

Through E-mail/By Bag

Government of India  
Department of Atomic Energy  
PSU Section

Anushakti Bhavan  
C.S.M Marg  
Mumbai – 400001

No. 10/12(3)/2022/PSU | 9 556

Date: 20.07.2022

Sub: - DAE's comments on News Item Published in the Telugu Newspaper Named 'Eenadu Andhra Pradesh Edition' dated 7<sup>th</sup> August 2021 entitled "Do Pollution Leaks Apply to Uranium? In Kadapa District, Andhra Pradesh

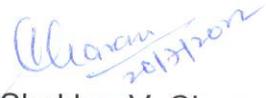
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Reference is invited to NGT (PB), New Delhi email dated 07.05.2022 seeking comments/opinion of this Department on the above subject.

2. The comments/opinion of the Department in the matter is attached herewith for your kind perusal and further necessary action on order dated 28.04.2022 in Original Application No. 245 of 2022 before the National Green Tribunal, Principal Bench, New Delhi regarding News item published in the Telugu Newspaper Named 'Eenadu Andhra Pradesh Edition' dated 7<sup>th</sup> August 2021 entitled "Do Pollution Leaks Apply to Uranium? In Kadappa District, Andhra Pradesh.

3. This is issued with the approval of Competent Authority.

Encl: As above

  
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**DAE's comments on News Item Published in the Telugu Newspaper Named 'Eenadu Andhra Pradesh Edition' dated 7 August 2021 entitled "Do Pollution Leaks Apply to Uranium?" in Kadappa District, Andhra Pradesh.**

The article in Telugu Newspaper named 'Eenadu Andhra Pradesh Edition' dated 7 August 2021 reported that the Uranium Company (Uranium Corporation of India Limited - UCIL) at M.Tummalapalle, Wermula Zone under Pulivendula Constituency, Kadapa district, Andhra Pradesh was negligent in the management of waste from uranium refinery. That the notice issued by State Pollution Control Board (SPCB) to install 250 micron thick polyethene layer on the bottom of a tail pond to store uranium waste was ignored thereby resulting in damaging the crop yield, making the crop products inedible, causing skin diseases and so on. As per Atomic Energy Regulatory Board (AERB) standards, the drinking water can contain up to 60 ppb (parts per billion) whereas the tests conducted by State Pollution Control Board (SPCB) indicated uranium values up to 4000 ppb in the waters of villages surrounding Tummalapalle area. In this regard, the National Green Tribunal (NGT) vide its order No.245/2022 dated 28.04.2022 sought the opinion of the Department of Atomic Energy (DAE). DAE examined the matter in consultation with the concerned agencies of the Department which had conducted various studies in order to establish the source of ground water contamination in the wells surrounding the tailing pond of UCIL. The salient aspects of the findings are furnished below before the NGT.

**Background Information:**

*Issues similar to those raised by 'Eenadu Andhra Pradesh Edition' on August 07, 2021 have been raised on several occasions in the past. In the year 2018, water samples from tailings slurry, stagnant water and supernatant water from the tailing*

pond had been collected by Andhra Pradesh Pollution Control Board (APPCB) on various dates and had been analysed in the same year by agencies engaged by APPCB who are accredited by Atomic Energy Regulatory Board (AERB) and National Accreditation Board for Testing and Calibration Laboratories (NABL). These reports had indicated uranium concentration Below Limit of Quantification (BLQ) in almost all the bore wells except a few cases. As a part of background monitoring, Health Physics Unit (HPU) of Bhabha Atomic Research Centre (BARC) collects water samples from the monitoring wells located at tailing pond and surrounding areas from time to time. During the testing of such water samples, a few cases of anomalies had also been found out during such surveillance. Earlier in June 2017, during regulatory inspection of Tummalapalle mill, AERB had observed that high uranium values (956.7 ppb) in boreholes of MC Palle village has been reported, which is located about 2km from tailings pond of Tummalapalle mill, UCIL. In this regard, AERB had recommended UCIL for finding out the reasons for high uranium values in public bore wells.

In view of this, extensive in depth investigations have been carried out by different agencies to find out the root cause of contamination of ground water in the area and also to establish if the tailings pond had played any role in such contamination. The particulars of such investigations carried out are described below.

#### **Studies on Ground water Flow Direction:**

A study focussing on the ground water flow direction around the tailing pond was conducted in order to understand whether tailing pond resulted in any ground water contamination. Water samples from more than 50 wells in the region, spatially well distributed within a radius of 10 km were collected three times during the period

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from December 2019 to March 2021 and were analysed for various parameters, including uranium and barium.

The general groundwater flow direction in the region around the tailing pond is from South West (Udumalaikuruti upstream) to North East (Vemula, downstream). Based on detailed study of the topography (48 well locations), water table data and gradient analysis (54 wells) and water quality data (130 wells) across three different time periods spanning one year, it is found that there is no discernible uranium plume emanating from the tailing pond. This is evident from the fact that the concentrations of uranium in wells downstream of the tailing pond are low. Additionally, the regions upstream of the tailing pond have very high uranium concentration. The presence of high groundwater uranium concentrations in upstream areas indicates that there is significant contamination of uranium due to natural ore deposits in that area resulting in poor water quality. This indicates that contamination is natural and not anthropogenic.

#### **Studies on Hydrogeological Aspects:**

Tailing pond is located at an aerial distance of 2.2, 6 and 1.5 km from the villages MC Palle, Kanampalle and KK Kotalu respectively. None of these villages are located downstream of tailing pond. Moreover, the MCPalle and Kanampalle villages are situated on the ore body / mineralisation. From the watershed analysis, it is evident that the tailing pond / MC Palle are located at two different watersheds and separated by two hillocks with height of 400m RL and a valley with structural features. It is also observed that the tailing pond water shed is located at lower elevation when compared to MCPalle watershed and tailings water would not be travelling to the higher elevation and further these two watersheds are not connected by the same aquifer.

To ascertain the tailing pond water percolation into ground water, the data of agriculture bore wells (71) located in the vicinity covering downstream and upstream of the tailing pond and MCPalle, Kanampalle and KK Kotalu villages have been collected and interpreted with orebody configuration which is derived from exploratory borehole data of AMD through orebody modelling. The extent of the uranium mineralisation at Tummalapalle region starts from the outcrop and extends up to 800m vertical depth. Ore body modelling based on 378 boreholes drilled by AMD reveals that out of 71 agriculture bore wells, 29 bore wells have intersected the ore body showing uranium concentration. The uranium concentration of remaining 42 bore wells which do not intersect ore body, is well within the permissible limits. However, it is noted that 9 bore wells located at MC Palle village show uranium concentrations in the range of 87 µg/l to 7500 µg/l. It is observed that these bore wells are located in close proximity to the dyke which is passing across the village. The reason for higher concentration of the non-intersecting agriculture bore wells could be attributable to existence of this post mineralised dyke.

As per the directives of APPCB, polyethylene and bentonite clay lining is to be laid for Thickened Tailing Disposal area (TTD). Presently, thickened tailings are not generated from the plant and polyethylene lining is not applicable. As per AERB guidelines, the bottom of tailing pond is lined with natural clay. The low permeability of clay lining ensures that the migration is contained within the tailing pond and there is no possibility of percolation of tailing water into ground water table.

The tailing slurry is being discharged into tailing pond and the supernatant water is re-circulated back into the system. It is important to note that the monitoring wells located in the downstream of tailing pond do not show any higher values of uranium

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concentration and other constituents of tailings water. It implies that the migration of tailings water is not occurring and also the clay lining is effective.

PCB has collected water samples from tailing slurry, stagnant water and supernatant water from the tailing pond and groundwater samples from adjoining villages of KK Kotalu, Kanampalle & MC Palle villages. From the analysis, it is observed that the pH of the ground water is in the range of 7.04 to 7.75 against the pH >12 of tailing pond water. It confirms that there is no migration of tailing pond water into the ground as pH of ground water remains unaltered.

### **Studies on Isotope Hydrology**

The Isotopic hydrological study was conducted over an area of 625 Km<sup>2</sup> in Tummalapalle area, Kadapa district, Andhra Pradesh during monsoon and post monsoon seasons in years 2020 and 2021 to understand factors leading to high uranium concentration in ground waters. The study included collection of 155 water samples which were subjected to various analysis such as hydrochemical, environmental isotope, isotopes of dissolved carbonates & sulphates and radioisotopes.

Analytical results show an average uranium concentration of 332 µg/L during monsoon and 428 µg/L during post monsoon. Higher levels of nitrate (av.68.51 mg/L) is also observed. Average pH in ground water is found to be 7.24 whereas that of mine effluent water is highly alkaline (11-12) which can damage pipes and water carrying appliances.

Statistical studies such as analysis of variance and factor scores reflect that the average values of uranium did not vary much in the last eight years and that uranium migration could be attributed to various geochemical processes. Stable isotope systematics study suggest a common source of recharge, which is predominantly

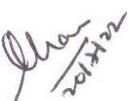
rainwater. The isotope signatures of high uranium containing groundwater do not match with that of mine effluent samples. Modelled age determinations of ground waters based on radio isotopes indicate a range of about 600 to 3000 years suggesting that tailing pond and decant pond are not contributing to uranium contamination.

This multi isotopic study has brought to light that the higher concentration of uranium in ground waters could be due to geogenic in nature and suggest that high uranium values may be attributed to rocks having uranium bearing minerals in the system.

Relatively high concentration of uranium in ground waters has been found in parts of Punjab. Recent published literature shows 5.4 to 43.4 ng/ml in Melwa, 11.7 to 113.7 ng/ml in Batinda and 0.5 to 579 ng/ml in the districts of SW Punjab. The Malwa region has the state's two biggest coal-fired power stations, which generate fly ash that has high levels of uranium. The high uranium concentrations in Punjab appear to be geogenic as these areas, consist of high heat producing granites and acid volcanic rocks which have high concentrations of uranium.

## **Summary**

Studies on hydrological particularly groundwater flow, geohydrological focussing essentially on ore body modelling and multi isotope tracer hydrological investigations involving various analysis such as hydro chemical, environmental isotope, isotopes of dissolved carbonates & sulphates and radioisotopes indicate that tailing ponds do not contribute uranium contamination in ground waters of Tummalapalle area, but may be attributable to ore deposit as evidenced by the age of groundwater and further substantiated by the presence of high uranium values essentially in the upstream side of the tailing pond.

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