

## **Fact Sheet regarding the Pottipuram Research Centre (PtRC) [Erstwhile India-based Neutrino Observatory (INO)]**

Here are some clarifications to remove some of the misconceptions about the proposed underground neutrino observatory, now named as the Pottipuram Research Centre (PtRC) of the India-based Neutrino Observatory (INO).

1. **Main goals:** The main goal of the PtRC is to set up an observatory deep underground under a hill near Pottipuram village in the Theni district to observe the sky through particles called *neutrinos*. Hence it is a **basic-sciences research project** to study their properties. Just as a telescope is set up in an area where there is less light so that you can observe the sky clearly, neutrinos are best observed from underground labs; in fact, all neutrino labs around the world are located underground.

2. **Underground:** The only unusual feature of the laboratory is that **it has to be about 1000m or more underground**. The rock material of the Earth itself acts to absorb the background particles and radiation so that a cleaner neutrino signal is obtained. The present location of the laboratory is proposed to be in revenue land with a tunnel that accesses the underground laboratory caverns. The site was chosen because of good rock quality and safety features as well as the lack of any dense vegetation (no trees will be cut) or any large animal movement in the locality. This is due to the unusually low rainfall in this area.

3. **No strategic activities:** Like any other basic science project, PtRC is open to the public and does not have any strategic dimension which involves secrecy. In fact, the participation of students from the area is encouraged. In addition, it is **not an industrial or commercial enterprise**, has no pollutants or emissions, and after the construction period (which involves standard or conventional approaches such as used in railway tunnel construction), there will be hardly any disturbance in the longer operational phase which should last decades.

4. **No harmful emissions or radioactivity:** The laboratory **does not involve any radioactivity** or other hazardous materials.

5. **No displacement of people:** The land, allotted free of cost by the TN government, is revenue land of extent 26.825 Ha which is outside the forest boundary. All activities of PtRC will be confined to this piece of land. Note that there will be NO displacement of people nor any interference in their day-to-day activities. The participation of the locals in various aspects of the lab is welcome.

6. **Low impact during construction:** The tunnel to be built to access the underground labs will be a **horizontal tunnel** similar to a railway or road tunnel. Nearly 100 kilometres of such tunnels have been built in Tamil Nadu, and hundreds more kilometres across India. While the impact during the construction phase will be more than during the operation phase, this impact will be reduced and controlled through many standard procedures routinely used in the construction of such tunnels. A detailed mitigation plan has been submitted to the authorities before clearances were obtained. Tamil Nadu itself (through **TNEB/TANGEDCO**) has constructed many kilometers of such tunnels for their underground power stations and is completely competent to build and assess such structures. **In fact, the detailed project report for PtRC (erstwhile INO) was prepared by TANGEDCO.** Note that tunneling for

PtRC in the remote Bodi West Hills, which is more than 2 km away from the nearest village, will not disturb the villagers since vibrations due to drilling are known to be negligible beyond 500 m of the drilling area.

**7. No occupation of forest land or proposed tiger corridor:** While a part of the tunnel and the caverns are *under* the Reserve Forest area, **no forest land will be occupied by the project**. Forest clearance for the project was obtained with the understanding that no part of the forest land will be disturbed or occupied. In fact, the tunnel will be several meters deep underground by the time the forest boundary is reached and the laboratory is more than 1000 m underground. Hence there will be no disturbance on the surface which is classified as Reserve Forest (RF). In any case the disturbance due to tunneling is also confined to the period of construction. During the operation time, there will be no disturbance on the surface.

The project being more than 1 km underground, there will be **no disturbance to the animals or vegetation** on the surface. It cannot cause any harm to the RF on top or to the Mathikettan National Park beyond the Kerala border. The observatory is located entirely in TN and lies well outside the Eco-Sensitive Zone of the National Park. The tiger corridor connecting Mathikettan to Periyar, that will allow tigers free movement on the hill tops, also lies on the surface, far above the underground lab complex. There will be no disturbance and no hurdles in the free movement of tigers (or any other animals) in the forest above ground.

**8. No damage to dams:** Dams like Idukki or Mullai Periyar are more than 30 km away from the proposed site and will not be affected. There are several examples from Tamil Nadu itself. For instance, the tunneling for PUSHEP project near Masinagudi was done just below the Glenmorgan fore bay dam without causing any damage. Also, the water which reaches Tamil Nadu for the hydroelectric power project from the Mullai Periyar rivers is brought in tunnels to the power house. **These tunnels were constructed 3 years after the commissioning of the dam and just beneath the dam, without causing any damage to it.** In fact there is an on-going tunneling work just south of Mullai Periyar dam at about the same distance through similar rock conditions for the Shengottai-Punalur railway line. No damage to either Periyar dam or other water bodies nearby has been noticed.

**9. No effect on water table and aquifers:** There are fears expressed about the effect on water table and aquifers. Geo-technical studies done by GSI clearly shows that the rock above the proposed laboratory is highly compact granite without water pockets and hence cannot affect the aquifers in the region. In addition, since the proposed tunnel is a horizontal tunnel, the apprehension that the water table will be depleted due to a well-like vertical tunnel structure **is unfounded**.

The fear that this project will take away ground water from locals is also misplaced since **TWAD board** has already executed the pipe line to supply water to the project from the river several kms away. A sump to store about 12 lakh litres of water has already been built by the TWAD board of TN, in the land allotted free of cost by TN government in 2010-2011. It is well understood by the project proponents that no local water resource will be used for the project. The water requirement of the project will reach a quantum of 3.4 lakh litres a day after about 10-15 years, which is the same as the water requirement of about 150 households.

**10. Human resources development and student participation from TN:** A mini-prototype of the proposed detector to be located at Pottipuram is already working in the Madurai centre

(transit campus) for the last two years. A large number of students from across India, including from the neighbouring colleges and Universities in and around Madurai, Theni, Dindugal, etc., have visited and participated in its developmental activities. In fact, the presence of the lab in Madurai has galvanised scientific interest among the students of Tamil Nadu. Apart from the INO PhD students, many local students have done their summer projects and other projects at the transit campus, Vadapalanchi road, Madurai, over the last few years. PtRC is thus well on its way to building a pool of young and dynamic researchers. The lab will also enable the access of international level experimental and theoretical researchers to the academic community in TN.

**11. Towards the growth of local industry:** When built, PtRC will have one of the world's most massive detectors with about 4 million channels of electronics and 50,000 tons of iron. The R & D is fully indigenous and all components have been designed in-house and are being manufactured by various industries in India. Many dozens of them are located in Tamil Nadu. Hence the construction and maintenance of the detector components and facilities will help the SMSEs in this region as components are going to be manufactured and maintained locally.

**12. All India Collaboration:** The PtRC project is a collaboration amongst more than twenty institutions and universities in India. Nearly a hundred scientists and many students locally and from all over India are involved in the research and development activities already. That number will go up significantly once it becomes operational. It is expected that it will develop into a large national laboratory, with international repute. It is a large Mega Science project first of its kind in TN and India. It is jointly funded by the Department of Science and Technology and the Department of Atomic Energy and is a basic sciences project intended to understand more fully the composition of the world we live in.

**13. Commitment to Environment conservation:** The scientists involved are conscious of being accountable to the public and will abide by all the necessary clearances and conditions imposed upon the project. It is recognized that the scientific community has an obligation to carry out research in a safe and eco-sensitive manner, and observing nature (at observatories) also requires protecting nature.

In summary, the PtRC (erstwhile INO) project is not in any way harmful to the people, land or environment of Pottipuram, Theni, or its environs. In fact, its presence in the region will act to galvanise interest among the local students in science, and the scientific process, which is so critical to the nation today. The future of science in the country demands setting up **indigenous** mega projects through which both science and technology development is possible along with local area development. This project can set an example to future mega-projects, being the first one in that direction.