.5}$)

S. No.	Test Parameter	Unit	Result	Specification/Limit (As per CPCB)	Test Method
1	Particulate Matters,(PM_{10})	µg/m^3	66.8	For 24 Hrs.=100	IS 5182 (Part-23)
2	Particulate Matters,($PM_{2.5}$)	µg/m^3	30.5	For 24 Hrs.=60	IS 5182 (Part-24)
3	Sulphur Dioxide, (SO_2)	µg/m^3	8.5	For 24 Hrs.=80	IS: 5182 (Part-2)
4	Nitrogen Dioxide,(NO_2)	µg/m^3	16.2	For 24 Hrs.=80	IS: 5182 (Part-6)

CHECKED BY
SHRADDHA GUPTA

For ENVIRO-TECH SERVICES

AUTHORIZED SIGNATORY

Quality Manager

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TEST REPORT

TEST REPORT NO.: ETS/1016-4/01/2025 DATE OF REPORT: 10.01.2025

AMBIENT AIR QUALITY MONITORING AND ANALYSIS REPORT

S. No.	Test Parameter	Unit	Result	Specification/Limit (As per CPCB)	Test Method
5	Carbon Monoxide,(CO)	mg/m^3	0.30	For 1 Hrs.=4	IS 5182 (Part-10)

*****End of Test Report*****

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TC-13009

TEST REPORT

TEST REPORT NO.: ETS/1016-5/01/2025 ULRNO.TC130092500010165F DATE OF REPORT: 10.01.2025

AMBIENT AIR QUALITY MONITORING AND ANALYSIS REPORT

Name And Address of Customer : M/s HARCOURT BUTLER TECHNICAL UNIVERSITY (HBTU) NAWABGANJ, DISTT-KANPUR (U.P.) 208002

Date of Monitoring : 03.01.2025
Analysis Start Date : 06.01.2025
Analysis End Date : 10.01.2025
Duration Of Monitoring : 03.01.2025 To 04.01.2025
Time Of Monitoring : 10.45 AM To 10:45 AM (CO for 1.0 Hrs.)
Sample ID No : 1016-5
Sampling Done By : ETS STAFF
Sampling Location : NEAR LAKE VIEW HOSEL (EAST CAMPUS)
Sampling Method : ETS/STP/AIR-01
Sampling Machine Placed At Height : 1.5 METER FROM GROUND LEVEL
Weather Condition : CLEAR **Ambient Temperature:** 15.0 °C
Wind Direction : E To W
Equipment Used : Respirable Dust Sampler (PM_{10}) + Fine Particulate Sampler ($PM_{2.5}$)

S. No.	Test Parameter	Unit	Result	Specification/Limit (As per CPCB)	Test Method
1	Particulate Matters,(PM_{10})	µg/m³	73.5	For 24 Hrs.=100	IS 5182 (Part-23)
2	Particulate Matters,($PM_{2.5}$)	µg/m³	33.0	For 24 Hrs.=60	IS 5182 (Part-24)
3	Sulphur Dioxide, (SO_2)	µg/m³	10.2	For 24 Hrs.=80	IS: 5182 (Part-2)
4	Nitrogen Dioxide,(NO_2)	µg/m³	22.8	For 24 Hrs.=80	IS: 5182 (Part-6)

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AUTHORIZED SIGNATORY

MD HUMRAJ
Quality Manager

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TEST REPORT

TEST REPORT NO.: ETS/1016-5/01/2025 DATE OF REPORT: 10.01.2025

AMBIENT AIR QUALITY MONITORING AND ANALYSIS REPORT

S. No.	Test Parameter	Unit	Result	Specification/Limit (As per CPCB)	Test Method
5	Carbon Monoxide,(CO)	mg/m^3	0.40	For 1 Hrs.=4	IS 5182 (Part-10)

*****End of Test Report*****

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TEST REPORT

TEST REPORT NO.: ETS/1016-6/01/2025 ULRNO.TC1300925000010166F DATE OF REPORT: 10.01.2025

AMBIENT AIR QUALITY MONITORING AND ANALYSIS REPORT

Name And Address of Customer : M/s HARCOURT BUTLER TECHNICAL UNIVERSITY (HBTU) NAWABGANJ, DISTT-KANPUR (U.P.) 208002

Date of Monitoring : 03.01.2025
Analysis Start Date : 06.01.2025
Analysis End Date : 10.01.2025
Duration Of Monitoring : 03.01.2025 To 04.01.2025
Time Of Monitoring : 10.20 AM To 10:20 AM (CO for 1.0 Hrs.)
Sample ID No : 1016-6
Sampling Done By : ETS STAFF
Sampling Location : NEAR STAFF QUARTER (WEST CAMPUS)
Sampling Method : ETS/STP/AIR-01
Sampling Machine Placed At Height : 1.5 METER FROM GROUND LEVEL
Weather Condition : CLEAR **Ambient Temperature:** 15.0 ^{0}C
Wind Direction : E To W
Equipment Used : Respirable Dust Sampler (PM_{10}) + Fine Particulate Sampler ($PM_{2.5}$)

S. No.	Test Parameter	Unit	Result	Specification/Limit (As per CPCB)	Test Method
1	Particulate Matters,(PM_{10})	µg/m^3	76.8	For 24 Hrs.=100	IS 5182 (Part-23)
2	Particulate Matters,($PM_{2.5}$)	µg/m^3	36.5	For 24 Hrs.=60	IS 5182 (Part-24)
3	Sulphur Dioxide, (SO_2)	µg/m^3	10.8	For 24 Hrs.=80	IS: 5182 (Part-2)
4	Nitrogen Dioxide,(NO_2)	µg/m^3	24.0	For 24 Hrs.=80	IS: 5182 (Part-6)

CHECKED BY
SHRADDHA GUPTA

For ENVIRO-TECH SERVICES

AUTHORIZED SIGNATORY

MD NOMAN
Quality Manager

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TEST REPORT

TEST REPORT NO.: ETS/1016-6/01/2025 DATE OF REPORT: 10.01.2025

AMBIENT AIR QUALITY MONITORING AND ANALYSIS REPORT

S. No.	Test Parameter	Unit	Result	Specification/Limit (As per CPCB)	Test Method
5	Carbon Monoxide,(CO)	mg/m^3	0.52	For 1 Hrs.=4	IS 5182 (Part-10)

*****End of Test Report*****

CHECKED BY
SHRADDHA GUPTA

For ENVIRO-TECH SERVICES

AUTHORIZED SIGNATORY
MD HUMRAJ
Quality Manager

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TC-13009

TEST REPORT

TEST REPORT NO.: ETS/1016-7/01/2025 ULRNO.TC1300925000010167F DATE OF REPORT: 10.01.2025

WATER SAMPLE ANALYSIS REPORT

Name And Address of Customer : M/s HARCOURT BUTLER TECHNICAL UNIVERSITY (HBTU)
NAWABGANJ, DISTT-KANPUR (U.P.) 208002

Date of Sampling : 04.01.2025
Analysis Start Date : 06.01.2025
Analysis End Date : 10.01.2025
Sample ID No : 1016-7
Sampling Done By : ETS STAFF
Sampling Description : GROUND WATER
Sampling Location : FROM BOREWELL-I (EAST CAMPUS)
Sampling Method : ETS/STP/WATER-02
Sample Quantity : 2.0 + 0.5 Ltr.
Packing Condition : SEALED
Packed In : P.V.C. AND GLASS BOTTLE

S. No.	Test Parameter	Unit	Result	Specification/Limit (As per IS:10500: 2012)		Test Method
				Desirable	Permissible	
PHYSICAL & CHEMICAL PARAMETERS;						
1	Colour	Hazen	<5.0	5	15	APHA 2120-B
2	Odour	...	Agreeable	Agreeable	Agreeable	APHA 2150-B
3	Taste	...	Agreeable	Agreeable	Agreeable	APHA 2160-C
4	pH	...	7.69	6.5 - 8.5	No Relaxation	APHA 4500-H+
5	Turbidity	NTU	<1.0	1	5	APHA 2130-B
6	Total Dissolved Solids,(TDS)	mg/L	403.0	500	2000	APHA 2540-C
7	Calcium,(Ca)	mg/L	40.8	75	200	APHA 3500:(Ca)-B
8	Chloride,(Cl)	mg/L	41.5	250	1000	APHA 4500:(Cl-)-B
9	Fluoride,(F)	mg/L	0.19	1	1.5	APHA 4500:(F-)-D
10	Free Chlorine (Residual)	mg/L	<0.1	0.2	1	APHA 4500:(Cl)-B
11	Magnesium,(Mg)	mg/L	19.6	30	100	APHA 3500:(Mg)-B
12	Sulphate,(SO_4)	mg/L	30.2	200	400	APHA 4500:(SO_4)-E
13	Total Hardness,($CaCO_3$)	mg/L	185.0	200	600	APHA 2340-C
14	Total Alkalinity,(CaCO3)	mg/L	157.1	200	600	APHA 2320-B
15	Nitrate,(NO_3)	mg/L	9.2	45	No Relaxation	APHA 4500:(NO_3-)-B

CHECKED BY
SHRADDHA GUPTA

For ENVIRO-TECH SERVICES

AUTHORIZED SIGNATORY
Quality Manager

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TEST REPORT

TEST REPORT NO.: ETS/1016-7/01/2025 DATE OF REPORT: 10.01.2025

WATER SAMPLE ANALYSIS REPORT

S. No.	Test Parameter	Unit	Result	Specification/Limit (As per IS:10500: 2012)		Test Method
				Desirable	Permissible	
16	Ammonia,(as Total NH_3-N)	mg/L	<0.01	0.5	No Relaxation	APHA 4500:(NH3)-C
17	Anionic Detergent,(MBAS)	mg/L	<0.01	0.2	1	APHA 5540-C
18	Chloramines (as Cl_2)	mg/L	<0.01	4.0	No Relaxation	APHA 4500:(Cl)-G
19	Phenolic Compound,(C_6H_5OH)	mg/L	<0.001	0.001	0.002	APHA 5530-C
HEAVY METALS;-						
20	Iron,(Fe)	mg/L	0.19	1.0	No Relaxation	APHA-3120B
21	Copper,(Cu)	mg/L	<0.01	0.05	1.5	APHA 3120B
22	Manganese,(Mn)	mg/L	<0.01	0.1	0.3	APHA-3120B
23	Mercury,(Hg)	mg/L	<0.001	0.001	No Relaxation	US EPA Method 200.7 1994
24	Cadmium,(Cd)	mg/L	<0.001	0.003	No Relaxation	APHA 3120B
25	Selenium,(as Se)	mg/L	<0.01	0.01	No Relaxation	APHA 3120B
26	Arsenic,(As)	mg/L	<0.01	0.01	No Relaxation	APHA 3120B
27	Lead,(Pb)	mg/L	<0.01	0.01	No Relaxation	APHA-3120B
28	Zinc,(Zn)	mg/L	<0.01	5	15	APHA-3120B
29	Aluminium,(Al)	mg/L	<0.01	0.03	0.2	APHA-3120B
30	Barium,(Ba)	mg/L	<0.01	0.7	No Relaxation	APHA 3120B
MICROBIOLOGICAL PARAMETER;						
31	Escherichia coli	MPN/100mL	<2	Not Specified		IS 1622
32	Total Coliform	MPN/100mL	<2	Not Specified		IS 1622

*****End of Test Report*****

CHECKED BY
SHRADDHA GUPTA

For ENVIRO-TECH SERVICES

AUTHORIZED SIGNATORY
MD HUM
Quality Ma

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TC-13009

TEST REPORT

TEST REPORT NO.: ETS/1016-8/01/2025 ULRNO.TC130092500010168F DATE OF REPORT: 10.01.2025

WATER SAMPLE ANALYSIS REPORT

Name And Address of Customer : M/s HARCOURT BUTLER TECHNICAL UNIVERSITY (HBTU)
NAWABGANJ, DISTT-KANPUR (U.P.) 208002

Date of Sampling : 04.01.2025
Analysis Start Date : 06.01.2025
Analysis End Date : 10.01.2025
Sample ID No : 1016-8
Sampling Done By : ETS STAFF
Sampling Description : GROUND WATER
Sampling Location : FROM BOREWELL-II (WEST CAMPUS)
Sampling Method : ETS/STP/WATER-02
Sample Quantity : 2.0 + 0.5 Ltr.
Packing Condition : SEALED
Packed In : P.V.C. AND GLASS BOTTLE

S. No.	Test Parameter	Unit	Result	Specification/Limit (As per IS:10500: 2012)		Test Method
				Desirable	Permissible	
PHYSICAL & CHEMICAL PARAMETERS;						
1	Colour	Hazen	<5.0	5	15	APHA 2120-B
2	Odour	...	Agreeable	Agreeable	Agreeable	APHA 2150-B
3	Taste	...	Agreeable	Agreeable	Agreeable	APHA 2160-C
4	pH	...	7.43	6.5 - 8.5	No Relaxation	APHA 4500-H+
5	Turbidity	NTU	<1.0	1	5	APHA 2130-B
6	Total Dissolved Solids,(TDS)	mg/L	342.6	500	2000	APHA 2540-C
7	Calcium,(Ca)	mg/L	37.2	75	200	APHA 3500:(Ca)-B
8	Chloride,(Cl)	mg/L	42.8	250	1000	APHA 4500:(Cl-)-B
9	Fluoride,(F)	mg/L	0.27	1	1.5	APHA 4500:(F-)-D
10	Free Chlorine (Residual)	mg/L	<0.1	0.2	1	APHA 4500:(Cl)-B
11	Magnesium,(Mg)	mg/L	17.5	30	100	APHA 3500:(Mg)-B
12	Sulphate,(SO_4)	mg/L	24.8	200	400	APHA 4500:(SO_4)-E
13	Total Hardness,($CaCO_3$)	mg/L	166.2	200	600	APHA 2340-C
14	Total Alkalinity,(CaCO3)	mg/L	129.5	200	600	APHA 2320-B
15	Nitrate,(NO_3)	mg/L	7.4	45	No Relaxation	APHA 4500:(NO_3-)-B

CHECKED BY
SHRADDHA GUPTA

For ENVIRO-TECH SERVICES

AUTHORIZED SIGNATORY

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TEST REPORT

TEST REPORT NO.: ETS/1016-8/01/2025 DATE OF REPORT: 10.01.2025

WATER SAMPLE ANALYSIS REPORT

S. No.	Test Parameter	Unit	Result	Specification/Limit (As per IS:10500: 2012)		Test Method
				Desirable	Permissible	
16	Ammonia,(as Total NH_3-N)	mg/L	<0.01	0.5	No Relaxation	APHA 4500:(NH3)-C
17	Anionic Detergent,(MBAS)	mg/L	<0.01	0.2	1	APHA 5540-C
18	Chloramines (as Cl_2)	mg/L	<0.01	4.0	No Relaxation	APHA 4500:(Cl)-G
19	Phenolic Compound,(C_6H_5OH)	mg/L	<0.001	0.001	0.002	APHA 5530-C
HEAVY METALS;-						
20	Iron,(Fe)	mg/L	0.16	1.0	No Relaxation	APHA-3120B
21	Copper,(Cu)	mg/L	<0.01	0.05	1.5	APHA 3120B
22	Manganese,(Mn)	mg/L	<0.01	0.1	0.3	APHA-3120B
23	Mercury,(Hg)	mg/L	<0.001	0.001	No Relaxation	US EPA Method 200.7 1994
24	Cadmium,(Cd)	mg/L	<0.001	0.003	No Relaxation	APHA 3120B
25	Selenium,(as Se)	mg/L	<0.01	0.01	No Relaxation	APHA 3120B
26	Arsenic,(As)	mg/L	<0.01	0.01	No Relaxation	APHA 3120B
27	Lead,(Pb)	mg/L	<0.01	0.01	No Relaxation	APHA-3120B
28	Zinc,(Zn)	mg/L	<0.01	5	15	APHA-3120B
29	Aluminium,(Al)	mg/L	<0.01	0.03	0.2	APHA-3120B
30	Barium,(Ba)	mg/L	<0.01	0.7	No Relaxation	APHA 3120B
MICROBIOLOGICAL PARAMETER;						
31	Escherichia coli	MPN/100mL	<2	Not Specified		IS 1622
32	Total Coliform	MPN/100mL	<2	Not Specified		IS 1622

*****End of Test Report*****

CHECKED BY
SHRADDHA GUPTA

For ENVIRO-TECH SERVICES

AUTHORIZED SIGNATORY
Quality Manager

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TC-13009

TEST REPORT

TEST REPORT NO.: ETS/1016-9/01/2025 ULRNO.TC1300925000010169F DATE OF REPORT: 10.01.2025

WASTE WATER SAMPLE ANALYSIS REPORT

Name And Address of Customer : M/s HARCOURT BUTLER TECHNICAL UNIVERSITY (HBTU) NAWABGANJ, DISTT-KANPUR (U.P.) 208002

Date of Sampling : 04.01.2025
Analysis Start Date : 06.01.2025
Analysis End Date : 10.01.2025
Sample ID No : 1016-9
Sampling Done By : ETS STAFF
Sampling Description : AFTER TREATMENT
Sampling Location : FINAL OUTLET DRAIN FOR EAST CAMPUS
Sampling Method : ETS/STP/WATER-02
Sample Quantity : 2.0 Ltr.
Packing Condition : SEALED
Packed In : P.V.C. CANE

S. No.	Test Parameter	Unit	Result	Test Method
1	pH	...	7.70	APHA 4500-H+
2	Total Suspended Solids,(TSS)	mg/L	52.2	APHA 2540-D
3	Total Dissolved Solids, (TDS)	mg/L	1062.0	APHA 2540-C
4	Oil & Grease, (O & G)	mg/L	5.8	APHA 5520-B
5	Biological Oxygen Demand($BOD_{3d}27^{0}C$)	mg/L	22.5	IS: 3025 (Part-44)
6	Chemical Oxygen Demand,(COD)	mg/L	126.0	APHA 5220-B

*****End of Test Report*****

CHECKED BY
SHRADDHA GUPTA

For ENVIRO-TECH SERVICES

AUTHORIZED SIGNATORY

Note:-

1. Test reports without ETS LAB HOLOGRAM are not issued by our laboratory.
2. The results indicated only refer to the tested samples and listed applicable parameters.
3. No complaint will be entertained if received after 7 days of issue of test report.
4. Our liability is limited to invoice value only.
5. The sample shall be destroyed after 15 days & Biological / Perishable sample shall be destroyed immediately after issue of test report.
6. This test report shall not be used in any advertising media or as evidence in the court of Law without prior written permission of the laboratory.

ENVIRO-TECH SERVICES

An Analytical Laboratory

(A GOVERNMENT APPROVED LAB)

Plot No. 1/32, S.S. of G.T. Road Industrial Area, Ghaziabad (U.P.) - 201001

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TC-13009

TEST REPORT

TEST REPORT NO.: ETS/1016-10/01/2025 URLNO.TC130092500010160F DATE OF REPORT: 10.01.2025

WASTE WATER SAMPLE ANALYSIS REPORT

Name And Address of Customer : M/s HARCOURT BUTLER TECHNICAL UNIVERSITY (HBTU) NAWABGANJ, DISTT-KANPUR (U.P.) 208002

Date of Sampling : 04.01.2025
Analysis Start Date : 06.01.2025
Analysis End Date : 10.01.2025
Sample ID No : 1016-10
Sampling Done By : ETS STAFF
Sampling Description : AFTER TREATMENT
Sampling Location : FINAL OUTLET DRAIN FOR WEST CAMPUS
Sampling Method : ETS/STP/WATER-02
Sample Quantity : 2.0 Ltr.
Packing Condition : SEALED
Packed In : P.V.C. CANE

S. No.	Test Parameter	Unit	Result	Test Method
1	pH	...	7.82	APHA 4500-H+
2	Total Suspended Solids,(TSS)	mg/L	68.5	APHA 2540-D
3	Total Dissolved Solids, (TDS)	mg/L	1195.0	APHA 2540-C
4	Oil & Grease, (O & G)	mg/L	6.5	APHA 5520-B
5	Biological Oxygen Demand($BOD_{3d}27^{o}C$)	mg/L	26.6	IS: 3025 (Part-44)
6	Chemical Oxygen Demand,(COD)	mg/L	189.0	APHA 5220-B

*****End of Test Report*****

CHECKED BY
SHRADDHA GUPTA

For ENVIRO-TECH SERVICES

AUTHORIZED SIGNATORY
Quality Manager

Note:-

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