

No. 01/683/11-Mines/1755  
Government of Goa,  
Directorate of Mines & Geology,  
2<sup>nd</sup> Floor, Udyog Bhavan,  
Panaji – Goa.

Date : 10/10/2011

**ORDER**

1. The Directorate of Mines looks after the enforcement of Mines and Minerals (Development and Regulation) Act, 1957 and the Rules made thereunder. These legislations regulate the grant/renewal of mineral concessions in respect of major and minor minerals.
2. Mining and quarrying industry in Goa has witnessed phenomenal growth in the last few years and is the second most important industry next to Tourism industry of Goa. The sudden increase of iron ore prices in the international markets especially China explains the tremendous growth of state's mining industry.
3. The iron ore industry contributes significantly to the exports, employment and foreign exchange earnings. In addition it generates a substantial output multiplier effect for the state. However in the recent years, the operation of iron ore industry has been under strict watch from the environmental perspective and allegations of illegal mining are being reported from time to time.
4. During the last five years, exports of iron ore have increased considerably mainly due to the demand in the steel industry in China. However the production figures reflected in the monthly returns submitted by the mine-owners show a gross mismatch.

5. The Directorate had undertaken an exercise to inquire into the source of extraction from the exporters who are not mine owners in order to assess the royalty due to the Government. However, inquiries could not progress much due to the absence of data and reluctance on the part of exporters to furnish the information. It was also revealed that a number of traders were involved in the transaction of supply of iron ore to the exporters who were not in a position to indicate the source of extraction. Complaints about theft of ore, re-handling of old rejection dumps also came to our notice. However, effective and timely action could not be taken due to inadequate staff available with the Directorate. It is therefore necessary to put a mechanism in place to ensure that the quantity exported/meant for export is removed from a valid mining lease.

6. Under section 23C of the MMDR Act, the State Government is empowered to frame rules for preventing illegal mining, transportation and storage of minerals and for the purposes connected therewith. Such rules may provide for all or any of the following matters, namely:

- (a) Establishment of check posts for checking of minerals under transit;
- (b) Establishment of weigh-bridges to measure the quantity of mineral being transported;
- (c) Regulation of mineral being transported from the area granted under a mining lease;
- (d) Inspection, checking and search of minerals at the place of excavation or storage or during transit;

(e) any other matter which is required to be or may be prescribed for the purpose of prevention of illegal mining, transportation and storage of minerals.

7. The State Government in exercise of the powers under the above section had framed rules titled “Goa (Prevention of Illegal Mining, Transportation and Storage of Minerals) Rules 2004. These rules essentially deal with registration of traders and maintenance of records of source of procurement of minerals. However, they are not adequate enough to monitor the quantity of ore that is being removed and transported for export/storage.
8. During the year 2010-11, total quantities of 54 million tons (approx) were exported from Mormugao and Panaji Ports. Such a huge quantity involves transportation through deployment of around 20,000 trucks, carrying the ore from the mines to the river loading points passing through various routes, public roads and highways. Besides, it has also been observed that these trucks are overloaded beyond the permitted capacity. It has been the experience that any enforcement to check such violations under Motor Vehicle Act along the public roads has met with resistance from the truck operators creating traffic congestion and leading to law and order problem. The task of monitoring the quantity transported from the mining areas therefore becomes difficult.
9. This difficulty can be overcome by implementing automation system based on secure ISO 14443-A worldwide standard High Frequency (13.56MHz), passive short range Radio Frequency Identification (RFID) and Near Field Communication (NFC) technology. By this system movement of trucks with the weighed cargo can be tracked down through real-time GPRS connectivity at headquarters. This system should be adopted as under:

- a. There should be web based online monitoring system which should register and identify every authorized truck by issuing a valid ISO 14443-A RFID tag (in form of a RFID contactless Smart Card made of PVC plastic having standard ISO size around 54mm X 86mm, Card can have relevant data printed in colour) to the truck owner. This truck RFID tag should be programmed electronically to have truck details (owner's name, registration No., etc.) and tare weight of the truck stored on the memory of the RFID tag. The programming should be in secure format so that only authorized RFID and NFC reading and writing devices /terminals are able to read and write the data on the RFID tag.
- b. The exit weighbridge at every mine needs to be equipped with the ISO 14443-A RFID reader-writer unit to read the truck RFID tag in close proximity only. The reading and writing of data on the RFID tag should be on a secure standard protocol and read distance between the RFID tag and reader-writer unit should be 5-10 cms only. This RFID unit at the weighbridge should have an integrated audio-visual indicator, thermal transfer printer, battery back-up, industrial design to sustain the environmental conditions at the mines. This RFID unit should have the capability to be interfaced with the weighbridge for capturing the gross weight of the truck and write the gross weight on the memory of the truck RFID tag. This captured weight, truck details, date-time stamp, etc. should be uploaded on a real-time GPRS interface to the centralized web-application.
- c. The centralized web-application should have the facility to manage truck RFID tags, monitor RFID reader-writer unit installed at weighbridges, generate real time, mine-wise online monitoring report of the tonnage, vehicle details, number of trips, etc as required by the State Government.

- d. The web application should be able to handle data coming from RFID reader – writer units installed on multiple weighbridges at exits of mining leases, intermediate locations (stacks, processing plants) and jetty locations. The web application should have self diagnostic feature to check the status of the RFID unit installed on the weighbridge.
- e. The system should operate with minimum 98% accuracy in uploading the data from weighbridge RFID reader – writer unit. The transaction should not be lost in case of network failure and should be stored in local memory. Data upload should be on a real time GPRS interface. The RFID – NFC system should be designed in such a manner that it performs with same accuracy in all weather conditions including heavy rains in monsoon season. Considering the desired data security and weather conditions, only high frequency (13.56MHz) RFID and NFC is recommended.
- f. The system should have the facility to equip the vigilance personnel with NFC mobile phone devices with relevant integrated application to identify and read the data stored on the truck RFID tag memory even on an offline mode. The vigilance squad should have administration rights on the NFC mobile phone device to block-unblock a truck RFID tag as and when required.
- g. ISO 14443-A RFID reader-writer units should also be installed at the jetty weighbridge and the intermediate location (stacks, processing plants) to reconcile the number of trips recorded at the mine exit weighbridge. The data on the truck RFID tag memory should be recorded at the RFID reader-writer installed at the Jetty and intermediate location. This data should be matched with the weight recorded at the mine exit. Any deviation in the weight has to be reported immediately over the GPRS interface to the web

application to generate necessary reports. The data stored on the RFID tag memory should be erased when the truck RFID tag is shown at the RFID reader-writer unit installed at the jetty and intermediate location. Only after the data is erased, this truck RFID tag will be allowed to continue the next trip starting from the mine exit. This is to ensure that every truck reaching the jetty directly from mine exit or through the intermediate location is recorded. If the jetty does not have a weighbridge facility then a NFC mobile phone should be used to read the truck RFID tag.

- h. The server on which the web application is hosted will be located at the State Government of Goa owned data center. Necessary data security and backup provisions should be made available.
  - i. The web application software should be able to generate various reports as follows:
    - Registered truck details
    - Tonnage of truck exiting mine location
    - Tonnage of truck arriving at jetty
    - Number of trips per mining lease per day
    - Any other relevant report based on the available data, required by the Directorate of Mines, Government of Goa.
10. The existing system of conducting checks at the field level has its inherent weaknesses and there can be the element of harassment. The above proposal has therefore been mooted to discourage any malpractices at the field level and to enable to maintain a close supervision and monitoring even from the headquarters through the connectivity.
11. Introduction of such a system needs a technical expertise which is available with the IT companies / agencies, who may be

willing to design the solution including Hardware & Software. This entire issue and probable solution was discussed with the representatives of GMOEA, representatives of various mining companies from the state of Goa, IT Director of the state of Goa, and few other state government office bearers on 24/08/2011, 22/09/2011 and 23/09/2011. It is therefore necessary to identify such companies / agencies who are involved in delivering such systems and put up before the GMOEA officials who have to actually install and regulate this system for the smoother transportation and control over production at the mining lease sites. The actual cost for installation and maintenance of the system is to be borne by the Mining Companies which requires to be ascertained from the IT Company / agency, who shall be notified by the Government based on the following criteria:

- a. Company/agency should be in the business of developing and deploying RFID and NFC systems.
- b. Company/agency should have satisfied customers across different business verticals using systems based on RFID and NFC technology. Minimum five reputed customer references to be provided.
- c. Company/agency should have adequate experience of delivering the required RFID and NFC based system. The company/agency should comply fully to the following:
  - i. The company/agency should have deployed a High frequency secure ISO 14443-A standard passive RFID and NFC based system in minimum two mining companies located in the State of Goa. This RFID and NFC based system should have been operational for a period of minimum 12 months before the date of this Administrative Order.

- ii. The company/agency should have developed and installed ISO 14443-A RFID reader-writer units with a GPRS interface at more than 20 weighbridges at mining companies located in State of Goa. These RFID reader-writer units at the weighbridges should be integrated with the web application based monitoring system.
  - iii. Company/agency should have developed and delivered NFC mobile phone based application to the mining companies located in the state of Goa. This NFC mobile phone application must be working and in use on more than 100 NFC mobile phone devices, at the mining companies located in the State of Goa.
  - iv. Customer reference with purchase order copies to be submitted by company/agency to prove compliance with above mentioned points.
- d. Site visit for representatives of State Government at the mining companies located in Goa which use the company/agency's RFID and NFC based system to be arranged by company/agency upon request from State Government of Goa.
- e. Company/agency or its implementation partner should have local office in the state of Goa in order to provide local support to the RFID and NFC system.
- f. Any company/agency appointed for this execution shall have prior approval of the State Government of Goa and the company/agency should be enlisted exclusively for tenure of five years.
- g. The company/agency should have adequate spares and resources to replace and repair the system for uninterrupted operations at the mine exit and jetty.

- h. The company/agency should provide technical manpower at the Directorate of Mines for uninterrupted operations of the web application software and report generation.
12. The mining companies in the state of Goa have to provide necessary uninterrupted power supply for the smooth operation of the proposed RFID and NFC system. Any other necessary infrastructure, mountings, fittings and space for installing the RFID reader – writer unit at the weighbridge should be provided by the mining companies.
13. A detailed Software Requirement Specification (SRS) report has to be prepared by the IT company/agency in discussion with the Directorate of Mines. This SRS will be submitted to the Directorate of Mines for their acceptance and approval. A third party auditor can be appointed to evaluate the software functions and system workflow.
14. The IT company/agency should make a provision to further develop and enhance the web application to facilitate e-filing of returns which would be integrated with the payment gateway, if required.
15. Important Dates:
- a. October 10, 2011: Date of notification of administrative order by State Government of Goa to GMOEA.
  - b. October 24, 2011: Last date to recommend the suitable IT company/agency by GMOEA.
  - c. October 31, 2011: Certification and appointment of the recommended IT company/agency by the Directorate of Mines, Government of Goa, to develop and implement the RFID and NFC based system.

- d. November 10, 2011: Last date to enter into a contract and place order on the appointed IT company/agency by the GMOEA, to develop and implement the required RFID and NFC system.
  - e. November 28, 2011: Submission and signing of Software Requirement Specification (SRS) report, prepared by appointed company/agency, by Directorate of Mines, Government of Goa.
  - f. March 01, 2012: Proposed RFID and NFC system as per the SRS report to be implemented and online reports to be generated using the system.
16. No mining lease holder shall be allowed to transport the mineral ore without complying to the RFID & NFC system as mentioned in this Order. This system should be installed by the Company / Agency recommended by GMOEA and approved by Directorate of Mines & Geology.
17. Any mining lease holder transporting the mineral ore without complying to the RFID & NFC system is liable to be issued with stop work directions including suspension of the lease licence.
18. This Order is issued with approval of the Government and shall come into force with immediate effect.

(Arvind D. Loliyekar)  
Director of Mines & Geology

To,  
All the Mining Companies

Copy to :  
The President,  
Goa Mineral Ore Exporters' Association,  
Panaji – Goa.