



भारत सरकार GOVERNMENT OF INDIA  
खान मंत्रालय MINISTRY OF MINES  
भारतीय खान ब्यूरो INDIAN BUREAU OF MINES  
क्षेत्रीय खान नियंत्रक के कार्यालय  
OFFICE OF THE REGIONAL CONTROLLER OF  
MINES



REGD WITH A/D  
Phone: 0674-2352463  
Tele Fax: 0674-2352490  
E-mail: ro.bhubaneswar@ibm.gov.in  
Plot No.149, Pokhariput  
BHUBANESWAR-751020

No. MSM/FM/42-ORI/BHU/2018-19

Date: 15.01.2019

To

✓ Shri Sabysachy Mishra, Head (Mine & Production Planning),  
Sukinda Chromite Mine,  
M/s Tata Steel Ltd, At/P.o- Kalarangiatta,  
Dist- Jajpur, Odisha-755028

Sub: Approval of modification of Review of Mining Plan of Sukinda Chromite Mine along with Progressive Mine Closure Plan (PMCP), over an area of 406 ha in Jajpur district of Odisha State, submitted by M/s Tata Steel Ltd under Rule 17(3) of MCR, 2016.

Ref: - i) Your letter No. SCM/MPP/34/18 dated 28.12.2018.  
ii) This office letter of even no. dated 02.01.2019.  
iii) This office letter of even no. dated 02.01.2019 addressed to the Director of Mines, Govt. of Odisha, copy endorsed to you.

Sir,

This has reference to the letter cited above on the subject. The draft of modification of Review of Mining Plan along with Progressive Mine Closure Plan (PMCP) has been examined in this office based on earlier site inspection carried out on 21.11.2018 by Shri G C Sethi, Deputy Controller of Mines & Shri S R Mazumdar, Senior Mining Geologist. The deficiencies observed are enclosed herewith as Annexure- I.

You are advised to carry out the necessary modifications in the draft modification of Review of Mining Plan in the light of the contents vide Annexure- I and submit **three (3) firm bound and two (2) soft copies of the document text in CD in a single MS Word file ( the drawing/plates should be submitted in Auto CAD compatible format or JPG format in resolution of 100x100 pixels on same CD )** with financial assurance under Rule 27 of MCDR 2017 of the Modification of Review of Mining Plan within 15 (Fifteen) days from the date of issue of this letter, for further necessary action. If the total page of annexures exceeds 50 (Fifty) then it should be submitted as separate volume. But reference of these annexures must appear in the modification of Review of Mining Plan document. The plates are also to be submitted in separate volume.

The para-wise clarifications and the manner in which the deficiencies are attended should invariably be given while forwarding the modified copies of the modification of Review of Mining Plan. It may be noted that no extension of time in this regard will be entertained and the modification of Review of Mining Plan will be considered for rejection if not submitted within above due date. It may also be noted that if the deficiencies are not attended completely, the submission would be liable for rejection without further correspondence.

Yours faithfully,

(HARKESH MEENA)

क्षेत्रीय खान नियंत्रक / Regional controller of Mines

**SCRUTINY COMMENTS ON EXAMINATION OF MODIFICATION OF REVIEW OF MINING PLAN & PROGRESSIVE MINE CLOSURE PLAN FOR SUKINDA CHROMITE MINE OF M/S TATA STEEL LTD., OVER AN EXTENT OF 406 HECTARES, LOCATED IN JAJPUR DISTRICT OF ODISHA STATE, SUBMITTED UNDER RULE 17(3) OF MCR, 2016 & RULE 23 OF MCDR, 2017**

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- (1) All the headings as mentioned in the IBM Manual Appraisal MP 2014 should be furnished in all chapters in the text e.g. para 1(a) etc. among others.
- (2) In table 1.2, the max bottom mRL as per approved proposal and proposed UPL for modification has not been correlated in lateral extent.
- (3) The term 'subgrade ore' may be replaced with "Mineral Rejects". The term "Low grade Ore" etc. are incorrect and should be replaced with relevant terminology as "Ore" and "Mineral Reject". Need to define "Ore/Saleable Ore" and "Mineral Reject" with respect to Cut-off grade and threshold value of Chromite and the same should be used at all relevant places. Necessary corrections to be done in text/tables/calculations etc.
- (4) In page 10, reason for modification as stated in point no-2 may be rechecked/corrected and further elaborated with respect to max bottom mRL of the cross section in the area proposed for development vis-a vis present mRL.
- (5) The reason for justification and modification furnished under para 3.6 is not relevant to the reason for which modification has been submitted. Necessary corrections to be done.
- (6) Para 1(a), topography, drainage pattern, vegetation, climate, rainfall data of the mining lease area has not been described. Specific information pertaining to mining lease area should only be furnished.
- (7) In table 1.1, the explored depth and level of exploration as per UNFC doesn't correlate. Present UPL w.r.t approved pit slope angle need to be justified. Recheck/justify with proper reason.
- (8) In page 44, necessary supporting document in support of 5 MPa intact rock strength as mentioned for friable ore as mentioned should be furnished.
- (9) In page 49, para c, the email address furnished is incorrect. Need to do necessary correction.
- (10) In page 50, under para d, the details of already drilled bore holes indicating drilling type (Core/RC/DTH), Coordinates, Bore Hole numbers, Borehole diameter, spacing, inclination, collar RL, bore hole closing depth, agency involved in exploration etc. have not been furnished in tabular format.
- (11) In page 51, table no. 1.3, the lease area explored as per UNFC norms is not correct and should be corrected as per the provision of MEMC Rules 2015.
- (12) In page 52, paragraph no.3 should be rectified w.r.t provision of the gazette notification. Necessary correction to be done. Under para (iv), necessary information regarding analysis carried out in mineralized area may be analyzed meter wise with 10% of check samples has not been provided in tabular format.
- (13) Under future exploration program, the correct provision of rule 12 (4A) of MCDR 2017 (as amended up to 27.03.2018) should be quoted and necessary correction in the justification may be submitted for compliance of G2 level of Exploration for open cast mining operation. The mineralized area should be properly marked in Geological plan with due justification and "G2" level of exploration.
- (14) Complete chemical analysis for entire strata for all radicals have not been furnished for selected samples from a NABL accredited Laboratory or Government laboratory or equivalent. Entire mineralized area should be analyzed meter wise with justification of 10% of check samples have not been furnished. (At least for 10% of total samples may be analyzed in accordance to BIS and reports from NABL accredited/other government laboratory). Necessary justification should be provided.
- (15) In page 54, Nature of quality control procedures adopted (e.g. standards, blanks, duplicates, external laboratory checks) and whether acceptable levels of accuracy (i.e. lack of bias) and precision have been established has not been justified. Check analysis of at least 10% of samples analyzed from third party NABL accredited for assessing the acceptable levels of accuracy have not been justified.



- (16) The parameters considered for resource & reserve estimation have not been defined properly as per guidelines mentioned in IBM Appraisal of MP 2014 (refer para 4.1.4.1). The method of estimation and its process is not defined. Determination of bulk density and recovery factor, based on field test supported by necessary documents. The bulk density parameters should be mentioned with relevant supporting test reports from NABL laboratory. The reason for modification in UPL should be rechecked/corrected with necessary information required.
- (17) In page 59, the pit slope angle mentioned is incorrect. Need to rectify the same.
- (18) Mineral Resources estimated purely based on level of exploration, with reference to the threshold value of minerals declared by IBM have not been furnished in the following format. Grade has not been furnished in table 1.10.

Level of Exploration	Resources in million tons	Grade
G1 - Detailed exploration		
G2 - General Exploration		
G3 - Prospecting		
G4- Reconnaissance		

- (19) Basis of resource categorization as per UNFC mentioned in Page 60 is incorrect. Necessary modification should be done as per the provision of Minerals (Evidence of Mineral Contents) Rules, 2015, reference Point No.04 (Technological) in Part II and Exploration norms specified for different types of deposits in Part III of the said rule. Accordingly, UNFC boundaries have to be redrawn and reserves and resources under different categories of UNFC have to be re-estimated. In table 1.6, the grade wise reserves and resources under UNFC categories have not been mentioned separately for Ore and Mineral Reject part of ROM.
- (20) Justification of UNFC categories for reserve and resources has not been furnished as per the UNFC guideline. Specific geological information pertaining to various Geological axes has to be furnished. Also, lateral extension and depth continuity considered for UNFC boundaries as per provision of MEMC rules 2015 have not been specified. The justification of UNFC codes for reserves and resources have to be rechecked w.r.t Economic, Feasibility and Geological axis for three bands of chromite. The same should be cross checked and rectified in LVS shown in Fig 1.8 in page 64. Further, justification has not been submitted for 333 categories of resources as per UNFC and as per the provision of MEMC Rules 2015 has not been mentioned. The reference of different study report/feasibility study report has not been referred in categorization of UNFC codes. Necessary corrections to be done at all places.
- (21) In page 65 and also at relevant places of the document, the reference of underground operation (viz crown pillar etc.) may be omitted as only open cast operation has been proposed.
- (22) The formula for cross sectional area considered should be rechecked and corrected. Detail calculation both in terms of section wise and RL wise reserves and resources by cross sectional method showing cross sectional area, volume, bulk density considered tonnage etc. for Ore, Mineral Reject and OB have not been furnished in tabular format for Northern band, Middle band and Southern Band Ore body. The Bulk density considered for Ore and Mineral reject part of ROM have not been specified categorically with justification. The consideration of recovery factor has not been considered in reserve/resource estimation with necessary supporting documents in favor of recovery factor. Need to do necessary corrections at all places. Detail calculation of pyroxenite reserves in cross sectional method has not been furnished.
- (23) Processing of ROM and Mineral reject should be rechecked and corrected with respect to processing of different nature of ore (friable/lumpy) encountered in three chromite bands- Northern, Middle and Southern Band. This may indicate size and grade of feed material and concentrate (finished marketable product), recovery etc. Material balance chart with a flow sheet or schematic diagram of the processing procedure indicating feed, product, recovery, and its grade at each stage of processing should be furnished.
- (24) The feasibility study report should be corrected at all relevant places w.r.t corrections as mentioned in above points.
- (25) The actual generation status of ROM, OB & stripping ratio till September 2018 has been furnished in the referred table, which is uncalled for and need not be furnished as the calculation/ evaluation is required on yearly basis. The information furnished in remarks



column of the table as well as the reasons for deviation may also be revised. Accordingly, the data furnished in table nos. 3.3.3, 3.3.4, 3.3.5, 3.3.6, 3.3.7 & 3.3.8 and all other relevant tables/plates in the document may also be revised. (Table No. 3.3.2)

Tentative Insitu Excavation: Detail calculation both in terms of section wise and RL wise reserves and resources showing cross sectional area, volume, bulk density considered, tonnage etc. for Ore, Mineral Reject and OB have not been furnished in tabular format for Northern band, Middle band and Southern Band Ore body estimated through cross sectional method.

- (26) The terminology like crown pillar, rib pillar & sill pillars are referred, which is irrelevant in this document as the proposed mining operations are restricted to opencast mining only.
- (27) The quarry dimension of OB X & OB II quarries are stated to have been furnished in refer table but the same has not been furnished. (Table 2.1)
- (28) The OB II quarry is proposed to be backfilled during 2018-19 & 2019-20 but the extent of area proposed to be backfilled in each year and quantities of waste materials required should be furnished. Besides, the height such backfilling & the location co-ordinates for the same may also be furnished. All should be presented in tabular form. (Table 2.2)
- (29) In the table 2.2 furnished under the heading Insitu Tentative Excavation the following observations are made: (i) The proposed status of OB generation, production of Chrome ore, Pyroxenite ore & mineral rejects generation has been furnished in tabular form but the bench/RL of the excavation planning has not been given, which should also be furnished by adding one more column in the table. (ii) The recovery percentage of the chrome ore, Pyroxenite & mineral reject is missing, which should be furnished supported by authenticated recovery test report. (iii) The location co-ordinates of the excavation planning for each year also not furnished and the same may also be given by adding one more column in the table with proper plate reference. (v) The grades of Chrome ore, Pyroxenite, mineral reject may also be furnished supported by authenticated chemical analysis report. Accordingly, corresponding incorporations /modifications may also be made in connected paras in the text & relevant plates. [Para 2.0(A)(I), page No. 67]
- (30) The mining operations are restricted to opencast method only; thereby the proposals & information/data related to underground mining must be deleted not only from this place but also from other places of the document. Besides, the plan & sections linked with the underground activities may also be detached. Accordingly, the relevant chapters of the document may also be revised. (Page No. 87 to 101)
- (31) The land use pattern in different counts as on 01.10.2018 & 31.03.2020 has been furnished instead the same at the end of 2018-19 & 2019-20 is required. Accordingly, the data/information furnished in table 8.5 & any other place of the document may also be revised. (Table 2.14)
- (32) The electricity requirement in different counts furnished in the above referred table should be checked and corrected. (Table 7.1)
- (33) The proposed employment status for mining engineer, geologist and mine manager etc. is missing und the heading Employment Potential, which should be furnished. (Page No. 147)
- (34) Quarry wise extent of area proposed to be degraded in each year of the modification period of two years should be furnished. Besides, pit wise extent of area utilized for dumping, reclamation, rehabilitation & afforestation for each year of the aforesaid period may also be furnished. All should be furnished in tabular form and rest of the things should be erased. (Para 8.3.1)

## ANNEXURES

- i) In the contents for list of annexure, an annexure numbered as -7B is stated to be enclosed but in the enclosure side no such annexure is found.
- ii) The copy of the violation letter dated 29/31.10.2012 and the compliance status thereof has been enclosed as annexure-11, which is very old, instead the violation pointed out and compliance status thereof during last two/three years if any to be furnished.
- iii) The copy of the relevant portion of the slope stability analysis report from SRK consulting engineers, South Africa conducted during 2004 & CMRI DURING 2000 have been



enclosed as annexure-13 & 14 but the mine working has been reached much below now and number of benches has been increased, thereby, the extract of the slope stability analysis done during 2000 & 2004 will not serve the purpose. Therefore, further slope stability study should be conducted in fresh through the institutes of national repute like CMFR, IIT etc. and such reports should be submitted.

- iv) The ambient Air quality & water quality analysis report, dated 27.10.2018 from Visiontek Consultancy Services Pvt. Ltd., has been enclosed as annexure-17 & 18 but the copy of the valid NABL accreditation certificate in support of the aforesaid analytical laboratory has not been submitted. Besides, the analysis report for noise level, ground vibration etc. may also be enclosed for more informative.
- v) The underground feasibility study report has been enclosed as annexure-21 but the mining operations are restricted to opencast workings only, thereby the report has no relevance with the present method of mining, thereby the same should be detached.
- vi) The NABL certificate with scope of accreditation for chromium, manganese, pyroxenite, dolomite and limestone issued in favour of FAMD, Sukinda has been enclosed as annexure-22 but no analysis report from M/s TATA Steel Ltd., FAMD, Sukinda has been submitted. Moreover, any analysis report from 3rd party NABL is required.
- vii) The authenticated chemical analysis report for different grades of chrome ore, pyroxinite, waste dump & mineral rejects etc. has been enclosed as annexure-35 & 36 but the reports are not from 3rd party NABL accredited laboratory, thereby not to be considered as authenticated.
- viii) Geotechnical study reports should be enclosed as annexures with the document.
- ix) Form-I and Form-J as per MCDR, 2017 should be furnished for all boreholes.

**PLATES (General):**

- i) Show a scale of the plan at least twenty-five centimeters long and suitably sub-divided; show the true north or the magnetic meridian and the date of the later;
- ii) The conventions provided under the Metalliferous Mines Regulations, 1961, shall be used in preparing all plans and sections
- iii) All plans and sections should comply with the provisions of Rule 32 of MCDR 2017.
- iv) All plans and sections should be signed with date by Qualified Person.
- v) Along with local grid coordinates, UTM coordinates should also be provided in the grid lines and latitude/longitude coordinates should be mentioned adjacent to boundary pillars in all plans and sections.
- vi) The UPL has to be redrawn based on provision of UNFC boundaries as per MEMC Rules 2015 and should be shown in red color in all relevant plans and sections.
- vii) The proposed bench mRL to be mentioned in the all plans and sections.
- viii) Date of survey should be given on plan and sections and the same should be signed by with date.
- ix) Grid Lines to be shown in all sections - Geological Sections, Development Sections, Conceptual sections, Dump sections etc. The lithology should be shown in all relevant sections.

**Key Plan:**

- i) The key plan should incorporate all features as mentioned Rule 32 5 (a) of MCDR 2017 and all features should be shown in index as well.
- ii) Approach road to lease area should be shown in key plan.
- iii) The Latitude/longitude of the extreme ML pillar coordinates should be marked in key plan.

**Surface Plan:**

- i) UTM coordinates to be mentioned along with local coordinates along the grid lines.
- ii) The features shown in the index is not distinguishably shown in the plan. The UPL should be shown over the plan and in index. Necessary corrections to be done.
- iii) Few boundary pillars should be correlated with some permanent ground features giving distance and bearing/direction.



- iv) Nomenclature of the existing waste and mineral reject dumps along with stacks should be mentioned.

**Geological Plan & Section:**

- i) The Geological plan is not updated with surface geology and has been kept blank at places. The presence of soil cover, pyroxenite band has not been shown at places. The drilled boreholes have not been updated at places. The UNFC boundaries have to be revised as per the provision of MEMC Rules 2015 and plotted. The index of Geological and surface features is not legible. Necessary corrections to be done in Geological sections.
- ii) In the Geological plan, the UTM coordinates has not been mentioned along with local coordinates along the grid lines.
- iii) The redefined UNFC boundaries and UPL along with UNFC code should be prominently shown in Geological Plan and sections.
- iv) All the lithology within and outside the UPL to be shown in the Geological sections. Necessary corrections to be done in all the sections.
- v) Geological cross sections at 100m interval have not been submitted.
- vi) The index of Geological features should be same in both Geological Plan and all the Geological sections.
- vii) In Geological Plan, longitudinal section line to be shown and a longitudinal section to be submitted.
- viii) The color of the UPL should be same in all plans and sections. In the Geological sections, the revised UPL and benches should be drawn properly.
- ix) Necessary corrections of UNFC boundaries to be done in Longitudinal Vertical Section.

**Development plan & Section:**

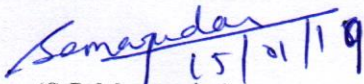
- i) Development section should be drawn on same scale as Geological section and on same section line. Development sections also to be shown in 100m section interval.
- ii) Quarry name, existing and proposed waste dump, mineral reject dumps etc. to be shown in the development plans and sections.
- iii) The lithology of the area has not been shown in year wise development plan and sections in the area proposed for development.
- iv) Each year development proposal for different blocks should be shown separately in different color. The proposed bench position at the end of the year should be shown in different colour and same should be marked in legend. The UPL may be redefined and benching pattern to be made in all development plans and sections. The UPL should be shown in Red color which should contrast to the year wise development proposal color shown in development plan and sections.
- v) The RL of the benches should be clearly shown in year wise development plan and sections.
- vi) In the development sections the blank portion within the UPL should be properly defined with lithology. Necessary corrections to be done at all relevant places.
- vii) UNFC codes should be shown in development sections.
- viii) DRG No. 13/2018 (Development Plan of OB X Quarry for 2019-20): The index reference given for the proposed quarry profile for the years 2018-19 & 2019-20 are not clearly demarcated on the plan portion of the plate, thereby the development proposed in both the years should be differentiated by separate colour codes for ease in monitoring. Accordingly, the plates submitted showing the development sections and other relevant plates submitted along with the document may also be revised.

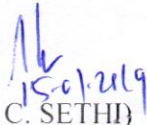
**Dump plan & section:**

- i) Separate dump plan and sections should be submitted showing the year wise buildup of dump along the section with RL. The index of the dump section should be properly shown showing the year wise buildup proposal.
- ii) The grid coordinates should be shown in the X-axis of the dump sections.

**Environment plan:**

- i) The Environment Plan as prepared should be satisfy the provision as laid down rule 32 (5) (b) of MCDR'2017.
- ii) The drainage pattern of the lease area also to be shown on the plan.
- iii) Air, water and noise monitoring stations to be shown in the plan.

  
(S.R. Mazumdar)  
Senior Mining Geologist

  
(G. C. SETHI)  
Deputy Controller of Mine