

## URANIUM CORPORATION OF INDIA LIMITED

### Status of Environmental Compliance of Jaduguda Uranium Mine and Ore Processing Plant as on March 2014 (MoEF No. J-11015/710/2007-IA.II (M) dated 6<sup>th</sup> May, 2011)

#### Specific conditions

- I. *The project proponent shall obtain Consent to Establish from the State Pollution Control Board and effectively implement all the conditions stipulated therein.*

Consent to established has been obtained from Jharkhand State Pollution Control Board (JSPCB) vide reference no. PC/JSR/AIR/U-09/02-B-4879 dated 06.10.2012. Status of the compliance of the conditions stipulated therein has been submitted to JSPCB vide letter no. UCIL/ENV/AD/MoEF/15/12 dated 22.11.2012.

- II. *The environmental clearance is subject to approval of the State Land use Department, Government of Jharkhand for diversion of agricultural land for non-agricultural use.*

Jaduguda Mine and Ore Processing Plant started in year 1967. Government of Jharkhand (formerly Bihar) has already delivered the possession of private land (agricultural land) for setting of uranium mine & ore processing facility. No additional land (agricultural) is required for expansion and renewal of mining lease as all the proposed activities of the expansion project are confined to the existing premises only.

- III. *The environmental clearance is subject to grant of forestry clearance. The project proponent shall obtain requisite prior forestry clearance under the Forest (Conservation) Act, 1980 for working in the forest area.*

The Ministry of Environment & Forest, Government of India has granted the forestry clearance for the mine, processing plant and tailing pond under the Forest (Conservation) Act, 1980 vide letter No.8-49/97-FC dated 20.04.1998 and 12.02.2004.

- IV. *The project proponent shall ensure that no natural watercourse and/or water resources shall be obstructed due to any mining operations.*

No natural watercourse and water resources have been obstructed due to underground mining activity at Jaduguda.

- V. *The top soil should be stacked at earmarked site(s) only with adequate measures and it should not be kept unutilized for a period more than 3 years. The topsoil should be used for land reclamation and rehabilitation of mined out areas.*

Not applicable as method of mining is underground. Top soil is not available.

- vi. *Regular monitoring of subsidence movement on the surface over working area and impact on water bodies / vegetation / structures / surrounding shall be continued till movement cases completely. In case of observation of any high rate of subsidence movement, appropriate measures shall be taken to avoid loss of life and material. Cracks shall be effectively plugged with ballast and clayey soil / suitable material.*

Cut and fill method of underground mining is being practiced in Jaduguda Mines. The voids created during mining activities are filled up with waste rock and sand. Therefore subsidence is not envisaged. This practice has been adopted since more than four decades at Jaduguda Mines and no subsidence has been observed during mining operation.

- vii. *All the mine entries shall be above the highest flood level to avoid any anticipated flooding of mine from the surface water during the rainy season.*

The mine entry of Jaduguda Mines is at 115.037 mRL which is higher than the HFL (100 mRL).

- viii. *In areas where subsidence is anticipated in shallow uranium ore occurrence, such areas be identified and provided with garland drains to ensure draining of water and avoid ingress of the same in to the underground mine.*

Subsidence is not envisaged as explained in sr. no. (vi). Necessary action has been taken to avoid ingress of water into the mine. A garland drain has been constructed to divert the rain water around the mine entry.

- ix. *The project authorities shall check the possibility of existence of fault(s) before deciding about the thickness of safe barrier required to be maintained between the working face and the water bodies, if any, in consultation with the Director General Mines & Safety (DGMS). De-pillaring should also be carried out after taking prior approval of the DGMS.*

No water body exists within core zone of the project. However, necessary permission is being obtained from the Director General of Mines & Safety (DGMS) for mine development and extraction of ore.

- x. *The project proponent shall carry out conditioning of the ore with water to mitigate fugitive dust emission, without affecting flow of ore in the ore processing and handling areas.*

Water sprinkling is done to mitigate fugitive dust emissions in the ore processing plant and ore handling areas. Water sprinklers have been installed at ore handling areas e.g. grizzly and conveyor belts as shown in following photograph. Fugitive dust (Respirable siliceous Dust) during February 2014 in ground hopper and grinding area of ore processing plant was found to be 0.67 mg/m<sup>3</sup> and 0.54 mg/m<sup>3</sup> respectively (Permissible limit is 0.80 mg/m<sup>3</sup>).



- XI. The decanted water from the tailing dam shall be re-circulated and there should be zero discharge from the tailing dam.*

The decanted water from the tailing pond is treated in Effluent Treatment Plant. Part of the treated water is being reused in the processing plant. Excess treated effluent from ETP is discharged as per inland water discharge standards. There is no discharge from tailing pond to the environment.

- XII. The project proponent shall develop effective emergency response procedure to ensure appropriate risk management measures in the public domain, if any, due to project.*

Emergency response preparedness plan has been developed as per DGMS and AERB guidelines.

- XIII. Effective safeguard measures, such as regular water sprinkling shall be carried out in critical areas prone to air pollution and having high levels of particulate matters loading and unloading points & all transfer points. Extensive water sprinkling shall be carried out on haul roads. It should be ensured that the Ambient Air Quality parameters conform to the norms prescribed by the Central Pollution Control Board in this regard.*

Sprinkling of water on haul road and dusty area is done. Pucca haul road has been constructed for ore transportation. Ambient air quality monitored during October 2013 at two locations in core zone in terms of  $PM_{10}$  ( $10-69 \mu g/m^3$ ),  $PM_{2.5}$  ( $<5.0 \mu g/m^3$ ),  $SO_2$  ( $<5 \mu g/m^3$ ),  $NO_x$  ( $9.35-16.56 \mu g/m^3$ ), Pb ( $0.01-0.02 \mu g/m^3$ ), and CO ( $<1.0 mg/m^3$ ) parameters were found within the permissible standards.

- XIV. Plantation shall be raised in an area of 79ha including a 7.5m wide green belt in the safety zone around the mining lease, around processing plant, around tailing dam, roads etc. by planting the native species in consultation with the local DFO/Agriculture Department. The density of the trees should be around 2500 plants per ha.*

A comprehensive greenbelt and plantation of trees have been developed around the project in the area of about 79 ha. The existing greenbelt and plantation is shown as below.



- xv. *The project authority should implement suitable conservation measures to augment ground water resources in the area in consultation with the Regional Director, Central Ground Water Board.*

Rainwater recharge pit has been constructed at two locations within township area in consultation with ground water board.

- xvi. *Regular monitoring of ground water level and quality shall be carried out in and around the project area (mine lease, ore processing plant and tailing dam) by establishing a network of existing wells and installing new piezometers during the operation. The periodic monitoring [(at least four times in a year – pre-monsoon (April-May), monsoon (August), post-monsoon (November) and winter (January)); once in each season)] shall be carried out in consultation with the State Ground Water Board / Central Ground Water Authority and the data thus collected may be sent regularly to the Ministry of Environment and Forest and its Regional Office, Bhubaneswar, Central Ground Water Authority and Regional Director, Central Ground Water Board. If at any stage, it is observed that the ground water table is getting depleted due to the mining activity; necessary corrective measures shall be carried out.*

Three new piezometers have been installed at locations near Jaduguda rear gate, hospital and colony. Periodical monitoring of ground water level is done. Water levels (bgl) during November 2013 and January 2014 vary as 2.13 to 2.95 m and 2.20 to 3.10 m respectively. The water quality in terms of pH, TDS, turbidity, chloride, sulphate, hardness, alkalinity, nitrate, calcium, magnesium, aluminum, boron and heavy metals (Cu, Cr, Fe, Mn, Pb, Zn, Se) meet the drinking water standards as per IS:10500 except iron and aluminum. In general, iron and aluminum levels in ground water are elevated in the area compared to drinking water standards. The

monitoring report is being sent to the Ministry, MoEF Regional Office, Bhubaneswar, Central Ground Water Authority and Regional Director, Central Ground Water Board.

- XVII. The project authorities should obtain prior approval of the competent authority for drawl of surface water and ground water, required for the project.*

No groundwater is withdrawn for the project. A barrage has been constructed on Garanala in the year of 1987 to meet the water requirement of the project.

- XVIII. The mineral handling plant should be provided with adequate number of high efficiency dust extraction system. Loading and unloading areas including all the transfer points should also have efficient dust control arrangements. These should be properly maintained and operated.*

In the ore processing plant, high efficiency dust extraction system (HEPA filter) has been installed at draying and packaging area. Dust extraction and wet scrubbing system have also been installed at crushing plant, lime plant and pyrolusite plant to control the emission.

- XIX. Vehicular emissions should be kept under control and regularly monitored. Measures shall be taken for maintenance of vehicles used in mining operations and in transportation of mineral. Overloading of trucks should be avoided to stop spillage. The ore shall be transported through closed containment to prevent spillage.*

Ore from Jaduguda Mines is transported to processing plant through the conveyor belt. Ore from other UCIL's mines like Narwapahar, Bhatin and Bagjata is transported through covered truck. Regularly maintenance of vehicles is enforced and overloading of truck is avoided to prevent the spillages during transportation.

- XX. Digital processing of the entire lease area using remote sensing technique should be done regularly once in three years for monitoring land use pattern and report submitted to Ministry of Environment and Forests and its Regional Office, Bhubaneswar.*

Landuse pattern of the lease area is as under:

Land use category	Lease area	
	Area in ha	Area in %
1. Agricultural	73.28	18.87
2. Forest	79.89	20.58
3. Tailings Pond	20.52	5.29
4. Industrial Establishments	30.11	7.76
5. Greenbelt / Plantation	79.00	20.34
6. Settlement	100.14	25.79
7. Open Land	5.29	1.37
8. Major Water bodies	0	0
<b>Total</b>	<b>388.23</b>	<b>100.00</b>

Digital map using remote sensing technique has been submitted to MoEF as annexure.

xxi. *The project proponent should take all precautionary measures during mining operation for conservation and protection of endangered fauna such as giant squirrel, Indian elephant, pangolin, sloth bear, python etc. spotted in the study area in consultation with the concerned forest officials. Action plan so prepared for conservation of flora and fauna shall be implemented in consultation with the State Forest and Wildlife Department. Necessary allocation of funds for implementation of the conservation plan shall be made and the funds so allocated shall be included in the project cost. Copy of action plan shall be submitted to the Ministry of Environment and Forests and its Regional Office, Bhubaneswar within 3 months.*

Endangered fauna are not spotted in the lease area. Only python has been reported for which action plan for conservation has been submitted to the ministry. Special training program on environment including conservation of python was conducted on 25.01.2014 at VTC Jaduguda. 42 employees were participated in the above awareness program.

xxii. *Monitoring of background radiation levels in water, soil and ambient air should be carried out periodically in the study area (core and buffer zone) of the project.*

Monitoring of background radiation levels in water, soil & ambient air (Gamma Radiation Survey) are carried out by Health Physics Unit of BARC in core & buffer zone of the project. Uranium and radium values in 12 ground water samples during January 2014 are well within drinking water standards (U:60 µg/l and <sup>226</sup> Ra: 300 mBq/l). Soil analysis of 5 sample from adjoining area of the mine for U (Nat), Ra-226, Po-210 and Th-(α) revealed that values are within natural variation of this background. The environmental Gamma radiation survey conducted during January 2014 in core zone shows the variation as 0.1 to 0.4 µGy/hr which is within permissible limits (8 µGy/hr).

xxiii. *The plants growing in the area, soil invertebrate animals and local agricultural produce should be analyzed to check the build up of radioactivity levels, if any.*

Analysis of soil invertebrate animal for buildup of radioactivity levels will be submitted.

xxiv. *Discharges from the treatment plant and settling pits should be constantly monitored for concentration of radio nuclides.*

Radiological parameter in treated effluent is done by HPU-BARC. The values of gross alpha (0.7-1.6 Bq/l) and Gross beta (1.1-1.2 Bq/l) of treated effluent during October 2013 to March 2014 are within permissible limits (Gross alpha : 3.7 Bq/l and Gross beta: 37 Bq/l).

xxv. *Sludge from the treatment plant and settling pit should be transported to the tailing pond of Turamdih Ore Processing Plant in safe containment.*

Sludge from treatment plant is transported to tailings pond of Jaduguda.



- xxvi. *The project proponent shall have an emergency response plan to ensure that all potentially affected people understand the possible causes and consequences of radiation and other project related activities.*

Jaduguda is an underground mine of low grade uranium ore. In mining of such a low grade ore, radiological emergency doesn't arise. However, for the radiological surveillance, Health Physics Unit of BARC monitors the various parameters around the project on periodical basis. Atomic Energy Regulatory Board (AERB) periodically reviews the observations.

- xxvii. *Wet drilling and water spraying on muck should be practiced to reduce generation of silica and low level of radioactivity in the work place. The external radiation dose should be monitored quarterly to ensure that workers engaged in the work place are not over exposed.*

Wet drilling & water spraying on working area, waste dump and haul road is practiced to reduce the fugitive dust. The fugitive dust and external radiation dose is monitored by HPU of BARC.

Respirable siliceous Dust during October 2013 to March 2014 at workplace area of mine varies from 0.15 to 0.66 mg/m<sup>3</sup> (Permissible limit: 0.80 mg/m<sup>3</sup>). The corresponding value of airborne long lived alpha activity in dust varies from BDL to 48 mBq/m<sup>3</sup> which is within permissible limits (150 mBq/m<sup>3</sup>).

- xxviii. *Provision shall be made for the housing of construction labour within the site with all necessary infrastructure and facilities such as fuel for cooking, mobile toilets, mobile STP, safe drinking water, medical health care, crèche etc. The housing may be in the form of temporary structures to be removed after the completion of the project.*

Not applicable.

- xxix. *The critical parameters such as SPM, RSPM, NOx in the ambient air within the impact zone, peak particle velocity at 300m distance or within the nearest habitation, whichever is closer shall be monitored periodically. Further, quality of discharge water shall be monitored [(TDS, DO, PH, Total Suspended Solids (TSS) and radio nuclides]. The monitored data shall be uploaded on the website of the company as well as displayed on a display board at the project site at a suitable location near the main gate of the Company in public domain. The circular No. J-20012/1/2006-IA.II(M) dated 27.05.2009 issued by Ministry of Environment and Forests, which is available on the website of the Ministry [www.envfor.nic.in](http://www.envfor.nic.in) shall also be referred in this regards for compliance.*

Board has been displayed at main gate of the company in public domain. Soft copy of monitoring results and compliance report is sent to MoEF. Environmental data is uploaded on company's website.

- xxx. *A Final Mine Closure Plan along with details of Corpus Fund should be submitted to the Ministry of Environment & Forests 5 years in advance of final mine closure for approval.*

A Final Mine Closure Plan will be submitted to MoEF before 5 years of mine closure.

**B. General Conditions**

- I. *No change in mining technology and scope of working should be made without prior approval of the Ministry of Environment and Forests.*

No change in mining technology & scope of working shall be made without prior approval of the Ministry of Environment & Forest.

- II. *No change in the calendar plan including excavation, quantum of mineral uranium ore and waste should be made.*

No change in the calendar plan including excavation and quantum of mineral shall be made.

- III. *Four ambient air quality monitoring stations should be established in the core zone as well as in the buffer zone for RSPM (Particulate matter with size less than 10 micron i.e. PM10) and NOx monitoring. Location of the stations should be decided based on the meteorological data, topographical features and environmentally and ecologically sensitive targets and frequency of monitoring should be undertaken in consultation with State Pollution Control Board.*

Ambient air quality monitored during October 2013 to March 2014 at four locations in core and buffer zones in terms of PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>2</sub>, NO<sub>x</sub>, Pb and CO were found within the permissible standards.

- IV. *Data on ambient air quality RSPM (Particulate matter with size less than 10 micron i.e. PM10) & NOx should be regularly submitted to the Ministry of Environment Forest including its Regional office located at Bhubaneswar and the State Pollution Control Board / Central Pollution Control Board once in six months.*

Ambient air quality data are submitted to Ministry of Environment Forest including its Regional office located at Bhubaneswar and the State Pollution Control Board once in six months.

- V. *Fugitive dust emission from all the sources be controlled regularly mentioned and data recorded properly. Water spraying arrangements of haul roads, wagon loading, dumps loading & unloading points should be provided and properly maintained.*

Fugitive dust emission is controlled by wet operation of dust extraction system & drilling and water spraying arrangement on haul roads, loading & unloading points. Water tankers with water sprinkling arrangement are used. Respirable dust is monitored in work zone area. Results are furnished in sr. no. (xxvii) of the specific condition.



- VI. *Adequate measures should be taken for control of noise levels within prescribed standards. Workers engaged in blasting and drilling operations of HEMM, etc., should be provided with ear plugs/muffs.*

Ear muffs/plug are provided to the workers. HEMM is not applicable to Jaduguda underground mine. Monitoring of noise levels is carried out within premises. All values are within the permissible limits.

- VII. *Industrial wastewater (workshop and waste water from the mine) should be properly collected, treated so as to conform to the standards prescribed under GSR 422(E) dated 19th May 1993 and 31st December 1993 or as amended from time to time. Oil and grease trap should be installed before discharge of effluents from workshop.*

Mine discharge water is pumped to surface and then reused in ore processing plant operations after physical treatment. No water is discharged from mine to the environment.

- VIII. *Personnel working in dusty areas should wear protective respiratory devices and they should be provided with adequate training and information on safety and health aspects. Occupational health surveillance program of the workers should be undertaken periodically to observe any contractions due to exposure to dust and take corrective measures, if needed.*

Personnel working in dusty area are provided with PPE. Use of PPE is also monitored. Vocational Training Officer (VTO) conducts various programs e.g. initial, refresher, special & development trainings on occupational health & safety and other topics as per the certified schedule of DGMS.

Occupational health surveillance:

- Medical team visits surrounding villages periodically and medicines are supplied free of cost
- Pre employment and Periodical medical examination of all employees for blood test, lung function test, x-ray, audiometric test, ECG & physical tests etc.
- Medical facility is provided for all employees and their dependent.

During 2013, total 191 employees were medically examined and 714 were given vocational training from mine and plant.

- IX. *A separate environmental management cell with suitable qualified personnel should be set up under the control of a senior Executive, who will report directly to the Head of the organization.*

Environmental Engineering Cell (EEC) has been set up at Turamdih. EEC is under direct supervision of General Manager (Safety, Environment & Training) who report to the head of the organization. The manpower available at EEC is Sr. Environmental Engineer-1, Environmental officer – 2, Chemist – 1, Lab Assistant -1, Helper -2.

- x. *The funds earmarked for environmental protection measures should be kept in separate account and should not be diverted for other purpose. Year wise expenditure should be reported to the Ministry and its Regional Office located at Bhubaneswar.*

Fund for environmental protection measure is made available. For environmental protection measures, about Rs. 700 lakh/annum is incurred.

- xI. *The project authorities should inform to the Regional Office located at Bhubaneswar regarding date of financial closures and final approval of the project by the concerned authorities and the date of start of land development work.*

The competent authority has approved the financial sanction for capacity enhancement. Land development work for enhancement of production is not applicable as no additional land has been envisaged. Only rate of production of the existing ore processing plant will be enhanced.

- xII. *The Regional Office of this Ministry located at Bhubaneswar shall monitor compliance of the stipulated conditions. The project authorities should extend full cooperation to the officer (s) of the Regional Office by furnishing the requisite data / information / monitoring reports.*

Uranium Corporation of India Ltd. is committed to take action of any requirement/suggestion of the Ministry for safeguard of environment. We extend our full cooperation to officials of Regional Office of MoEF, Bhubneshwar during their visit.

- xIII. *The project proponent shall submit six monthly report on the status of compliance of the stipulated environmental clearance conditions including results of monitored data (both in hard copies as well as by e-mail) to the Ministry of Environment and Forest, its Regional Office Bhubaneswar, the respective zonal office of Central Pollution Control Board and State Pollution Control Board. The proponent shall upload the status of compliance of of the environmental clearance conditions, including results of monitored data on their website and shall update the same periodically. It shall simultaneously be sent to the Regional Office of the Ministry of Environment and Forests, Bhubaneswar, the respective zonal office of Central Pollution Control Board and the State Pollution Control Board.*

Being Complied.

- xIV. *A copy of clearance letter will be marked to concerned Panchayat, Zila Parisad / Municipal Corporation, Urban Local Body and the Local NGO, if any, from whom suggestions / representations, if any, were received while processing the proposal. The clearance letter shall also be put on the website of the Company by the proponent.*

Not applicable as no suggestion / representation had been received while processing the proposal.

- XV. *State Pollution Control Board should display a copy of the clearance letter at the Regional office, District Industry Centre and Collector's office/ Tehsildar's Office for 30 days.*

Complied with by State Pollution Control Board, Ranchi.

- XVI. *The environmental statement for each financial year ending 31st March in Form-V as is mandated to be submitted by the project proponent to the concerned State Pollution Control Board as prescribed under the Environment (Protection) Rules, 1986 as amended subsequently, shall also be put on the website of the company along with the status of compliance of environmental clearance conditions and shall also be sent to the Regional Office of the Ministry of Environment and Forest, Bhubaneswar by e-mail.*

The environmental statement is being sent to Jharkhand State Pollution Control Board. The status of six monthly compliance reports of environmental clearance conditions is being sent to JSPCB and the Regional Office of the Ministry of Environment and Forest, Bhubaneswar by e-mail.

- XVII. *The project authorities should advertise at least in two local newspapers of the District or State in which project is located and widely circulated, one of which shall be in the vernacular language of the locality concerned, within 7 days of the issue of the clearance letter informing that the project has been accorded environmental clearance and a copy of the clearance letter is available with the State Pollution Control Board and also at web site of the Ministry of Environment and Forests at <http://envfor.nic.in> and a copy of the same should be forwarded to the Regional Office of this Ministry located Bhubaneswar.*

Advertise was published in two local newspapers namely Hindustan Times and Uditvani dated 21<sup>st</sup> May 2011 which are widely circulated in the area. A copy of the clearance letter was made available to the State Pollution Control Board and MoEF.