Drilling of 800m bore well with scientific data logging

NIT Durgapur has taken a programme to drill deep boreholes of 800 m at Tantloi and Bakreswar geothermal area to obtain scientific data for exploration of geothermal power and helium in large scale. Details of the programme are given below. Drilling agencies who are interested in the said job are requested to send the completed and filled up application form (hard copy). Applications complete in all respect should be sent to the Project Manager on or before November 5, 2014, 5.00 PM through post.). In addition a soft copy of the same should be sent to the following email.

Dr. Hirok Chaudhuri
Assistant Professor, Physics Department, NIT Durgapur &
Project Manager, Helium and Geothermal Project, NIT Durgapur
Email: chaudhuri_hirok@yahoo.co.in, / hirok.chaudhuri@phy.nitdgp.ac.in

Application form

[Point no. 2C, 2D, 3, 5, 6 & 7 must be filled by the agency / company]

1. Location of Borehole : Tantloi hot spring site (23°02′32″ N; 87°20′12″ E) (near Tantloi Village, Dumka district, Jharkhand)

2. Specification of the bore-hole :

2A. Depth of the borehole **:** 800 m (~ 2664ft)

2B. Diameter of borehole **:** 12 inches (Provide the details along with budgetary aspect if the bore-hole diameter will be 24 inches)

2C. Type of Casing for borehole **:**
(To be filled by the agency/company)

2D. Type of Valve assembly at bore-hole head **:**
(To be filled by the agency/company)

3. Measurements & data acquisition : Geochemical and geophysical parameter to be measured/ data logging at each 10 m of the 800 m deep borehole at the time of drilling for R & D activities :

(To be filled by the agency/company – Please tick the points given below that could be performed by the agency)

(A) Gas sampling for analysis of stable gas concentration and helium isotope and radon ~ Proper sampling of gases for analysis of concentration of terrestrial gases such as hydrogen, helium, argon, oxygen, nitrogen, methane, carbon di-oxide and isotope analysis of $^{3}He/^{4}He$ and radon at depth

(separate sampling should be taken at different depth with increasing depth of 10m; **total 240 samples ~** (i) 80 samples for stable gas analysis, (ii) 80 samples for isotope analysis and (iii) 80 samples for radon analysis; tedler bags and glass sampling bottles will be provided)

(B) Gas discharge logging ~ Mainly helium and argon discharge ~ Discharge rate of hydrothermal gases from the bore well head
(separate data set should be taken at well head for increasing depth of 10m; **total 80 datapoints**)

(C) Gaseous Helium and argon yield logging ~ Amount of total volume of gaseous helium and argon from the bore well head
(separate data set should be taken at well head for increasing depth of 10m; **total 80 datasets**)

(D) Water sampling to measure the concentration of water dissolved helium, argon, radon and Na, K, Fe, Mg, etc. and helium isotope analysis ~ Proper sampling of hydrothermal water for analysis of concentration of water dissolved terrestrial gases such as hydrogen, helium, argon, oxygen, nitrogen, methane, carbon di-oxide and isotope analysis of $^{3}He/^{4}He$ and radon along with Na, K, Fe, Mg, etc. at depth
(separate sampling should be taken at different depth with increasing depth of 10m; **total 320 samples ~** (i) 80 samples for stable gas analysis, (ii) 80 samples for isotope analysis and (iii) 80 samples for radon analysis; (iv) 80 samples for analysis of Na, K, Fe, Mg, etc. glass sampling bottles will be provided)

(E) Water discharge logging ~ Discharge rate of hydrothermal water from the bore well head
(separate data set should be taken at well head for increasing depth of 10m, **total 80 datapoints**)

(F) Water dissolved gas logging ~ Amount of total volume of helium and argon dissolved in hydrothermal water from the bore well head
(separate data set should be taken at well head for increasing depth of 10m, **total 80 datasets**)

(G) Temperature gradient logging ~ temperature of the fluid at depth
(separate data set should be taken at different depth with increasing depth of 10m, **total 80 datasets**)

(H) Bed rock conductivity logging ~ conductivity of the rock at depth
(separate data set should be taken at different depth with increasing depth of 10m, **total 80 datasets**)

(I) Pressure gradient logging ~ pressure of the fluid at depth
(separate data set should be taken at different depth with increasing depth of 10m, **total 80 datapoints**)

(J) Water quality logging ~ water quality (fluid temperature, conductivity, pH, dissolved oxygen, dissolved helium, dissolved argon, REDOX, TDS etc.)
(separate data set should be taken at different depth with increasing depth of 10m, **total 80 datasets**)

(K) Sonic logging
(separate data set should be taken at different depth with increasing depth of 10m, **total 80 datasets**)

(L) Natural gamma ray spectra logging
(separate data set should be taken at different depth with increasing depth of 10m, **total 80 datasets**)

4. Necessary geological, geochemical and geophysical information required for the drilling of bore-hole

4A. Purpose of the bore-hole :

Extraction of hydrothermal gas & hot water to recover helium (~ 2.0 vol. % in surface manifestation of hot spring) in large scale and to develop a prototype Helium Purification Plant and a Geothermal Power Plant using the hydrothermal fluid. Different geochemical and geophysical parameters will also be monitored in the deep bore hole using different equipments and logging for associated R & D activities.

4B. Geological setting of the area along with Geophysical & Geochemical backdrop :

Geologically the area belongs to Singhbhum Shear Zone dominated by the Chotonagpur Granites and Gondwana Sedimentary formations. The area is located at the eastern end of the Son- Narmada-Tapi mid continental rift (SONATA) near Rajmahal Trap. The area is a part of the eastern Indian Shield and western Bengal Basin. The major

geological formations are **(1)** Quaternary sediments, **(2)** Laterite and bauxite, **(3)** Tertiary sediments, **(4)** Mesozoic sediments, **(5)** Metamorphics of Singhbhum, **(6)** Singhbhum Granite Gneiss, **(7)** Chotanagpur Gneiss complex, **(8)** Singhbhum Granite, **(9)** Chotanagpur Gneisses complex of east India, **(10)** Rajmahal Trap, **(11)** Dalma, Dhanjori and Simlipal volcanics, and **(12)** Gabbro and anorthosites. S4ONATA Rift boundary lies southerly showing EW trend. A number of deep seated faults, folds and minor lineaments are present in the area. The area comprises with high Helium content (0.54 to 2.10 vol. % in) and high radon 222 and moderate CO_2 concentration in hot spring gas and soil gases.

5. Time requirement for the drilling, logging and analysis of data with final report (in days)
(To be filled by the agency/ company; additional sheet may be attached if require)

5A. Time requirement for the drilling :
5B. Time requirement for the data logging :
5C. Time requirement for the data analysis and report generation :

[At the end of the project a final & detail report with proper analysis of the required geochemical & geophysical data sets along with graphical representation (as mentioned at section no. 3) must be provided by the agency]

5D. Total time requirement (in days) :
(in tabulated format clearly mentioning 5A, 5B and 5C

6. **Budgetary Aspect (in INR) :**
(To be filled by the agency/ company; additional sheet may be attached if require)

6A. **Cost for drilling** (Provide total cost along with the cost for per meter drilling and clearly mentioning associated expenditure if any, following the point 2A & 2B) (clearly mention the method of drilling with type of Rigs) :

6B. Cost for casing and valve assembly (Provide total cost along with the cost for per meter casing and clearly mentioning the associated expenditure if any, following the point 2C & 2D) **:**

6C. Cost for scientific data logging and data analysis and report generation (Provide total cost along with the cost for measurements for individual parameters in per meter basis and clearly mentioning the associated expenditure if any, following the point 3**) :**

Total Cost :

5. Details of the company/agency profile :
(To be filled by the agency/company)

Name of the Company/Agency with official address,	**Contact details**	**Remarks** (along with the details about the expertise with supporting documents~ photocopies) and brief company profile and Covering Letter
	Postal Address: Land Phone: Fax: Mobile Ph.: E-mail: Website: Name of the contact person with cell phone no and email :	

Name :
Date :
Place :

Signature with official seal