

**THE SECRET MOVE TO SET UP RADIOACTIVE WASTE REPOSITORY**  
**UNDER THE WESTERN GHATS IN KERALA-TAMIL NADU BORDER**

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The Union cabinet has given the final clearance for setting up the India-based Neutrino Observatory (INO) under the mountains in Idukki-Theni districts of the Western Ghats. This is one of the ten mega science project managed by the Department of Atomic Energy (DAE). With a finished volume of 235,000 cubic meters, INO will be the biggest underground laboratory in the world. The proposed site (77°17'5.32"E, 9°56'46.20"N) is in the highly degraded portion of the Suruli Shear Zone and is surrounded by the catchment area of three perennial river systems (Periyar, Vaigai and Vaippar) and 12 dams within a radius of 50 km. DAE has refused to discuss the impact of blasting out 800,000 tons of rock using 1000 tons of gelatine on the aquifers and reservoirs in the area.<sup>1</sup>

On 26 March 2014, we reported that DAE was also planning to construct a deep geological repository (DGR) for storing the high level wastes from the nuclear power plants under the Western Ghats in Idukki-Theni districts of Kerala and Tamil Nadu.<sup>2</sup> The report was based on the following entry regarding a project under scrutiny, published on the website of the Tamil Nadu State Environmental Impact Assessment Authority (TNSEIAA).

File No :	0336/2010
Date of Application:	22-04-2010
Applicant Name :	The Institute of Mathematical Sciences
Site Address :	Pottipuram village, Uthamapalayam taluk
Contact Address :	CIT Campus, Taramani, Chennai - 600 113
District :	Theni
Category / :	1(e) Nuclear Power Plants, Nuclear Fuel Processing Plants and Industry, Nuclear Waste Management Plants

Nuclear power plant and fuel processing plant require plenty of water which is not available at Pottipuram. So the third category – nuclear waste management plant- seems to be more appropriate. We argued that the project was a 'Deep Geological Repository' (DGR) for storing high-level radioactive waste from nuclear reactors that the DAE officials have been talking about during the past couple of years.

The list of projects or activities requiring prior environmental clearance includes 'Building and Construction projects  $\geq$  20000 sq.mtrs and  $<$ 1,50,000 sq. metres of built-up area' (category 8(a)).<sup>3</sup> The built-up area of INO tunnel and caverns will be more than twice the upper limit. The size matter is the only reason for bringing INO under the environmental regulator's scanner. The IMSc project pending consideration was listed in category 1(e), "Nuclear Power Plants, Nuclear Fuel Processing Plants and Industry, Nuclear Waste Management Plants". Though INO officials refused to clarify this point, Prof P Ajith, senior scientist at the International Centre for Theoretical Studies, a DAE funded institution under TIFR commented on this:

"I do not see any evidence supporting your allegation, except that the INO environmental clearance application was categorized as belonging to 1(a). While I think that this is perhaps not an appropriate category for this application, I do not see any other categories more appropriate than this either."<sup>4</sup> 'Building and construction' is a more appropriate category for INO than nuclear waste.

IMSc has been working on the INO project at Singara in the Nilgiris since 2006 and the environmental regulators in Tamil Nadu were aware of their activities. TNSEIAA came into being on 19 March 2008<sup>5</sup> and they should have known about the activities related to the proposed underground laboratory. TNSEIAA received an application from the IMSc for setting up an underground project in Theni district on 22 April 2010 and on 28<sup>th</sup> April convened a meeting to consider the grant of Environmental Clearance under EIA Notification 2006 for INO at Pottipuram village, Theni District. In that meeting "the proposal was discussed in detail and the Authority decided to refer to the MOEF whether SEIAA can consider the project in view of the *complexities* mentioned in the Agenda".<sup>6</sup> Tunnels have been constructed in Tamil Nadu and other parts of India and INO tunnels have 'been in the air' in Tamil Nadu for about four years. So what are the

complexities discovered by TNSEIAA after the receipt of the application from IMSc on 22 April 2010?

The entry of project 336 submitted by IMSc on 22 April 2010 has been removed from the TNSEIAA website in June 2014, with explanation that the project is for the neutrino observatory and its sanction has been accorded by the central Ministry of Environment, Forest and Climate Change (MOEF) in June 2011. INO has issued two press releases in March and June 2014, distancing from the repository and denying its existence. The timelines given below shows some discrepancies:

Timeline as per TNSEIAA Website in July 2014.<sup>7</sup>

22.04.2010 - TNSEIAA received the INO proposal from IMSc- dealt in F.No.336/2010

28.04.2010 - TNSEIAA decided to “refer the project to MOEF whether it can consider the project in view of the complexities mentioned in the Agenda.”

05.05.2010 - TNSEIAA referred the application to the MOEF (Letter No. SEIAA/TN/F.No.336/2010)

18.06.2010 - TNSEIAA returned the proposal to INO with a request to approach the MOEF (MOEF letter no. 21-967/2007-IA.III dated 18.06.2010)

Timeline as per TIFR Press release dated 28 March 2014.<sup>8</sup>

12.04.2010 - INO submits application to TN SEIAA.

22.09.2010 - SEIAA transferred the application to MOEF due to the special nature of the project.

Timeline as per TIFR Press release dated 20 Jun 2014.<sup>9</sup>

22.40.2010 - INO submits application to TNSEIAA, Tamil Nadu.

13.09.2010 - TNSEIAA informed INO that the application has been transferred to MOEF.

13.09.2010 - TNSEIAA returned the application fee to INO. (SEIAA/TN/F.No 336/2010/.

– 11.2010 - Fresh application was made by INO to MOEF. (Date not shown)

01.06.2011- MOEF clearance was given for INO project after additional clarifications made on 5.04.2011.

## Timelines as per MOEF Sanction letter dated 1.06.2011

The opening sentence in the MOEF sanction letter for INO reads: “This has reference to letter No SEIAA/TN/F.No.336/2010 dated 5.5.2010 and subsequent letters dated 6.7.2010, 31.12.2010 and 1.3.2011 seeking prior environmental clearance for the above project under the EIA Notification, 2006.”

### Highlights from the timelines

In the sanction letter, MOEF mentions only the letters from SEIAA dated 5.5.2010, 6.7.2010, 31.12.2010 and 1.3.2011 and it does not refer to any communication from IMSc. According to the TNSEIAA’s website, the letter dated 05 May 2010 to MOEF was a query as to “whether it can consider the project in view of the complexities”. In response, the MOEF directed SEIAA to return the proposal to the proponent. However, from the MOEF sanction letter, it appears that the application was forwarded by SEIAA along with the letter dated 5<sup>th</sup> May 10. This should mean that (a) MOEF did not consider the application for INO submitted by IMSc directly to the Ministry in November 2010 mentioned in INO’s second press release and (b) TNSEIAA was working for the project even after returning the application and the processing fee.

TNSEIAA states that the application was returned to IMSc on 18 June 2010. INO press release says that it was returned on 22 September 2010 ( 28 March 2014 press release) and on 13 September 2010 (20 June 2014 press release).

In the 28 March 14 press release of INO, the date of application was 12 April 2010. In the second press release of June 2014, the date has been advanced to 22 Apr 10. Dr Ajith has an ingenious explanation for this:

“The application date of 12-04-2010 (the date on which the application was signed by the applicant), while 22-04-2010 is the date in which SEIAA started the file 0336/2010. I do not see any discrepancy between these dates, considering the time for the postal delivery, holidays in between, etc.”

SEIAA website clearly mentions 12 April 2010 as the date of application, and not as the date of receipt of application. SEIAA office is 9 km away from IMSc and between 12 and 22 April 2010, there was only one holiday on 14 April (Dr Ambedkar Jayanthi/Tamil New year). (By the way, Dr Ajith specialises on the gravitational forces of galaxies thousands of light years away from here, where 9 kilometres and 10 earth days do not matter much.)

### Mathematics and Radioactive waste

IMSc is part of the INO collaboration and they were dealing with the administrative work related to the project. After receiving the government sanctions, the headquarters of INO was shifted to the Tata Institute of Fundamental Research (TIFR) Mumbai. However, 27 ha of common grazing land in Pottipuram village was taken over by the Kalpakam-based Indira Gandhi Centre for Atomic Research (IGCAR) for construction of surface facilities of INO. People who are not familiar with the working of atomic science in India might be wondering how and when the mathematicians who write their equations on coffee house tables using only chalk or pencil, generate radioactive waste? Our question has been answered by an insider: “All fundamental physics institutes in India (including TIFR, IMSc, HRI etc.) are funded through the DAE. This is for historical reasons: Homi Bhabha started the Indian atomic energy programme, and also started TIFR and wanted to maintain control over both institutions. *This is a serious issue in Indian science, and fundamental physics and mathematics* (including the National Board of Higher Mathematics) should be decoupled from the DAE, and this is indeed a question that must be taken up”.

### Criterion for Geological Repositories

The high level radioactive waste from nuclear power plants will remain hazardous for thousands of years. In the words of Buscheck and colleagues from the Lawrence Livermore National Laboratory, “a key criterion is for essentially complete containment of nuclear waste for 300 to 1,000 years after permanent closure of the repository. Following that containment period, the release per year of any radionuclide (specific nuclear species) from the system cannot exceed 1 part in 100,000 of the radionuclide

inventory present 1,000 years following closure. This rate cannot be exceeded for at least 10,000 years. Such rigid expectations for a (hu)manmade system are unprecedented in history. For perspective, 10,000 years is the interval since the end of the last Ice Age, and the great pyramid of Cheops is less than half as old as that."<sup>10</sup>

RK Bajpai from the Bhabha Atomic Research Centre (BARC) in an article published in the Journal of Geological Society of India (Can Geologists Ensure Isolation of Radioactive Wastes in Deep Rock Formations over Thousands of Years? ) notes that the geological domains suitable for a DGR are expected to lie in low seismicity prone area, with minimum forest cover, agriculture, groundwater, surface water, mineral wealth as well as absence of structural pathways like fault, shear, dykes etc.<sup>11</sup> The proposed site lies in a sheer zone, has high population density and is part of the fragile Western Ghats, a UNESCO heritage site.

### Conclusion

DAE may have successfully removed all the files relating to DGR at TNSEIAA and IMSc. But the signatures of that virus still lingers in their body fluids and this may haunt them for a while. The people of Tamil Nadu and Kerala, who are the stakeholders of the water in the reservoirs and aquifers of Idukki-Theni are concerned about the possibility of radioactive contamination. They expect the governments of Tamil Nadu and Kerala to wake up and get independent scientific opinion on the project. There is nothing special about the proposed site for neutrino observation. The laboratory can be set up in any abandoned mine with an overburden of about 1000 meters.

- <sup>1</sup> Padmanabhan, V. T., and Joseph Makkolil. "Mountain tunnelling, aquifer and tectonics—a case study of Gran Sasso and its implications for the India-based Neutrino Observatory." CURRENT SCIENCE 104.4 (2013): 414.  
<http://www.currentscience.ac.in/Volumes/104/04/0414.pdf>
- <sup>2</sup> [https://www.academia.edu/7015822/Indias\\_Deep\\_Geological\\_Repository\\_for\\_Radioactive\\_Wastes\\_DGRRWComing\\_up\\_in\\_Idukki\\_Theni\\_portion\\_of\\_the\\_Western\\_Ghats](https://www.academia.edu/7015822/Indias_Deep_Geological_Repository_for_Radioactive_Wastes_DGRRWComing_up_in_Idukki_Theni_portion_of_the_Western_Ghats)
- <sup>3</sup> <http://www.cseindia.org/sites/default/files/schedule.pdf>
- <sup>4</sup> P Ajith on email dated 01 June 2014
- <sup>5</sup> <http://www.seiaa.tn.gov.in/seiaa/index.php/about-seiaa> accessed on 26 March 2014
- <sup>6</sup> Agenda and Minutes of the 32<sup>nd</sup> meeting of the SEIAA held on 28.04 .2010.  
[http://www.seiaa.tn.gov.in/seiaa/SEIAA\\_Admin/author/File%20uploads/meeting%20files/SEIAA/pdf/138261594332-Meeting.pdf](http://www.seiaa.tn.gov.in/seiaa/SEIAA_Admin/author/File%20uploads/meeting%20files/SEIAA/pdf/138261594332-Meeting.pdf)
- <sup>7</sup> Agenda No.:57-01-02 F.No.336/2010 Minutes Regarding The Proposal For Construction Of India-Based Neutrino Observatory (INO) Project At Bodi West Hills, Pottipuram Village, Theni District By M/S. Institute Of Mathematical Sciences, Chennai. [http://www.seiaa.tn.gov.in/seiaa/SEIAA\\_Admin/author/File%20uploads/SEAC/Minutes/pdf/140358983557-Minutes.pdf](http://www.seiaa.tn.gov.in/seiaa/SEIAA_Admin/author/File%20uploads/SEAC/Minutes/pdf/140358983557-Minutes.pdf)
- <sup>8</sup> India-Based Neutrino Observatory (INO) PRESS RELEASE , Mar 28, 2014 .  
<http://www.ino.tifr.res.in/ino/pressreldocs/INO-PressRelease-28March2014.pdf>
- <sup>9</sup> INO Press Release, Jun 20th 2014, updated Jul 1, 2014.  
<http://www.ino.tifr.res.in/ino/pressreldocs/pressrel-18062014.html>
- <sup>10</sup> Thomas Buscheck, et al., Localized Dry-Out: An Approach for Managing the Thermal–Hydrological Effects of Decay Heat at Yucca Mountain, Lawrence Livermore National Laboratory, Livermore, CA, UCRL-JC-121332 (1995)  
[https://www.llnl.gov/str/pdfs/03\\_96.1.pdf](https://www.llnl.gov/str/pdfs/03_96.1.pdf)
- <sup>11</sup> RK BAJPAI, 2013 Can Geologists Ensure Isolation of Radioactive Wastes in Deep Rock Formations over Thousands of Years? JOURNAL GEOLOGICAL SOCIETY OF INDIA Vol.81, May 2013, pp.600-604 Repository Engineering Section, Technology Development Division, Nuclear Recycle Group, Bhabha Atomic Research Centre, Mumbai  
<http://www.geosocindia.com/abstracts/2013/may/p600-604.pdf>

Note: All web references, except endnote No 5, were accessed on 14 Jan 15.