Report of the Fact Finding Visit to certain villages affected by the Tummalapalli Uranium Mining Project of UCIL in Kadapa District, Andhra Pradesh

Fact Finding Held On: 11th June, 2018

Organized By:

National Alliance of People’s Movements (NAPM)
Human Rights Forum (HRF)
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A. Brief Background of the Fact Finding:

A preliminary fact finding visit to certain villages affected by the Tummalapalle uranium mining project in Vemula Mandal, YSR Kadapa District of Andhra Pradesh was coordinated by the National Alliance of People's Movements (NAPM), Human Rights Forum (HRF) and Rythu Swarajya Vedika (RSV) on the 11th, June 2018 to understand firsthand the grievances of people due to the operations conducted by the Uranium Corporation of India Limited (UCIL) in the area. The team included Mr. Soumya Dutta (environmental scientist and Climate change expert), Jayasree Kakumani (Human Rights Forum), Mr. Shiva Reddy (Rythu Swarajya Vedika), Meera Sanghamitra (NAPM), Rajesh Serupally (NAPM) and Krishna Shree (Madras School of Social Work).

The team visited villages KK Kottala, Kanumapalle, Mabbuchintalapalle as well as the tailing pond and affected farmlands. This interim report is based on a preliminary interaction with the residents of the aforesaid villagers, certain public representatives, local political and social workers, as well as perusal of available documentation on record including the Environmental Clearance, latest correspondence between the AP Pollution Control Board and UCIL, news reports and other articles and studies. The team also verified the radiation levels at the tailing pond and some of the agricultural fields. The team met representatives of certain villages affected by the mine although visit to these villages could not be conducted in this phase.

B. Brief Context:

The Thummalapalle Uranium Mine was granted environmental clearance by the Union Environment Ministry in February, 2007. The public hearing for the project was marked by massive protest by the locals, fearing serious impacts on their livelihood, environment and health due to the project. However, the project was subsequently cleared by a combined effort of the State and centre, threatening and convincing people that their concerns would be duly addressed.

Over the past decade, as mining operations began, numerous protests and complaints from the villagers1, media reports2 (Annex-1) as well as certain other studies began emerging, pointing to severe violation of norms and pollution of the soil3, ground water and air, leading to drastic increase in sodium and uranium levels, deteriorating crop productivity, impacts on the health and mortality of the residents and livestock.

It has been alleged that this pollution has been happening due to poor lining of the tailing pond, causing seepage. The cumulative impacts of the plant operations in the form of damage to agriculture and standing crop, water, health of local population (skin allergies, ulcers and kidney problems) and livestock (illnesses and pre-mature deaths), primarily due to alleged negligence by the plant authorities has been a saga of continuing anguish and anger amongst the residents. Apparently, certain villagers have also had to ‘vacate’ their houses, due to these impacts. Environmentalists and human rights activists who have been closely monitoring these

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developments, assisting the villagers and writing to the UCIL authorities have received little response, except for a limited intervention by the Pollution Control Board recently, after lengthy pursuit. Notably, on 9th April, 2018, certain activists who were part of this fact finding were unlawfully detained4 (Annex-2) the whole day and refused access to a meeting of the UCIL authorities and the villagers. It was only after a lot of insistence that Dr. K. Babu Rao, a retired scientist and environmental expert was allowed access to the meeting5.

It was in this context of repeated complaints and news reports of socio-environmental concerns and incidents of repression, that the present Fact Finding was considered necessary, upon the request of the local organizations to find out the status of violations of law, environmental impact and denial of democratic space of participation and critique for civil society.

C. Terms of Reference:

The team was mandated with the following Terms of Reference for the Fact Finding:

1. To study the socio-environmental impacts of the uranium mining undertaken by the Uranium Corporation of India Limited at Tumallapalle and in the surrounding villages in terms of the health of the villagers, their livelihood, agriculture, health and mortality of the livestock, pollution levels and the subsequent effects.

2. To assess and evaluate the status of compliance of the environmental clearance, consent conditions, regulations and norms issued by authorities such as the Ministry of Environment, Forests and Climate Change (MoEF & CC) and Andhra Pradesh Pollution Control Board (APPCB)

3. To suggest measures to ensure compliance with the legal framework, address environmental violations and safeguard the interests of the communities and the ecology.

D. Brief Project Overview:

The Tumallapalle Uranium Project (TUP) is situated in the Vemula Mandal of YSR Kadapa district of Andhra Pradesh at a distance of about 70 km from the district headquarters, Kadapa. It consists of the mine, ore processing unit and tailing pond. Villages Tumallapalle, Mabbuchintalapalle, Rachukonda palle, Kota and Bhumayagaripalam (Velpula and Medipentla mandals) are affected by the mining activities. Villages KK Kottala, Kunummapalle (Vemula mandal), Tumallapalle and Mabbuchintalapalle are affected by the tailing pond, constructed for storage of radioactive waste.

The Project is being operated by UCIL, a Government of India undertaking under the Department of Atomic Energy, headed by the Prime Minister of India. TUP was accorded site clearance by the Ministry of Environment and Forests, Govt. of India on 4th September, 2006 and conditional environmental clearance was granted on 21st February 20076, (Annex-3). As per the EC, land acquisition for the project was up to 973.61 hectares which includes 813.61 hectares for the mine, 60 hectares for the processing unit and 100 hectares for the tailing pond. This is in addition to 100 hectares required for residential colony. The project area consists of agricultural land (432.76 ha), barren land (475.85 ha) and grazing land (65.00 ha). While mentioning that ‘no displacement of people is involved’, the EC states that there would be 489 land oustees who would be compensated in accordance with the policies/guidelines of Government of AP and Government of India.

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6 http://environmentclearance.nic.in/writereaddata/Form-1A/EC/14_Jun_2016_180208173W2EQ3QRSEC.pdf
The EC mentions that about 9,20,650 TPA of solid waste would be produced from the project which would be dumped externally in the tailing pond. EC also provides that the tailing pond shall have impervious lining. Amongst other things the EC categorically stipulates that:

“The tailings pond shall be lined to prevent groundwater contamination and overflow shall be collected, treated and recycled in the ore processing plant and mine for industrial use. The ETP sludge shall be pumped back to the tailings pond. Effluent shall be treated in the sewage treatment plant and after conforming to the prescribed standards shall be used for irrigation.”

Public hearing for the project was conducted by the AP PCB at village Tumallapalle on 10th September, 2006 amidst heavy presence of the police and Rapid Action Force, with allegations that hundreds of people from the four affected villages contesting the project were chased away and instead outsiders in large numbers and students of mining technology from private polytechnic colleges in Pulivendala and Produttur were ‘brought to the hearing’ at the behest of Mr. Y S Vivekananda Reddy, the then Lok Sabha member of Kadapa and younger brother of the then Chief Minister Late Mr. Rajashekhara Reddy. A large number of the local affected people were reportedly denied the opportunity to air their views freely at the public hearing, which led well-known activists Dr. K. Balagopal (HRF), Dr. Sathyalakshmi and Sajaya (Movement against Uranium Projects) to demand a fresh Public Hearing, although the same did not take place.

On 19th Dec, 2017, the Department of Mines & Geology, Government of Andhra Pradesh granted the lease over 813.61 ha for 30 years. Mining plan for 0.9 Mt/yr rated capacity was approved by Atomic Minerals Directorate for Exploration and Research (AMD) on 10th January, 2007. The Department of Irrigation, Government of AP granted permission for the withdrawal of 6000m3/day of water from the Chitravati river on 23rd March 2006.

Consent For Establishment was granted on 11th April, 2007 by the APPCB, which stated interalia that:

a. "The thickened tailings disposal shall be lined with Bentonite with minimum 500 mm layer with 250 micron of Poly Ethylene layer with adequate protective layer of clay or sand of 250 mm. The pond shall be provided with a holding pond to collect drainage from deposit and also rainfall precipitation. The water from holding pond shall be pumped for treatment. There will be no water escape from the pond."

b. "The treated effluent shall be recycled back to the ore processing plant and mine for industrial use. The ETP sludge shall be pumped back to the tailings pond."

Thereafter, on 20th April, 2012, the Chairman Atomic Energy Commission & Secretary Department of Atomic Energy, Government of India, commissioned the Uranium Ore Mine & Processing Plant of UCIL at Tummalapalle. Subsequently, the APPCB issued Consent for Operation (CFO) order on 23rd October, 2012 with validity upto 30th June 2013, wherein the UCIL was directed to line the Thickened Tailings Disposal (TTD) area as mentioned in the CFE order of 11th April, 2007 before using and operating the system. The aforesaid CFO Order was further extended upto 30th June, 2016 with a specific mandate regarding lining of Thickened Tailings Disposal (TTD) area as follows:

“The Thickened Tailings Disposal (TTD) area shall be lined with Bentonite with minimum 500 mm layer with 250 micron of polyethylene layer with adequate protective layer of clay or sand of 250 mm. The pond shall be provided with a holding pond to collect drainage from deposit and also rainfall precipitation. The water from holding pond shall be pumped for treatment. There will no water escape from the pond”

On 1st May, 2015, the APPCB issued another order, extending the CFO to 30th June, 2021 and reaffirming the conditions already imposed.
Proposal for Expansion of UCIL Mine at Tummalapalle:

The uranium reserves in and around Tummalapalle village in Kadapa district were initially estimated at 15,000 tonnes but continuous exploration by UCIL shown the promise of increase up to 1.5 lakh tone\(^2\), a 10 fold increase\(^3\). In the light of these findings, UCIL wrote to the MoEF & CC on 29\(^{th}\) June, 2016, informing the Ministry that since nuclear power generation in India is slated to increase exponentially from the present 4,560 MWe to 20,000 MWe by 2020 (which would require more uranium as fuel), it proposes to expand the Tummalapalle uranium mine from the (then) present capacity of 9 lakh TPA to 13.5 lakh TPA.

This proposal was considered in the Twelfth meeting of the Reconstituted Expert Appraisal Committee (EAC) for Environmental Appraisal of Mining Projects (Non-Coal) of MoEF & CC held during 23\(^{rd}\) – 25\(^{th}\) November 2016 and in the same meeting, the EAC recommended UCIL’s proposal for expansion of the Tummalapalle Uranium Mine and prescribed the Standard ToR for undertaking detailed EIA study. Thereafter, on 19\(^{th}\) January 2017, the UCIL was granted ToR by MoEF for its expansion plan, of an increase in uranium extraction from 9.0 lakh TPA to 13.5 lakh TPA, with about 44 conditions and a validity upto 18\(^{th}\) Jan, 2020, before which the ToR requires the project proponent to undertake the EIA study as well as public hearing. Information of further development in this regard is not available in the public domain.

Copy of UCIL’s Letter, Extracts of EAC Minutes and ToR issued is (Annex-4)

Chronology of Key Developments is (Annex-5)

E. Brief on the Project Technology:

Uranium is a chemical element with symbol U and atomic number 92. It is a silvery-white metal in the actinide series of the periodic table. A uranium atom has 92 protons and 92 electrons, of which 6 are valence electrons. Uranium is the heaviest metal that occurs in nature. It is an unstable material which gradually breaks apart or "decays" at the atomic level. Any such material is said to be "radioactive". Uranium is the principle fuel for nuclear reactors, used in the manufacture of nuclear weapons and production of electricity.

Uranium can take many chemical forms, but in nature it is generally found as an oxide in combination with oxide), Triuranium Octoxide (U3O8), a yellow powdery substance, is the most stable form of uranium oxide and is the form most commonly found in nature. The most common forms of uranium oxide are U3O8 and UO2. Both oxide forms are solids that have a low solubility in water and are relatively stable over a wide range of environmental conditions. U3O8 is the most stable form of uranium and is the form found in nature. The most common form of U3O8 is “yellow cake,” a solid named for its characteristic color that is produced during the uranium mining and milling process. The natural uranium, even in its metallic form, is not all fuel for nuclear fission reactors. Only about 3 parts in 1000 of the ‘purified’ uranium is fuel, the U-235 part. The rest of 238 is not, but quite radioactive. So, even the extracted, purified U is not all nuke fuel.

The mine at Tummalapalle uses the method of pressure alkali leaching technology for the extraction of Uranium from its ore. The extraction is done by using a solution of carbonate (sodium bicarbonate, ammonium carbonate, or dissolved carbon dioxide) to dissolve the uranium ore. Dissolved oxygen also is sometimes added to the water to mobilize the uranium. The uranium-bearing solution then undergoes processing to become the final product, that of uranium yellowcakes which are used as fuel in Nuclear Power Plants. Uranium tailings are a waste.

\(^2\) [https://www.thehindu.com/news/national/tummalapalle-in-ap-could-have-one-of-worlds-largest-uranium-reserves/article22478407.ece]
\(^3\) [https://www.thenewsminute.com/article/one-lakh-tonnes-uranium-reserve-andhrs-tummalapalle-mine-all-you-need-know-56043]
byproduct (therefore called tailings) of uranium mining. The remaining radioactive sludge left off from the extraction process, called uranium tailings, is stored in huge impoundments such as the one seen in Tumallapalle. These have been found to become major sources of ground water pollution when not constructed and managed keeping environmental standards in mind, as has been the case in our area of study.

The Tummalapalle project consisting of underground mine and processing unit has achieved production of 2,350 tonnes per day against installed capacity of 3,000 tons per day. (2014 UCIL Annual Report). In order to extract 10 gms of uranium from the ore, UCIL must process 18 tonnes of mined mineral. The total generated slurry or solid waste will be almost equal to the total mined mineral. Considering the ideal situation where plant production capacity is 2,350 tonnes per day then only 1,305 grams of uranium can be produced per day and 2,350 tonnes of radioactive waste is evicted into the tailing pond. It’s been six years since the plant has been commissioned i.e. from April 2012 to April 2018, if we consider the ideal situation of the plant, then as on date, the plant must have dumped 51,46,500 tonnes (51,46,50,000 kg) of radioactive waste in the tailing pond (which doesn’t have any lining).

The Tumallapalle uranium mine may be operational for a maximum of not more than hundred years, but the radioactivity in the tailing pond will last for thousands of years which will be tremendously dangerous once the UCIL ends their operation in this area. Both radionuclides (\(^{230}\text{Th}\) and \(^{226}\text{Ra}\)) are common components of leached materials and airborne dusts from uranium ore tailings and waste piles, and \(^{230}\text{Th}\) and \(^{226}\text{Ra}\) can pose a health hazard if inhaled or ingested (uranium-234 (\(^{234}\text{U}\)) with a 240,000-year half-life, thorium-230 (\(^{230}\text{Th}\)) with its 77,000-year half-life, radium-226 (\(^{226}\text{Ra}\)) with a 1,600-year half-life). This is clear violation of the citizen’s fundamental right of access to clean environment for coming generations.

Radiation exposures to the general population resulting from off-site releases of radionuclides (e.g., airborne radon decay products, airborne thorium-230 (\(^{230}\text{Th}\)) or radium-226 (\(^{226}\text{Ra}\)) particles,\(^{226}\text{Ra}\) in water supplies) present some risk. The potential for adverse health effects increases if there are uncontrolled releases because of extreme events (e.g., floods, fires, earthquakes) or human error. The potential for adverse health effects related to releases of radionuclides is directly related to the population density near the mine or processing facility.

Internal exposure to radioactive materials during uranium mining and processing can take place through inhalation, ingestion, or through a cut in the skin. External radiation exposure (e.g., exposure to beta, gamma, and to a lesser extent, alpha radiation) can also present a health risk. Because \(^{230}\text{Th}\) and \(^{226}\text{Ra}\) are present in mine tailings, these radionuclides and their decay products can—if not controlled adequately—contaminate the local environment under certain conditions, by seeping into water sources and thereby increasing radionuclide concentrations. This, in turn, can lead to a risk of cancer from drinking water (e.g., cancer of the bone) that is higher than the risk of cancer that would have existed had there been no radionuclide release from tailings\(^9\).

The USEPA has set a maximum contaminant level of 30 \(\mu\text{g}/\text{L}\) for uranium in drinking water, as well as a maximum contaminant level goal of no uranium in drinking water, based primarily on its chemical toxicity (USEPA, 2012). The World Nuclear Association says “During the operational life of a mine the material in the tailings dam is often kept covered by water to reduce surface radioactivity and radon emission”.

All of these international standards and mandates were seen to be flouted with complete impunity in Tumallapalle Uranium Mine by the UCIL. The following sections of this report looks at the drastic impact of this on the people of the area, their livelihood and livestock.

\(^9\) https://www.ncbi.nlm.nih.gov/books/NBK201047/
F. The Tailing Pond

The Tailing pond as discussed above is the area that holds the radioactive byproduct of the uranium extraction process. The milling of uranium ore produces a waste product, the mill tailings, which contains about 85% of the ore's original radioactivity and a wide range of heavy metals left behind as byproducts, all of which have the potential to degrade various aspects of the environment. The tailings pond is designed to hold the solids, which are to be kept in a perennially wet state. At Tummalapalle, the remnants of the mining process are stored in the form of a semi-solid slurry and pumped to the pond located six km away from the unit. This slurry contains thorium and radium, which are common components of the leached material and airborne dust from uranium ore tailings and waste piles. They pose a serious health hazard if inhaled or ingested.

The water is an effective barrier that contains the radiation. However, the slurry consisting of the solid radioactive and toxic elements is expected to sink to the bottom and remain in the sediment. The water will contain dissolved radioactive elements and other toxic metals. It could be poisonous to animals drinking or swimming in the water. If the water evaporates completely, its effectiveness as a radiation barrier is compromised. Therefore, making it important for strict compliance of standards set out by national and international pollution control agencies and authorities, to reduce the hazardous impact of Uranium milling on the inhabitants of the area.

According to standards followed universally, the tailing pond should be lined at the bottom and the sides by a triple layer protective base consisting of Bentonite clay of a minimum 500 mm thickness, 1.5cm thick Poly ethylene layer and 50 cm layer of soil or clay. This is done in order to ensure that the radioactive tailings are allowed to precipitate onto the bottom of the pond without penetrating into the groundwater and causing radioactive contamination. The tailing pond should also be kept perennially wet so as to ensure that the radioactive slurry does not dry up and spread to neighbouring areas with the wind. The UCIL is required to plant saplings throughout the entire perimeter of the Tailing Pond so as to curtail the movement of dry radioactive dust from the tailing pond, with the wind, into the neighbourhood villages. The wind can spread the radioactive particles upto a 10 km radius of the tailing pond and therefore tree cover is necessary to curtail such movement.
But none of these mandates are being followed. We could not find evidence of Bentonite & 250 micron polyethene lining on the side walls of the Tailing pond. Everywhere along the tailing pond where we went, there were no signs that such lining is / was ever there. From our inspection the sides of the tailing pond are without any protective lining, making way for the leaching of radioactive liquid into the region’s groundwater table. The lining of the base of the tailing pond could not be ascertained as the pond was already covered with radioactive sludge.

There is sparse and intermittent tree cover around the tailing pond and it seems like it is the already existing natural vegetation of the plot. There are no visible signs that the project proponent has made any efforts to grow a tree cover according to the windrose around the tailing pond area. The tailing pond is barely moist and that too only in certain spots, and the moisture that was seen was also a result of the rain that the region had received two days before the day of our visit (11th June 2018), as asserted by villagers. Prior to that the tailing pond remained completely dry and only in the past two months, due to the intermittent rains witnessed in the area, the tailing pond remained moist.

This is in blatant disregard of the mandate put forth in the Environmental Clearance and by the Andhra Pradesh Pollution Control Board and goes to show the casual and reckless attitude of the UCIL in terms of its responsibility to ensure that the safety standards are upheld and the inhabitants, the flora and the fauna of the area is safeguarded from the harmful effects of the uranium mining and the associated radioactivity. The entire Kadapa region is characterized by strong winds, apparent from the installation of wind mills in the area, and in such a case lack of tree cover combined with the dry state of the tailing pond can carry the radioactive dust to a far longer distance than what has been estimated (10 km radius of the pond).

When we visited the tailing pond, we noted that the area is not cordoned off and entry is not strictly restricted. Reportedly, due to lack of other avenues for grazing, locals frequent the area with their cattle for grazing and other such activities. At the time of visit to the tailing pond, Mr. Rambabu, incharge of the tailing pond also came over in a jeep, but did not interact with the team members. The farmers who accompanied us to the tailing pond asserted that their head would ache and spin and they would feel general discomfort whenever in the premises of the tailing pond. This is also proof of the radioactivity in the area, and our team members had similar experiences when we went to the tailing pond to check radiation levels in the area.

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<th>Name of the Village/location</th>
<th>Radiation Levels - µSv. Microsievert/hour</th>
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<tr>
<td>Tailing pond (on the embankments) 14.3420451, 78.2386395</td>
<td>0.40</td>
</tr>
<tr>
<td>Tailing pond (immediately next to the solid waste-slurry) 14.3420451, 78.2386395</td>
<td>0.80 to 0.90</td>
</tr>
<tr>
<td>KK Kottala (in the seed village) 14.3357668, 78.2251973</td>
<td>&lt;0.18</td>
</tr>
<tr>
<td>Chandra Nayak s/o Ramulu Nayak farm, Kunampalli. (14.341605, 78.222633) (14°20’29.8N 78°13’21.5E)</td>
<td>0.26</td>
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G. Some Reflections of the Village Visits

Village 1: K K Kottala: located within one kilometer radius of the tailing pond

KK Kottala is a small village situated on the south-west side of the tailing pond, with about 200 voters presently. We were shocked to know that upto 200 people have already left the village in the past 2-2.5 years because of the uranium radioactivity and its impacts. R. Srinivasulu who is the Sarpanch of Mabbuchintalapalle and Kottala villages says that the villagers have been complaining about the pollution of ground water ever since the plant was commissioned and the salinity of the water has increased drastically in the last ten months. The common feature which we noted was that all the villagers use the polluted ground water for all domestic purposes such as bathing and cleaning. They told our team that they had skin irritation and an itchy feeling post-bath and they regularly see a white color layer on their body once the water dries up. The same, they said, could also be observed after the washed cloths were dried.

After series of complaints, UCIL installed an RO plant (Reverse Osmosis for water purification) in KK Kottala and Mabuchintalapalle, but the villagers still use the tube well water for all other purposes which include irrigation, drinking water for livestock, bathing and cleaning utensils. The RO was installed just last year, prior to which the villagers were dependent on the contaminated ground water for drinking as well. The incidence rate of skin diseases here appears to be strikingly high. Most of the villagers we met complained about irritation, rashes, skin allergies, unwanted skin growth, bone weakness, giddiness, body pains and even kidney and urinary complications. Although these symptoms are visible among many of the villagers, a few cases are exceptional.

Gangotri, a 12 years old child studying in 7th standard in Pulivendula Government Girls High school, has been suffering from a strange skin disease since she was 10 years and the scabby blisters has now spread all across her legs and to a portion of her hands. Her parents have consulted various doctors during the past two years but the skin disease still persists.

Gangotri has been suffering from strange skin blisters on her feet and hands for more than 2 years

Villagers queue up to show their ailments to the fact finding team at KK Kottala village

Karthik, a 9-year-old who studies in 4th standard, has been suffering from skin problems on this left hand since the past few months, with extreme itchiness as one of the symptoms. Karthik had previously suffered from a similar kind of skin disease last year on his right thigh, which healed recently after changing his medication numerous times as prescribed by doctors. But the disease started immediately on his left hand instead.
Anjanamma who is 50 years old, has been suffering from a type of skin disease quite like the others, in the last six months. When asked about her present situation she said “All this has happened due to the water pollution by UCIL, we have never witnessed these kinds of diseases before plant came up.” These are just some of the many cases that we witnessed in Kottala. A list of persons suffering with various illnesses in Kottala, as reported to the Fact Finding Team is (Annex-6)

Mounika, a young woman, told the team members that the most of the inhabitants regularly consume Citrogen tablets to control the extreme itchiness, watery eyes and associated allergy-like symptoms. This is a cause of concern as continued and unmonitored use of such medications could result in further complications as a result of the toxicity.

P. Narsimulu who is more than 65 years old, says “the livestock in the village has been drastically dying since the past one year. The hair of the goats has been shedding excessively, and they are unable to walk properly due to weakness in their bones. This is due to drinking of ground water”. Manasa who is Karthik’s mother said “the milk production in our buffalos has reduced from 2 liters per day in 2016 to a little less than just a liter per day, even when it has a calf”. When asked about the where the buffalos usually graze, she pointed towards a patch of land on the edge of the tailing pond. Devi and Shiva Prasad, a young couple, showed us scabs that had formed all over their cow’s hind legs. They also complained of reduced milk production in the cow.

Shiva Prasad’s cow with blackish skin ailment on the rear side of its body. An elderly woman at Kottala shows the skin disease on her feet causing immense itching.

Farmers in Kottala primarily grow bananas, chillies, groundnuts and tomatoes. We visited a few farms and found that the banana plantation had wilted and dried from excess of sodium in the water used for irrigation. White patches were visible on both the plants as well as on the soil surface. Some farmers from Kottala including S Mohan babu, Shiv Prasad, S Srinivasalu informed the team that certain UCIL officials were wrongly alleging that the farmers themselves are to blame for the pollution since the latter collect the soil from the tailing pond and deposit on their fields to increase the soil fertility in their fields. The farmers have completely rejected this allegation as bizarre and untrue.

During our visit, we were also informed that between 2014 and 2017 about 6 people from KK Kottala village, mostly dalits worked at the tailing pond without any protection, during which period the uranium mining process was fully operational. We were also told that workers from outside were brought in for construction of the tailing pond dam, without any protection from radiation. The construction took about 9 months. The dam is right next to slurry where we measured radiation and found it to be as high as 0.9 micro sieverts (limit is 0.24 micro sieverts). Apparently, this happened again in early 2018 till construction was stopped after villagers protested. These families need to be identified and immediate health interventions made, as they are highly likely to have contaminated radioactive particles inside them. Similar was the case with the workers at Jadugoda uranium mine, many of whose progeny are being born with abnormal genetic conditions.
Village 2: Kanumapalle: located within two kilometers radius of the tailing pond

The fact-finding team visited the village Kanumapalle which has a mixed population of ST (lambada) and non ST households. One of the most striking encounter here was with Chandra Naik S/o Ramalu Naik (ST), whose banana crop has been completely destroyed reportedly due to radioactive pollution. He told us that he spent more than Rs. 4 lakhs for digging 3 bores which also failed consequently. We witnessed that the banana stalk in his field oozed a strange red colour liquid and the fruits had also rotten and turned completely black in colour. In the place of the once flourishing farm stood dozens of droopy plantains trees with bleak and blackened, shrivelled branches. The radiation measured at his farm was 0.26 μSv. Microsievert/hour — higher than the maximum permissible limit. In Naik's own words, "Neither did the people want to purchase the fruit nor did I wish to jeopardize people's health and well-being by selling such material which was likely to be contaminated".

We spoke to a couple of landless Lambada men who lamented the fact that many of their livestock fell ill and died prematurely and the remaining livestock also had to be sold, due to the fear of contamination. In the entire village, reportedly, up to 500 out of 1,000 sheep perished. The pattern of illness and death amongst the livestock appeared to be similar with common symptoms that start with cough, breathing complications, loss of appetite, tumors and shedding of body hair leading to their death within a week of the onset of the illness.

Landless adivasis herdsmen lament over the massive illness and deaths of their goats and sheep

Chandra Naik shows the fact finding team the blackened plantain crop completely destroyed

Banana Plantations of Farmers of Kanumapalle stand ruined and lifeless due to radioactive contamination
Bhaskar S/o Lakshman Naik (ST) is one such landless person who informed us that 30 sheep of his died of similar illness and he did not even have money to take all of them to the Veterinary doctor who lived 12 kilometres away in Pulivendula and charged more than Rs. 175/- per injection. Anticipating that the other sheep would also fall sick and die, Bhaskar sold them away at the first price he could get. Ramanjaneyulu, S/o Ramlal Naik, also stated that about 30 adult goats and 40 kids (young goats) died due to similar illnesses leading to a loss of two lakhs rupees. Other villagers also reported deaths of sheep due to respiratory complications, loss of hair and miscarriages during birth. There were many such people in the village who have faced similar losses.

Lambada women we interacted with here told us that no health camps were conducted by the UCIL despite multiple health complications reported by the villagers, across age groups. It was extremely painful for the team to see the huge reddish patch on the tiny shoulder of 3 year old Anamika, as her mother lamented lack of medical support by UCIL. People here are dependent on private tankers for drinking water and Village Kanampalli’s request for an RO was reportedly denied by UCIL. Ravi Nayak, the President of Mandal Praja Parishad (MPP) of Kanampalli informed the Fact Finding Team that "Despite offering our land free of cost to set up the RO plant, UCIL never approved one for our village. Now we are buying drinking water from outside.”

Agriculture, human health and livestock severely impacted due to the radioactive contamination from UCIL’s unlined tailing pond.

Village 3: Bhoomaiahgaripalem: located 3 km away from the Uranium mine

The team spoke to Raghavendra Reddy, Sarpanch, from village Bhoomaiahgaripalem, situated 6 kilometers east of the tailing pond and three kilometers from the mine. One of the major grievances reported by him was of the sharply plummeting levels of groundwater from a depth of 60 to 90 feet, to 300 to 400 feet and almost 1500 to 2000 feet currently. Raghavendra, along with his extended family, had to dig 53 bores over 24 acres of family land, implying 2 bores per acre. Speaking of the numerous health related issues, he said that the Rajiv Gandhi Institute of Medical Sciences (RIMS), Kadapa refused to record proper diagnosis of the ailments that the villagers had reported. The skin diseases seen in the villagers were diagnosed as early stages of skin cancer but the same was not mentioned on paper and brushed off as general skin disease.
Village 4: **Mabbuchintalapalli** - located about five kilometers away from the Tailing pond

At Mabbuchintalapalli, the fact-finding team met a group of farmers as well as one Mr. Srinath Reddy, a member of the ruling TDP. The villagers informed us that they have stopped using the Panchayat bore water for drinking purposes, since the same has become unpotable. However, they are having to use this water for other domestic purposes (including cooking) since the RO water supply from UCIL is only limited to drinking use. We were told that rice when cooked with the bore water spoils soon after cooking, indicating the water is contaminated. The villagers told us that impacts of radioactive wastes have increased since 2014 and intensified in the last 8 months.

At the same village we also witnessed blackening of the roots of banana in the fields. One of the farmers, Maheshwar Reddy had to reportedly remove the crop prematurely at 7.5 months. Another farmer, Lakshmi Reddy S/o Ranga Reddy's farm bananas plants was entirely spoilt. In the adjacent field, his brother Gunda Nagi Reddy had to spend more than 1 lakh rupees for making the soil fertile by adding additional mud. We were told that similar impact could be seen in the farms of about 6 other farmers, ruining crop over 20 acres. Additionally, upto 25 fields in the villages are facing a 20-30% crop destruction impact, we were informed.

_Oodanaagi Reddy_ (60 years), owner of an acre of land, the only source of his family income, brooded over his land turning white and pale. He attributes this to the uranium mining. A content farmer who once produced upto 25 to 35 tonnes of banana crop, fetching him Rs 3 lakhs, now stands shattered. He was also deeply worried as to how would he repay the private money lender from who he took a crop loan at an interest rate of 18 percent per annum.

The District Agriculture Department has apparently conveyed to the villagers that the plants got destroyed due to the small roots of banana plants unable to bear the high uranium content in the soil. They also attributed this to excessive water usage by the villages. It is intriguing, since the nature of the roots have always remained the same and farmers here have been cultivating bananas for 30 years now, with very good crop, even exported out of Andhra Pradesh, so why then would the impact happen only now, is not satisfactorily answered by the Agriculture Department.

Certain farmers from the village collected water samples from their tube wells and sent it for testing at the labs of Centre for Materials for Electronics Technology (C-MET), which showed increased levels of Uranium, Strontium and Sodium in the water proving radioactive contamination as a reason for the failure of the crops.
H. Show-Cause Notice by PCB, UCIL Response and PCB Rejoinder:

Show-Cause Notice by PCB: 23rd March 2018

In the light of repeated complaints, the AP Pollution Control Board officials inspected UCIL and collected ground water samples from the bore wells in the surrounding villages on 22nd & 23rd Feb, 2018. Thereafter, the Board issued a show cause notice to the UCIL on 23rd March 2018, wherein, it also acknowledged receipt of complaints from the surrounding villagers regarding damage of their bore wells due to discharge of thickened tailings in unlined ponds. The Board categorically charged the UCIL of not lining the tailing pond inspite of specific conditions stipulated in the EC, Consent for Establishment and Consent for Operation thereby violating the conditions of EC, CFE, CFO orders.

The Board noted that as “M/s. UCIL uses different types of Sodium salts in huge quantity for alkaline leaching and the slurry (Tailings) having high alkalinity and sodium salts is being discharged into an unlined tailing pond. This may be the reason for high concentration of TDS, Alkalinity, Hardness, Sulphates & Sodium in most of the bore wells.”. It further stated that as per the analysis results of the samples collected from the surrounding bore wells by UCIL itself and also the Hon’ble Member of Parliament, Kadapa Parliamentary Constituency, the values of Uranium are exceeding the standards. The Board called upon UCIL to show cause within 15 days as to why action should not be initiated against it under the provisions of Water (Prevention & control of Pollution) Act, 1974 and amendments thereof, for not complying with conditions stipulated in the EC, CFE, CFO orders and thereby causing groundwater pollution in the surrounding areas.

UCIL’s Response: 2nd April, 2018

The UCIL in its response dated 2nd April 2018 summarily refused to accept the conclusions of PCB and stated that its operational practices, especially relating to tailing impoundment have been acclaimed internationally, that the International Atomic Energy Agency (IAEA) has also commended this effort of UCIL and has considered it as a Centre for International training on Uranium mining training and processing facility. It has averred that the tailing point is lined with appropriate clay material with desired thickness attaining stipulated permeability as per APRB guidelines and in fact the tailing characteristics improves the containment property of the tailing pond beyond the stipulation in the EC, CFE and CFO etc. UCIL contends that it has constructed 10 monitoring bore wells around the tailing pond as per AERB guidelines.

UCIL also stated that “High values of salt content reported in this soil of some agricultural fields may be attributable to continuous drawl of groundwater that contains undesired” and that “Higher uranium concentration reported around the area also show erratic pattern of distribution of uranium in ground water which may be due to varied concentration of in-situ uranium content in rock. Such values were observed before the start of UCIL’s operations in the area”.

Averring that its “care for environment and social issues has been amply demonstrated around all its operations”, the UCIL alleged that “the motivated efforts by some anti-nuclear NGOs continue to disrupt UCIL operations at times as being seen presently at Tummalapalle. UCIL wishes to reassure the State administration and all stakeholders of its commitment to adopt all possible measures to uphold the spirit of sustainable uranium production striking a right balance in efforts, linking the technological, economic, environmental and social aspects”.

PCB’s Rejoinder: 19th April, 2018

The Pollution Control Board, by way of rejoinder raised further queries, sought for additional documentary evidence and in some ways found the replies of UCIL scientifically wanting and
contested the claims of UCIL. The Board called upon the UCIL to furnish photographs at the time of laying of lining in tailing pond and certificate issued by the AERB. Specifically, the Board stated that:

- “Out of 10 monitoring bore holes, 8 are located on one side of the Tailings pond and only two monitoring bore holes are located on the other side. Only one monitoring bore hole is located towards the Mabbuchintalapalli village, which is a very badly affected village,” and called upon UCIL to “produce the copy of the approval given by competent authority who decided these locations of monitoring boreholes”.

- During the time of inspection it was observed that the decant water was not flowing towards decant water pond and officials present on-site informed that the decant water pond is not in operation of the last one month, leading to inference that the decant water is being percolated into the ground from the TP.

- Contrary to the current averments of UCIL that ground water in the region has high uranium concentration even prior to start of UCIL operations, the PCB pointed out from Page No. 72 of the EIA / EMP (Jan 2011) itself that baseline concentrations of uranium in the hand pumps and agricultural wells in Mabbuchintalapalli village were very less.

- The Board highlighted three specific reasons for the increase of concentrations of Uranium including a) improper lining of tailing pond b) The locations of monitoring bore wells not being correct and hence not representing the true nature of ground water c) Non-functioning of decanted water pond.

PCB's Show-cause notice, UCIL's Reply and PCB's Rejoinder is (Annex-7)

I. Brief of Various Studies / Reports on Tummalapalle:

a) Research by JNTU, Anantapur:

In December, 2016, researchers from Jawaharlal Nehru Technological University-Anantapur and its affiliated JNTUA College of Engineering at Pulivendula, analyzed samples of water and soil collected from Mabbuchintalapalle, Tummalapalle, Rajakuntapalle, Bhomaiahgaripalle, and V Kota villages to find out the extent of radioactive contamination. They detected heavy and trace metals like barium, cobalt, chromium, copper, molybdenum, nickel, lead, rubidium, strontium, vanadium, yttrium, zinc, and zirconium. Only nickel, strontium, zinc, zirconium, and rubidium were within the permissible limit, while other elements crossed the maximum limit. "The increased levels of barium, arsenic, cobalt, chromium, copper, molybdenum, lead, vanadium and yttrium are a major concern for the suitability in agricultural and other land management practices,” the researchers said, warning that they may enter the food chain. It is well-known that heavy metals if consumed in large quantities may lead to severe health issues, including cancers, respiratory and kidney complications. The study was also published in the recent issue of International Journal of Advanced Research.

b) Lab Reports of C-MET:

Earlier this year, in February, 2018, with the assistance of Mr. YS Avinash Reddy (Member of Parliament, Kadapa) some of the local farmers collected water samples from their tube wells and sent it for testing at the labs of Centre for Materials for Electronics Technology (C-MET), an autonomous scientific body under the Govt. of India. The results showed that uranium levels had increased up to 308.5 ppb or micrograms per liter, when the United Nations-certified limit for India is 30. Another major concern is also the increased sodium (salt) content in groundwater that is detrimental to agriculture. The levels of calcium and magnesium in the water are also on the rise. Calcium and magnesium contents are a measure of hardness of water.
c) Report on Violations of Right to Safe Drinking Water due to Uranium Mining:

The Fact Finding Team also perused through the *Report of the study on the violations of right to safe and accessible water for drinking and agriculture of uranium mining on Adivasi and non-adivasi communities of T. Velamavaripalle Panchayat in Vempalli Mandal, YSR Kadapa District, Andhra Pradesh*, conducted by Mr. Srinivas Chekuri for Vennela Rural Development Society (VRDS) and sponsored by Keystone Foundation Kotagiri, Nilgiris, Tamilnadu. Although the study area was different than the villages visited by the FFT, i.e. villages in the gram Panchayats of T. Velamavaripalle and Giddangivaripalle, it was within the Vemula mandal and, therefore, quite relevant for the purposes of this report as well. Amongst other things the study found out that:

- The drinking water has certain water quality issues too such as Fluoride, TDS, Iron (Fe) and Nitrate contamination besides presence of Uranium trace elements. Though Uranium present in the water now under permissible limits but poses a potential threat in the future as the ground water is depleting rapidly and it may leach into groundwater in higher proportions. The symptoms of Fluorosis are visible among tribal children due to Fluoride.

- Since dalits and adivasis can’t afford to buy the so called safe RO water for drinking and even RO water being not available in these villages, they are forced to drinking the same contaminated water and succumbing to various water born health disorders such as Fluorosis, osteoarthritis, rheumatoid arthritis, muscle pains, body pains and kidney problems etc.

- People irrespective of women, men and youth but all complain various health disorders such as joint pains, knee pains, muscle pains, signs of dental fluorosis among children, osteoarthritis, rheumatoid arthritis; severe forms of anemia etc., People are using pain killers such as diclofenac and Ibrufen 600 mg regularly to relieve from pain. Medical
experts say that prolonged usage of these pain killers results in kidney failure. Health Dept is not keeping such data as it becomes a major public hue and cry. These tablets are widely sold in village grocery shops.

- **The right to safe and accessible water for drinking and agriculture of Dalits and Adivasi communities living in and around Tummalapalle Uranium mining and stone quarrying area is violated due to rapid depletion of ground water resources by various factors. Since it is a dry-land and rain-fed area with a scanty average rainfall, ground water is the only source for drinking as well as irrigation. Ground water table has been drastically decreased to > 1200 feet (400 meters) from 80 feet after the commissioning of the Uranium project that too within a span of 5 years in the core and buffer zone areas (< 25 Kms radius) of the plant.**

- Moreover, the drinking water has certain water quality issues too such as Fluoride, TDS, Iron (Fe) and Nitrates contamination besides presence of Uranium trace elements. Though Uranium present in the water now under permissible limits but poses a potential threat in the future as the ground water is depleting rapidly and it may leach into groundwater in higher proportions. The symptoms of Dental Fluorosis are visible among tribal children. Fluorosis is caused due to drinking water that contains high levels of Fluoride.

**Amongst other things, the study recommended:**

- Supply of safe drinking water either surface or treated RO water to all the villages in T Velamavari panchayat and all the habitations in the core and buffer zone areas (< 25 Kms radius) of the Tummalapalle Uranium Project (TUP) immediately.
- Any natural resource available in the ground, including water should be made a common property and the Government should give directions on how to use and conserve it.
- Bore wells for irrigation should be banned gradually and open well irrigation (use of surface water) like in Hivarebazar (Maharashtra) must to be encouraged.
- All factories should treat waste water before disposing to rivers or any other water body to maintain the quality of the water.

*Excerpts of the Study Report is (Annex-8)*

**J. Recent Developments:**

*On 13th July, 2018, Mr. Hari Kiran, the Kadapa Dist. Collector visited the tailing pond and some of the affected areas and farms, where the villagers and local political representatives including Ms. Usharani, MPP and Mr. Maraka Shivakrishna reddy, ZPTC informed him of the problems due to the radioactive contamination, in particular agricultural losses and health-related impacts. The Collector apparently admitted that about 32 hectares of land belonging to 27 farmers has been affected in these villages.*

While highlighting that uranium is important for national security and also echoing UCIL’s position that the ground water contained high levels of uranium even prior to the mining by UCIL, the Collector reportedly assured the people that he would intervene with the authorities at the state and centre to ensure that there is no further contamination from the tailing pond and that affected farmers are duly compensated. The Collector also reportedly constituted ‘village committees’, with two persons each from every village, affected by the UCIL operations. The visit by the Collector was undertaken in the presence of Mr. Pranesh Gade, UCIL MD, Mr. Narsimhulu, Tehsiladar, and other district officials, MPTC, sarpanches etc. The visit was widely covered in the local vernacular media.
Some of the FFT members were informed by Mr. T. Rajendra Reddy of the Kurnool Zonal office of APPCB that the PCB has constituted a committee consisting of nuclear physicists and other eminent scholars to investigate and report on the environmental aspects of the Tummalapalle uranium mining. The committee visited the affected villages in the last week of June 2018 and its findings are yet to be made public. UCIL’s inability to furnish the proofs that APPCB’s rejoinder sought, has been communicated to higher officials and the committee’s report is now being awaited to decide on further action.

On 8th Aug, the Pollution Control Board called for a dialogue between officials from UCIL, certain people from the affected villages and members of the Expert Committee constituted by PCB. About 10 villagers from KK Kottala and Mabbuchinthalapalli villages attended the hearing at the PCB office, Vijayawada along with Dr. Babu Rao, Rohit Gutta, Jayashree Kakumani and Rajesh Serupally. The villagers described in graphic detail to the PCB, the problems they have been facing for years and to this date due to the UCIL operations in the area, in particular the impacts on health, livestock, agriculture and livelihoods. PCB officials also interacted in detail with the UCIL officials and above named persons, who were part of the Fact Finding. The FFT members shared their field observations and analysis and Dr. Babu Rao presented details submissions of the range of environmental violations. The Minutes of the Meeting are not yet available.

Between 24th April and 15th May, Mr. Babu Rao, environmentalist and Retired Scientist, Indian Institute of Chemical Technology (IICT), Hyderabad wrote three letters to the Collector, Kadapa, presenting his detailed analysis of the nature of violations and scale of contamination by UCIL and requested the Collector/s to intervene, by calling for a meeting of all concerned authorities, villagers and independent scientists, environmentalists and activists. Letters and Notes by Dr. K. Babu Rao is (Annex-9)

A compilation of certain relevant media reports is (Annex-10)
K. OBSERVATIONS / FINDINGS:

1. The team witnessed gross violation of environmental clearance conditions dated 21st February 2007 issued by the MoEF as well as conditions in the Consent for Establishment (CFE) and Consent for Operation (CFO) issued by the AP Pollution Control Board (APPCB), jeopardizing the constitutional right to people's life, livelihoods, access to safe food, water, health, air and well-being, primarily due to non-lining of the radio-active tailing pond, among other things.

2. More than a decade of poor detection, monitoring, enforcement (as well as prosecution) of the environmental conditions by the regulatory authorities, especially by the Pollution Control Board, the Union Ministry of Environment and Forests and its Regional Office, Bangalore which is in charge of the monitoring, is quite evident, except when an uproar was created by the people leading to limited intervention by the PCB.

3. Lack of transparency of the status of compliance of statutory conditions; nature, extent and impact of the uranium mining and waste disposal, and denial of opportunities for villagers and activists to interact with the officials in an informed and equally empowering way raises more questions about the sincerity of the project authorities in dealing with environmental violations.

4. Inspite of the stipulation in the environmental clearance that the tailing pond should have an impervious lining to prevent ground water contamination, ensure disposal of sludge in a safe manner and constant monitoring for maintaining levels of radio-nucleids in the ambient environment within permissible limits, the tailing pond does not have effective protective lining increasing the likelihood of seepage of radioactive waste into the ground water as well. UCIL has also ignored the conditions in the CFE for the tailings pond. It was not lined with bentonite clay as specified and polyethylene liner sheet has not been placed to prevent seepage.

5. It also appears that UCIL has no design document for the tailings pond at Kottala and standard practices for the construction, operation and monitoring of the tailings disposal pond, especially for transferring the tailings to the pond and in preventing seepage from the side slopes have not been followed. While UCIL claims that they have followed the more stringent norms of AERB, with regard to lining (as against that of the CFE), the same is not established on the ground. Side slopes abutting the tailings are not lined or compacted is evident visually. Slopes are highly porous and are likely to cause severe seepage loss of liquid coming with tailings. Even the bottom surface is not seepage proof. Approximate calculations indicate a loss of at least 43 m3/day from the bottom surface. That is a lot of contamination.

6. In grave violation of the prescribed standards, the surface of the tailing pond has been allowed to dry up for a substantial part of the year, which has led to the dispersion of the dry radioactive dust/particles to travel in the direction of the wind into the neighbouring villages, resulting in the plants, crops, animals and the villagers being exposed to radioactive contamination. During our visit to the tailing pond where we were accompanied by the local villagers, we measured radiation levels in the uranium tailing pond using Dosimeter. The results were worrying, as the meter recorded the reading varying from 0.70 Micro Sieverts/h to 0.90 Micro Sieverts/h, where the maximum permissible limit is below 0.24 Micro Sieverts/h.

7. Tailings ponds require monitoring of ground water contamination by placing adequate number of monitoring wells at appropriate locations as per standard specifications and groundwater studies. There is nothing on record to indicate that such an exercise has been
undertaken. UCIL has arbitrarily located 10 bore holes at considerable distance from the pond area defeating the very purpose of the monitoring wells. It has also not furnished any justification of the location, as sought for by the PCB. It is evident that these bore holes do not qualify as monitoring wells by any standard. No provision is made for purging the wells for collection of representative samples. The sample collection method used for collecting groundwater samples from these bore holes is inaccurate and not representative of the groundwater condition. It is an elementary mistake not expected from UCIL-BARC. Presently they are collecting water samples from the stagnant water column in the bore well and not from the water table. UCIL is claiming based on this false data that tailings pond is not causing any groundwater pollution.

8. Severe damage to the soil and agriculture/standing crop in the villages adjacent to the mine and tailing pond, leading to crop losses especially on the banana fields, and the subsequent impact on the livelihoods of the farmers.

9. Numerous cases of deaths and severe impact on the health of the livestock (cows, sheep, goat and hens) resulting in adverse effect on the livelihood of villagers, many of who do not own lands and are only dependent on livestock. Instances of villagers compelled to sell their remaining livestock due to this precarious situation and lack of veterinary support by the state is also quite alarming.

10. Severe contamination of the ground water and continued usage of the same by the villagers for other domestic purposes such as cleaning, bathing, cooking is an extremely life-threatening situation which the villagers have been pushed into, since the UCIL is providing barely enough water for drinking purposes. It is also clear that mining and processing of uranium ore at Thummalapalli has adversely affected the availability of groundwater in the region depriving the people of drinking as well as irrigation water to a great extent.

11. Multiple cases of cancer, kidney complications, skin allergies, rashes, itching, sleeplessness, burning sensations, knee problems attributable to the radioactive pollution by the Project were reported by the villagers however no effective medical interventions and support by the project authorities and the administration is indeed shocking.

12. Highly casual approach and severe negligence by the project authorities, district and state administration in responding to the numerous complaints and concerns of the local, affected people, despite peaceful protests and even after intervention by the local MPPs MP.

13. Condition No. 17 of CFE clearly specifies that “Green belt of width 50 m shall be developed along the boundary of the project Green belt development shall be started along with the construction activity. The total area of greenbelt shall be 300 ha as indicated at page no. 6-9 or EIA/EMP report.” While, actually the EIA/EMP report proposed 360 ha of greenbelt, even the reduced 300 ha of green belt has not been developed in the past decade, despite it being one of the most easiest conditions to meet.

14. From the data made available it is evident that work practices and safety at work are poor resulting in poor quality air at work place. We also saw a few UCIL officials on the bank of the tailing without any radiation protection cloths, which would be necessary as the tailings emit constant deadly gamma and Beta rays. UCIL has failed to look after its own employees, which again points out to their disregard to the life and safety of people. This is also a serious violation of the EC condition regarding occupational safety.
L. SUGGESTIONS & RECOMMENDATIONS:

1. UCIL should be made to own up its full legal responsibility to ensure and implement environmental mitigative and remedial measures to ameliorate the impacts due to its operation in the area, in keeping with the conditions stipulated in the environmental clearance dated 21st February 2007 issued by the MoEF as well as conditions in the Consent for Establishment (CFE) and Consent for Operation (CFO) issued by the AP Pollution Control Board (APPCB), as well as subsequent directions, issued by the government of India from time to time, within the framework of the Environment Protection Act 1986, Water (Prevention and Control of Pollution) Act 1974, Air (Prevention and Control of Pollution) Act 1981 and other protective legislations.

2. The Ministry of Environment and Forest must along with its Regional Office, Bangalore and the PCB undertake an immediate visit to the affected areas and assess the status of compliance of the environment clearance and consent conditions and issue necessary directions to the UCIL authorities for effective implementation of the same.

3. UCIL should be made to submit a plan for rehabilitating the tailings in the pond into a properly lined pond that prevents seepage / percolation of contaminated effluents from the pond into groundwater. This must be implemented after convincing the affected people of the soundness of the design. During the implementation, representatives of farmers should have access to the works to see the quality of work and express their concerns that must be duly addressed.

4. UCIL must immediately undertake measures to ensure effective and multi-layered lining as per the prescribed scientific and legal standards so that radioactive waste/particles do not travel beyond the designated area. The tailing pond must be kept in a perennial moist state so that the radioactive waste does not dry up and fly into the surrounding villages with the wind. The tailing pond area must also be cordoned off to prevent grazing by livestock and to ensure livestock does not come in contact with the radioactivity of the tailing pond.

5. The UCIL must take measures to plant saplings around the tailing pond and create a thick and protective tree cover to ensure that the radioactive particles do not fly in the wind. This should be done keeping in mind that the embankment of tailing pond should be cleared of the vegetation that is present on it currently, as this will weaken the tailing ponds side walls. The saplings should be planted after studying the windrose which is the usual direction that the wind flows in, so as to increase the effectiveness of the green cover.

6. UCIL must undertake measures to locate and establish monitoring wells on the banks of the Uranium tailing pond taking into consideration the ground water flow of the region and applying the relevant international standards for the same.

7. The Central Groundwater Board must immediately undertake hydrological modeling studies and analyze the level of contamination, potability of the groundwater in the area and issue necessary directions to the UCIL to remedy the same.

8. UCIL, along with the department of Agriculture, Krishi Vigyan Kendra, District Administration and the affected villagers must undertake an immediate assessment of the agricultural lands claimed to be affected by the radioactive pollution and immediately acquire and compensate all such lands that have been severely contaminated (as per the Land Acquisition and Rehabilitation Act, 2013) and in cases where remediation is fully possible must undertake the same and pay compensation to affected landowners as per law. While these works are in progress, the farmers should be appropriately compensated for
loss of crop and the cost of remediating the soil from sodium contamination. Crop compensation should continue till the groundwater is made suitable for irrigation.

9. UCIL must immediately undertake an assessment of the status of health of all the residents in every village within a 10 km radius of the mine and the tailing pond along with the Department of Health and Family Welfare and the Directorate General of Medical Health, Directorate of Veterinary Medicine and Civil Society Organisations, in particular to check the levels of radioactivity in human beings and livestock and based on the same provide free medical aid and health related support, with the involvement of experienced radiologists. This must include at least one permanent health camp/centre between two to three adjacent villages. Additionally, a detailed study should be done on the health of villagers by epidemiologists from a reputed medical institute and the report should be made public.

10. The villagers reported that Rajiv Gandhi Institute of Medical Sciences, located in Kadapa, refused to document their diagnosis of the villagers as having skin cancer, and instead brushed off the matter as ordinary skin disorders. At least for the past 3 years, there should be an enquiry with regard to all the patients residing within 10 km radius of the mine or the tailing pond who sought treatment from this hospital to analyze and ascertain the relationship of their health complications with the UCILs operations.

11. In coordination with veterinary department, the UCIL must immediately assess and compensate the extent of livestock death/illness as per current prices and must also undertake measures to segregate/quarantine livestock affected by radioactivity from the healthy ones.

12. In addition to safe and adequate potable water for humans and livestock, UCIL must provide safe and adequate water for all kinds of domestic consumption including cooking, cleaning, bathing and washing purposes as well as for irrigation to all the affected/surrounding villages.

13. UCIL and the District and State Administration/Government must institute a mechanism for patient hearing of the grievances of the affected people, provide all necessary information in a transparent manner and place the same in the public domain. The government must not resort to repression of people and activists, denial of their access to interaction with officials of UCIL. And withdraw any cases filed in this regard.

14. The District Collector must hold regular quarterly meetings of all the stakeholders at the Collectorate, Kadapa including the officials from UCIL, PCB, local public representatives, villagers, sarpanches, people's organizations as well as activists and environmentalists assisting this process and take decisions based on inputs from all parties in a dispassionate and scientific manner. These consultative meetings must have adequate participation of people from different villages to inform them of the developments, answer their concerns and solicit their inputs as well in safeguarding the environment and their livelihoods.

15. The UCIL must place before all the concerned Gram Panchayats, Telugu copies of the EC, CFE, CFO, Show-cause-notice by PCB and related documents, all compliance reports furnished to the MOEF from the date of clearance till date, for the people of the concerned villages to undertake an audit of the status of the environmental compliance. All these documents must also be available on the websites of MoEF & CC and the APPCB in English and Telugu.

16. Greenbelt in 360 ha as proposed in EIA report and mandated in the EC should be taken up and completed before the end of monsoon season this year, taking the windrose (the usual direction of the wind) into consideration.
17. UCIL should measure the radiation in and around the villages with proper devices (which should be properly calibrated before testing). UCIL must install Contact Ambient Air quality measuring devices near the plant and tailing pond. Also, a display should be installed in front of mine, tailing and in villages which should show constant pollution levels such as PM 2.5 and 10, radiation, wind flow and other pollutants in air. Likewise, UCIL must also install Constant Water sample measuring devices and regular water samples should be tested in the villages around tailing pond and in the tailing pond, and the results of the same should be made public.

18. A third-party expert committee consisting of mining engineers, geo technical experts and environmentalists should be constituted to examine the plant and a detail report should be made public.

19. UCIL must take immediate action to safeguard the safety of its employees and workers affected by its operations as per the mandate in the environmental clearance and ensure that all occupational safety measures are in place.

20. The Fact Finding Team witnessed leakages in few places from the slurty pipes. We could not locate any instruments to measure AAQ, wind direction or water purification plants to purify the water which needs to be recycled. These should be installed and maintained by the UCIL as proof of the environmental impact of their operations in the area, and their location must be justified.

21. In keeping with the well-established ‘Polluter Pays’ principle, UCIL should bear all the costs including for remediation of groundwater to its original status, land acquisition, rehabilitation, agricultural remediation, provision of safe drinking and domestic water, medical support and interventions, compensation for agricultural and livestock losses etc. and the same must be charged against the project cost.

22. It would be in the fitness of things if uranium processing is put in abeyance until the tailing pond is secured as mentioned above so that the situation of air and water contamination is not aggravated further leading to irreversible impacts. All the environmental laws should be maintained to uphold the Constitution, and to safeguard the fundamental right of Right to Life, which includes the right to access clean drinking water, clean air and good health. No fresh tailings should be transferred to the tailings pond till rehabilitation of the tailings is completed. Production should be started only after the tailings pond is properly rehabilitated and not before.

**M. CONCLUSION:**

In view of the findings in this Report, establishing serious violations in implementing the conditions specified in EC, CFE, CFO (which have in fact been pointed out categorically by the Pollution Control Board itself) leading to contamination of soil and groundwater affecting the agriculture and health of the villagers and transgressing their fundamental rights, prompt and firm legal and remedial action must be initiated by the concerned authorities to restore the faith of people in the rule of law and principles of environmental justice. The APPCB and MoEF must also be held accountable for failing to intervene in a timely and effective manner in the conduct of their regulatory functions.