

## **Systemic Improvements with respect to Geo-referencing as a tool for detecting and stopping illegal mining**

Ministry of Coal and the PSUs under its administrative control have undertaken following systemic improvements in various Coal Mines spread over different states to prevent Illegal Mining:

### **1. Geo-referencing Portal/Mobile Applications.**

The Ministry of Coal, has developed a portal by name, Coal Mining Surveillance & Management System (CMSMS) software in coordination with Bhaskaracharya Institute for Space Application and Geo-informatics "(BISAG), Gandhinagar and Ministry of Electronics & Information Technology (MeitY), to use space technology for curbing illegal coal mining activity in the coalfield areas. Khan-Prahari Mobile Applications is a tool for reporting any illegal coal mining incident through geo-tagged photographs as well as textual information by any individual from general public by accessing the portal.

### **CMSMS (Coal Mining Surveillance & Management System)**

Coal mining in certain areas has been getting a lot of criticism for illegal activities related to coal mining operations. The current system of monitoring of illegal coal mining is based on local complaints and inputs based on unreliable sources.

The CMSS is a satellite based monitoring system which can provide trigger for any coal mining like activity in the vicinity of the existing coal mining areas. Developed under the Digital India Program. CMSMS is one of the first of such surveillance systems developed in the country using spatial technology. CMSMS has been hosted on the National Centre of Geo-Informatics (NCoG) portal <https://ncog.gov.in/CMSS/login>. The system aims to establish a regime of responsive coal mining administration by curbing instances of illegal coal mining activity through remote sensing and detection technology.

The system provide tool to public for reporting through 'Khan Prahari' mobile application. The advantages of remote sensing technology based monitoring system are:-

- **Transparency** : General public are provided easy access to the system for

reporting.

- Bias-free and Independent : The system is based on data generated by the imagery of remote sensing satellites which are the eyes watching from the sky.
- Deterrence effect : This real time monitoring has potent deterrence effect.
- Quicker response : The coal mining areas will be monitored regularly.
- Effective Follow-up: The actions taken on triggers will be followed up at various levels like district mining offices, coal subsidiary Headquarters, CMPDI and Ministry of Coal.

## 2. Other IT Initiatives / Measures taken by CIL & Subsidiaries:

One of the important areas on which CVC had been laying stress over years is leveraging technology and IT initiatives. In pursuance of this objective, CIL and its subsidiaries embarked on wide range of IT measures from year 2014. Even though the prime focus of these IT initiatives was to prevent theft and pilferage of coal through increased surveillance, some of them as detailed below are also aimed at enhancing process efficiency and accountal accuracy in various areas.

- (a) *GPS/GPRS based Vehicle Tracking System and Geo-fencing*
- (b) *Electronic Surveillance by CCTV cameras.*
- (c) *RFID based Boom barriers for controlled access to trucks at entry/exit points.*

3. **Functionality & Utility of these IT System** : Functionality / utility of each of the above component of the IT initiative is briefly explained below:-

### (a) **GPS/GPRS based Integrated Vehicle Tracking System (IVTS)**

This system helps in detecting attempts to pilfer or divert Coal in the internal-coal transportation circuit in a mine i.e. when coal is carried by vehicles from the face of the mine to its stocking location(s) or dispatch siding. All vehicles plying within the mine are fitted with GPS devices to track their movement through a pre-decided Geo-fenced routes. Any deviation by the vehicle from its designated route results in transmission of automated message to a control room which has GPS signal

receivers. These alerts are auto-forwarded in real time to key mine officials, based on which an immediate on-site investigation/verification can be carried out, if required. Real time detection and enquiry of route deviations or unauthorized stoppages act as a potent deterrent against any ill practices in coal transportation by road.

**(b) Electronic surveillance by CCTV Cameras.**

Surveillance by CCTV Cameras in vulnerable operational areas obviously has a very high deterrence value being a real time observation and monitoring tools. They are also very useful for evidence gathering for use of investigative agencies. The CCTV cameras when networked to Control Rooms through IP based connectivity or by any other means can facilitate real time monitoring, video recording and even generate real-time alerts / notifications. Their potential is best realized if they are installed at vulnerable points like weighbridges, entry/exit points, railway sidings, coal dump, explosive magazines, material stores etc. Apart from the normal cameras, some sophisticated PTZ cameras & night vision cameras have also been installed in some areas of CIL as a part of the above IT initiative.

**(c) RF ID based Boom barriers:**

The system enables control over vehicles coming into mine premises for lifting of coal on behalf of customers. RFID tags contain vital information such as Registration No., Contractor details, tare weight etc. Whenever any vehicle fitted with RFID tag pass through entry/exit gate or enter a weighbridge, the encrypted information is read by the RAD reader installed at weigh bridges to capture the information electronically and transmit the same to a central server. Often RFD system is integrated with the weighbridges to facilitate accountal of coal dispatches without human intervention. This system is also integrated with the boom barriers to control entry and exit of trucks into mine premises automatically without delay in manual verification of documents each time the truck enters and exits.

**4. Objectives of IT measures:** The aforementioned IT measures are expected to achieve following objectives:

- i. Prevent theft/pilferage by acting as deterrent mechanism against theft/pilferage and illegal mining in leasehold areas.
- ii. Serve as tool for gathering and documenting the evidence in any investigation through digital footprints.
- iii. Check instances and quantum of theft/pilferage of coal and illegal mining.

- iv. Enhance accuracy and transparency in accounting of coal and OB during production and dispatch which in turn, help in quick and accurate detection of shortage/pilferage/theft etc.

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