



## New Horizons

UCIL is committed to meet the increasing demand of Uranium in the country. The corporation aims to deepen the existing mines, expand its processing facilities, open new mines in the Singhbhum Shear zone and other parts of the country. The company is in the process of opening new deposits like Lambapur-Peddagattu & Tummalapalle in Andhra Pradesh and Kylleng-Pyndengsohiong, Mawthabah in Meghalaya. The coming years would thus see a quantum leap in UCIL's activities which would include not only opening new mines but also development of the community around all its operations.



### URANIUM CORPORATION OF INDIA LIMITED

(A Govt. of India Enterprise)

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Fuelling Nuclear Power



## Uranium Corporation of India Ltd.

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An ISO 9001 : 2000, ISO 14001 : 2004

IS 18001 : 2000 Company

# The Corporation

**Incorporated on 4th October 1967, Uranium Corporation of India Limited, a Public Sector Enterprise under the Department of Atomic Energy, is at the forefront of the Nuclear Power Cycle Fulfilling the requirement of Uranium for the Pressurised Heavy Water Reactors, UCIL plays a very significant role in India's Nuclear Power Generation Programme with five operating mines, two processing plants, a magnetite recovery plant. UCIL, an ISO 9001: 2000, ISO 14001 : 2004 and IS 18001 : 2000 company, has adopted the latest state-of-the-art technology for its mines and process plants. Enriched with in-house expertise and a team of dedicated professionals, UCIL can be truly termed as "Company with a mission"**

## Jaduguda Mine

The uranium ore is found in the mineralized zone of the Singhbhum Shear zone which is about 160 km in length and 1 to 10 km in width in the East & West Singhbhum Districts of Jharkhand. The rocks in the zone are highly folded and sheared. Uranium bearing minerals occur in very finely disseminated form. The ore lenses are hosted in metamorphic rocks of Proterozoic age.

Jaduguda Mine has the distinction of being the first Uranium Mine of the country where mining operations began in 1967. The commissioning of its shaft with tower mounted Friction Winders marked a technical milestone for India's mining industry. The mine is accessed by a 5 metres diameter vertical shaft with a total depth of 640 metres. The shaft is throughout concrete lined and has a cage and a skip with their counterweights. The

cage accommodates 50 persons and the skip has a capacity of hoisting 5 tons of ore at a time. This shaft is also the main ventilation intake, besides, it has service lines such as compressed air and water pipe lines, communication and power cables etc. The present shaft caters upto a depth of 555

metres and an auxiliary shaft upto 905 meters with the latest friction winders has also been commissioned to mine deeper levels. The mine is well ventilated by boundary ventilation layout. Horizontal cut and fill method is followed for stoping. Deslimed mill tailings is used as back fill. Grade control and identification of ore in the mine are carried out by using Geiger Muller counters and Scintillating Probes. The ore is transferred to the adjacent process plant by a conveyor. Jaduguda Mine has created a large skill base for the mining industry in general and uranium mining in particular.



## Bhatin Mine

Bhatin Mine is located 3 km away from Jaduguda. It shares most of the infrastructure of Jaduguda Mine. The access to the ore body is through an adit and two winzes have been put up from adit for deeper levels. The method of mining is horizontal cut and fill stopping. Mining of this small deposit illustrates UCIL's commitment to optimally utilise the country's scarce Uranium resources.



## Narwapahar Mine

Narwapahar Mine is the first fully mechanized mine operating since April 1995. This is a trackless mine with a decline access to underground and ramp accesses to the stopes. This permits use of large diesel powered underground equipment resulting in high productivity, eliminating fatigue of workmen and providing a good working environment. Diesel traction and Electro-hydraulic Drill Jumbos are used for drilling.

The capability to drill long and parallel holes has improved drilling productivity. The mucking of blasted ore and waste is carried out by diesel powered Load – Haul – Dump Loaders and transported by Low – Profile – Dump – Trucks. To be able to utilize the high productive capacities of these machines, adequate back-up in terms of service vehicles such as passenger carriers, explosive vans, service and carriage trucks have been deployed. These make Narwapahar the most modern mine in India.



## Turamdih Mine

Turamdih Mine: Turamdih uranium deposit is located about 24km west of Jaduguda. This mine was commissioned in 2003. The entry into the mine is through a 8 degree decline which provides facilities for using trackless mining equipment like passenger carrier, drill jumbo, low-profile dump truck etc. At a depth of 70m, the orebody has been accessed from the decline by a cross-cut. Decline has been further extended upto a depth of 140 m. A vertical shaft of 5m diameter upto a depth 260m is complete and is planned to be commissioned by end of January 2009.



## Banduhurang Mine

Banduhurang Mine is the first opencast uranium mine of the country commissioned in June 2007. Situated adjacent to Turamdih underground mine, the deposit contains a moderately large reserve with very low grade. It is now a conventional opencast mine using excavator-dumper combination maintaining ore benches of 6m height, OB/waste benches of 6m/12m height while sustaining ROM



grade and stripping parameters. Considering the strategic nature of mineral and low content of uranium, computerised ore body modelling and mine planning was carried out using SURPAC software. Open-pit mining method was chosen as the most favourable option and the pit limits were optimised using WHITTLE software. Layout of the mine was finalized with all finer details.

## Bagjata Mine

Bagjata uranium project: A underground mine upto a depth of 300m is under construction at Bagjata, 26 km east of Jaduguda. A 7 degree decline and vertical shaft have been planned as entry into the mine. The ore of this mine will be treated in Jaduguda mill.



## Jaduguda Process Plant

The ore from Jaduguda, Bhatin and Narwapahar Mine are processed in the centralized processing plant (Mill) located close to Jaduguda Mine. Uranium is extracted from ore in the Jaduguda Mill by hydrometallurgical process. After three stages of crushing, the crushed ore undergoes two stages of wet grinding. The slurry thus obtained is pumped to the leaching pachucas for dissolution of Uranium. The leached slurry is filtered to obtain Uranium liquor.

The Uranium liquor is purified and concentrated by ion exchange method. The Uranium is then precipitated from this concentrated liquor as magnesium Di-Uranate, generally known as "YELLOW CAKE". This is thickened, washed, filtered and dried in the spray dryer and finally packed in drums and then sent to Nuclear Fuel Complex at Hyderabad for further processing into  $UO_2$  pellets.

The plant has also undergone several modifications adopting technologies to maximize the re-use of water, high



## Turamdih Process Plant

A new plant at Turamdih has been set up to treat the ore produced from Turamdih, Banduhurang and Mohuldih mines. The flowsheet of this plant is similar to that of Jaduguda. However, taking account of developments in hydrometallurgy / processing technology worldwide, some efficient equipment like apron feeders, particle size monitors, horizontal belt filter, pressure filter etc have been



incorporated in this plant. A very high degree of instrumentation has been encompassed that includes PLC based control system.



## Tailings Treatment & Disposal

Two types of wastes are generated while processing Uranium ore i.e. liquor depleted in Uranium from ion exchange unit after Uranium recovery and filtered cake depleted in Uranium from filtration of leached slurry. Both are neutralized with lime stone and lime slurry to precipitate the remaining radio nuclides along with heavy metals like manganese, iron, copper etc. The neutralized slurry is classified and the coarse fraction is pumped back to the mines for back filling the voids. The fine particles are pumped into the tailing pond where slime settles and clear water is decanted through decantation wells and sent to the Effluent Treatment Plant for re-treatment. The Tailings Pond is a well-engineered containment having an earthen dam on one side while the other three sides are protected by hills.



## Effluent Re-treatment & Reclamation

UCIL has implemented a composite scheme for reclamation of water and effluent re-treatment to make the final discharged effluent environmentally safe. Water from all mines is collected, clarified and reused in the ore processing plant. The Tailings Pond effluent is also clarified and a part of this is sent to the ore processing plant for reuse. The remaining portion is re-treated with barium chloride and lime, clarified and the settled precipitates are sent back to tailings pond. The harmless liquor is discharged.



## Control Research & Development

A full fledged Control Research & Development Department monitors the process parameters for the recovery of Uranium and by-products from the Ore. It assures quality of various raw materials used. The department is engaged in development of flow-sheets for the recovery of Uranium and associated by-products from new deposits. It is also entrusted with the responsibility of analysis of mine air.



## Technology Demonstration Pilot Plant

The existing extraction technology practiced at Jaduguda Process Plant may not be applicable to all types of uranium ores. Process flow sheets need to be developed and laboratory data thus generated requires to be confirmed on a large scale for techno-economic viability. It is in this regard that Department of Atomic Energy has set up a technology demonstration pilot plant having comprehensive facilities for uranium ore processing adjacent to Jaduguda Plant.



## Radiological & Environmental Safety

Health Physics Unit and Environmental Survey Laboratory of Bhabha Atomic Research Centre carries out in-plant and environmental monitoring of all the UCIL units. The laboratory also evaluates and ensures overall safety in accordance with the standards prescribed by the national and international regulatory bodies like Atomic Energy Regulatory Board (AERB) and the International Commission on Radiological Protection (ICRP). Monitoring of radioactivity and radiation level in different matrices in the mine, mill and the surroundings is carried out on routine basis. This facilitates continual improvement in working and the environment. Samples of soil, grass, vegetables, food stuff and aquatic organisms like algae fish etc. are also analysed to study the environmental impact, if any.



## UCIL's New Project

### New Mines under construction in Jharkhand

UCIL has already undertaken activities for opening one more underground mines in Singhbhum Shear Zone.

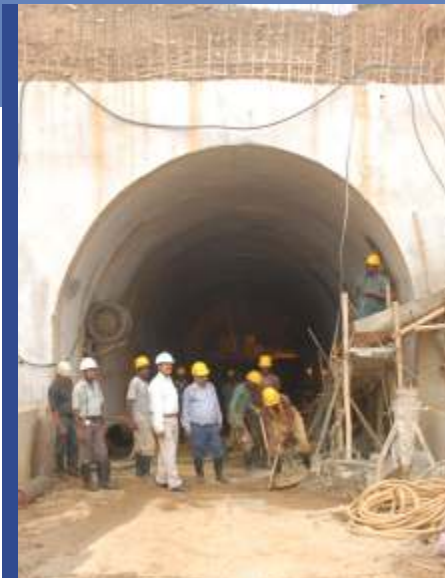


Mohuldih uranium project: Another underground mine 3 km west of Turamdih mine is under construction by UCIL. The ore of this mine will be treated in the new mill constructed at Turamdih.

### New Mines and plants in other parts of the country

Tummalapalle uranium project, Andhra Pradesh -A large uranium reserve in the carbonate host rock in Cuddapah district of Andhra Pradesh has been planned for development. All clearances including approval of Govt. of India have been obtained. Construction activities for an underground mine upto a depth of 300m and a processing plant based on alkali leaching (under pressure) technology have been initiated.

Lambapur uranium project, Andhra Pradesh -Substantial uranium reserves have been identified at Lambapur-Peddagattu region in Nalgonda district of Andhra Pradesh and UCIL is in the process of obtaining clearances for construction of three underground and one openpit mines in the area and a



## UCIL's New Projects

processing plant at Seripally, 52 k away from the mine site.

Kyelleng-Pyndengsohiong, Mawtahbah uranium project, Meghalaya - The sandstone hosted orebody at Killung and Rangam in West Khasi Hills district of Meghalaya is the first of its kind to be discovered in the country. UCIL has planned to construct openpit mines at this site and a processing plant at Mawthabah. Infrastructure development and some welfare activities have already been taken up. Site activities are expected to start soon.

Other new areas -UCIL is also in touch with Atomic Minerals Directorate for Exploration and Research to initiate pre-project activities in new areas where uranium exploration is in advanced stage. Exploratory mining has already been initiated by UCIL at Gogi in Karnataka. The same has also been planned at Rohil in Rajasthan. Decision to undertake regular mining operations at these sites will be taken up in due course.



## The People

UCIL firmly believes that it is a part of the larger community in the region where it operates. The company has therefore, taken cognizance of the cultural ethos and the socio-economic environment. With this approach, the company has undertaken the following activities.

**EDUCATION**-The company has well established schools up to 12<sup>th</sup> standard under the aegis of the Atomic



Energy Education Society. The company also provides free education and scholarship to the deserving tribal children.

**PUBLIC HEALTH AND SOCIAL SERVICES** – UCIL provides free medical facility to its employees at well laid hospitals both at Juduguda and Narwapahar Mines. UCIL sends its medical team every week to nearby villages for providing health care and also organises number of camps for blood donation, family welfare etc. in the locality.

**GAMES, SPORTS & CULTURE** – The company has been supporting number of sports activities. Employees participate in the Department of Atomic Energy(DAE) Sports & Cultural Activities at various units. As recreational facilities, UCIL has set-up Community Centres, Clubs etc.

**HOUSING** – The employees stay in well planned colonies with comfortable accommodation in a clean environment.



## The Community

UCIL Rural Development Projects are today bearing benefits. The facilities provided to the villages near the mines have brought about a marked change in this backward area.

Villagers around Jaduguda had to travel more than 50 km to reach Jamshedpur, the nearest city. UCIL constructed a 20 km long road and a high level all-weather bridge of 400 metres length, thus cutting the travel time by more than half.

Employment has been provided to local villagers and their children enjoy education facilities provided by the company.

Other amenities extended to the villagers include medical facility, infrastructure for schools and cultural activities, drinking water facility etc.





