MAHENDRA INSTITUTE OF ENGINEERING AND TECHNOLOGY

ENVIRONMENTAL MONITORING

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DECLARATION:

We, the students of Computer Science and Engineering,

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that the work entitled "ENVIRONMENTAL MONITORING" has been successfully completed under the guidance of Asst Prof. Mrs. ARUNA, Computer Science and Engineering Department, mahendra institute of engineering and techonology , namakkal.

This dissertation work is submitted in partial fulfillment of the requirements for the award of Degree of Bachelor of

Engineering in ComputerScience and Engineering during the academic year 2021-2025.

1. ABSTRACT:

Objective:

Environmental monitoring describes the processes and activities that need to take place to characterize and monitor the quality of the environment.

Environmental monitoring is used in the preparation of environmental impact assessments, as well as in many circumstances in which human activities carry a risk of harmful effects on the natural environment.

All monitoring strategies and programs have reasons and justifications which are often designed

to establish the current status of an environment or to establish trends in environmental parameters.

In all cases, the results of monitoring will be reviewed, analyzed statistically, and published. The design of a monitoring program must therefore have regard to the final use of the data before monitoring starts.

Environmental monitoring includes monitoring of air quality, soils and water

2. *Introduction To Environmental Monitoring*

Environmental monitoring refers to the tools and techniques designed to observe an environment, characterize its quality, and establish

environmental parameters, for the purpose of accurately quantifying the impact an activity has on an environment.

Results are gathered, analyzed statistically, and then published in a risk assessment and environmental monitoring and impact assessment report.

The main objective of environmental monitoring is to manage and minimize the impact an organization's activities have on an environment, either to ensure compliance with laws and regulations or to mitigate risks of harmful effects on the natural environment and protect the health of human beings.

. As human population, industrial activities, and energy consumption continues to grow, the continued development of advanced, automated monitoring applications and devices is crucial for enhancing the accuracy of environmental monitoring reports and the cost-effectiveness of the environmental monitoring process.

Monitoring programs are published outlines within an organization that detail precisely which elements are being monitored, overall objectives, specific strategies, proposed sampling methods, projects within each strategy, and time frames.

Environmental monitoring products and environmental monitoring software, such as Environmental Data Management Systems (EDMS), facilitate the implementation and monitoring of environmental monitoring and assessment programs, which includes a central data management hub, automated environmental monitoring

alerts, compliance checking, validation, quality control, and generation of reports on dataset comparisons.

Environmental Monitoring Types

The three main types of environmental monitoring are soil, atmosphere, and water. Some techniques of environmental scanning and monitoring include filtration, sedimentation, electrostatic samples, impingers, absorption, condensation, grab sampling, and composite sampling.

Data collected from these methods of environmental monitoring can be input into a DBMS, where it can be categorized, analyzed, visualized,

and create actionable insights that drive informed decision making.

Air Monitoring: Environmental data gathered using specialized observation tools, such as sensor networks and Geographic Information System (GIS) models, from multiple different environmental networks and institutes is integrated into air dispersion models, which combine emissions, meteorological, and topographic data to detect and predict concentration of air pollutants.

Soil Monitoring: Grab sampling (individual samples) and composite sampling (multiple samples) are used to monitor soil, set baselines, and

detect threats such as acidification, biodiversity loss, compaction, contamination, erosion, organic material loss, salinization, and slope instability.

Salinity Monitoring: Remote sensing, GIS, and electromagnetic induction are used to monitor soil salinity, which, if imbalanced, can cause detrimental effects on water quality, infrastructure, and plant yield.

Contamination Monitoring: Chemical techniques such as chromatography and spectrometry are used to measure toxic elements, such as nuclear waste, coal ash, microplastics, petrochemicals, and

acid rain, which can lead to the development of pollution-related diseases if consumed by humans or animals.

Erosion Monitoring: Monitoring and modeling soil erosion is a complex process in which accurate predictions are nearly impossible for large areas.

The Universal Soil Loss Equation (USLE) is most commonly used to try to predict soil loss due to water erosion. Erosion may be due to factors such as rainfall, surface runoff, rivers, streams, floods, wind, mass movement, climate, soil composition and structure, topography, and lack of vegetation

management.

Water Monitoring: Environmental sampling techniques include judgmental, simple random, stratified, systematic and grid, adaptive cluster, grab, and passive; semi-continuous and continuous environmental monitoring; remote sensing and environmental monitoring; and bio-monitoring are used to measure and monitor ranges for biological, chemical, radiological, microbiological, and population parameters.

Environmental condition monitoring for water is managed by federal, state, and local agencies, universities, and volunteers, and is

crucial in characterizing waters, determining the efficacy of existing pollution control programs, identifying trends and emerging problems, redirecting pollution control efforts as needed, and in emergency response efforts.

3. *IOT Based On Environmental Monitoring*

Environmental monitoring solutions have evolved over the years into Smart Environmental Monitoring (SEM) systems that now incorporate modern sensors, Machine Learning (ML) techniques, and the Internet of Things (IoT).

Technologies such as IoT devices and wireless sensor networks have made advanced environmental monitoring using IoT a more streamlined and Artificial Intelligence-controlled process.

Data captured by IoT environmental monitoring sensors from a wide variety of environmental conditions can be integrated via the Wireless Sensor Network (WSN) into one, cloud-based environmental system, in which IoT devices embedded with ML can record, characterize, monitor, and analyze elements in a specific environment.

IoT for environmental monitoring facilitates the development of wireless, remote environmental monitoring systems, which enable operations to remove much of the human interaction in system function, which reduces human labor, increases the range and frequency of sampling and monitoring, facilitates sophisticated on-site testing, provides lower latency, and connects detection systems to response teams, ultimately resulting in higher rates of significant disaster and contamination

Reasons for Environmental Monitoring:

The advantages of environmental monitoring lie in its ability to improve the quality of life for society by highlighting the relationship between the environment and health.

Transforming environmental monitoring data into information and communicating actionable insights to the community in a timely manner is crucial for keeping citizens informed of the state of their environment.

. Practical environmental monitoring applications include protection of public water supplies, management of hazardous and radioactive waste, identification and analyzation of pollution sources that affect urban air quality and its effects on human health, protection and

management of natural resources like soil and water supplies, weather forecasting, resource allocation for land planning and economic development with energy analytics and energy business intelligence, identifying population density patterns in relation to natural resources and economic development, mapping of natural resources, protection of endangered species, and global climate change.

4. ***RELEVANT SURVEY***:

Remote sensing data from environmental monitoring is a major source of spatial data used in Geographic Information Systems

(GIS).

Geospatial capabilities are a top feature of HEAVY.AI's accelerated geospatial analytics platform.

While the enormous volumes of data collected by modern environmental monitoring sensors and IoT devices easily overwhelm legacy GIS tools, HEAVY.AI's accelerated analytics platform allows analysts to cross-filter billions of location data records and polygons alongside other features in milliseconds.

Analysts can collect, monitor, store, visualize, and analyze data from an environment at lightning speeds with the power of HEAVY.AI's GPU-

accelerated

Environmental monitoring refer to set of activities which provide Chemical, Physical, Geological, Biological And other Environmental Social, or Health data required by environmental managers. (U.S EPA 1985) OR The systematic sampling of Air, Water, Soil, Biota in order to observe and study the environment as well as to derive knowledge from this process.

Background Information The council on Environmental quality regulation (CEQ, 1887) enunciate the principal of Environmental monitoring in the section 1505-3 and 1505-2 (C) . The CEQ regulation primarily focus on

the use of monitoring in conjunction with the implementation of mitigation measures.

Monitoring could also be used to determine the effectiveness of each of the several types of mitigation measures.

Types of Monitoring Pre- EIS Monitoring & Post- EIS Monitoring. Pre- EIS Monitoring include Baseline monitoring.

Post- EIS Monitoring include Effect or Impact monitoring Compliance monitoring.

Baseline Monitoring : refers to the measurement of environmental variables during a representative pre project period to determine existing

condition, ranges of variation, and process of change.

Effect or Impact Monitoring :

Involves the measurement of environment variables during project construction and operation to determine the changes which may have occurred as a result of the project

Compliance monitoring : Takes the form of periodic sampling and continuous measurement of level of waste discharge, noise, or similar emission, to ensure that condition are observed and standard are met.

Purpose of Environmental Monitoring

Numerous purpose can be delineated for pre and post EIS

environmental monitoring.

Environmental monitoring provides information that can be used for documentation of the impacts that result from a proposed federal action; this information enables more-accurate prediction of impact associated with similar federal action.

Environmental monitoring provide information which could be used by the agencies to control the timing, location, and level of impacts of a project.

Environmental monitoring provide information which could be used for evaluating the effectiveness of implemented mitigation measure.

Provide crucial information on the quality of aseptic processing

environment during manufacturing.

Prevent the release of potentially contaminated batch if appropriate standards are not fulfilled.

Prevent future contamination by detecting adverse trends.

Case Study

Environmental monitoring describe the process and activities that need to take place to characterize and monitor the quality of the environment. Monitoring will be done through 4W1H method. Where When What Whom & How.

Where : Dedicated location.

When : Activity before, during and after the project/operation.

What : Accuracy conclusion of the area.

Whom : The trained professionals.
How : As current practice, protocols, and through documents.

Benefits Of E . Monitoring Planning training activities at a military installation so as to not coincide with the use of certain ares for breeding or nesting by threatened or endangered faunal species.

To establish a basic for sustainable use of population.

To detect and, it is hoped, minimizing the detrimental environmental impacts, and to provide data which can be used as scientific basis for conservation.

5. *Conclusion*

1 . Environmental monitoring of air quality (1-hour TSP and 24-hour TSP) for the

Project was performed in February 2003. All the monitoring results complied with the AL levels except four 24-hr TSP exceedances.

Since all the 1-hr TSP monitoring results complied with the AL levels, it indicated an acceptable air quality during the operation hours of the Fill Bank.

However, a poorer ambient air quality in the Fill Bank could be interpreted from the 24-hr TSP monitoring results.

The Contractor was required to follow up all the mitigation measures as recommended in the EIA Report,

EP and EM&A Manual.

At this stage, provision of covers or hydroseeding on the exposed slopes and more frequent water spraying on the stockpiles and main haul roads are recommended.

2 . Impact noise level monitoring was performed on 21 February 2003. The monitoring results complied with the limit level of 75dB.

No complaint was received regarding noise issue.

3 . The water quality monitoring was conducted by the Reclamation Project in the reporting month.

Data was obtained continuously

through CED.

In the reportingmonth, 8 action level exceedances were recorded.

However, it was believed that the exceedances were not caused by the operation of the Fill Bank because only a small amount of surface runoff was discharged from the site and a sufficient desiltingsystem including provision of screening facilities and a permanent desilting chamber in the trapezoidal channel was provided.

4 . Environmental site inspections were conducted 4 times in the reporting month and mitigation measures were generally implemented for the Project.

ET had notified the Contractor

the observations and deficiencies, especially provision and maintenance of drip trays, oil stain on bare ground and improper waste accumulation. The Contractor was reminded to rectify the observations.

Besides, as air quality exceedances were recorded and they were believed to be attributable to the wind erosion on thestockpiles, the Contractor was reminded to cover the exposed slopes and provide sufficient water spraying on the stockpiles and haul roads.

5 . No complaint, prosecution and notification of summons was received in February2003.
There had been three complaints received since commencement of the

Project.

THANK YOU