

**MINISTRY OF ENVIRONMENT & FOREST REGIONAL OFFICE**  
**MONITORING REPORT**  
**OF**  
**PARE HYDRO ELECTRIC PROJECT (110 MW), ARUNACHAL PRADESH**

**PART-I**

**DATA – SHEET**

| <b>NAME OF PROJECT</b> |   | <b>PARE H E PROJECT (110 MW)</b>   |
|------------------------|---|--|
| 1.                     | Project Type: River-Valley/Mining/<br>Industry/Thermal/Nuclear/Other (Specify)                    | River Valley   |
| 2.                     | Name of the Project   | Pare H.E. Project.   |
| 3.                     | Clearance letter (s) OM No. and Date  | No. J-12011/12/2006-IA-1, Dated 13/9/06<br>No. J-12011/12/2006-IA-1, Dated 19/9/06   |
| 4.                     | Locations:  |  |
|                        | a) District(s)  | Papum Pare.  |
|                        | b) State (s)  | Arunachal Pradesh.   |
|                        | c) Latitudes/Longitudes   | Dam site: Lat (N) 27 <sup>0</sup> 14'13''<br>Long (E) 93 <sup>0</sup> 48'56''  |
|                        |   | PH site: Lat (N) 27 <sup>0</sup> 12'46''<br>Long (E) 93 <sup>0</sup> 48'30''   |
| 5.                     | Address of Correspondence:  |  |
|                        | a) Address of Concerned Project Chief Engg.<br>(With Pin Code & Telephone/Telex/Fax Nos.)         | Head of Project, Pare H.E. Project, NEEPCO<br>Ltd, Doimukh Arunachal Pradesh - 791112<br>Phone No 0360-2278252<br>Fax 0360-2278253 |
|                        | b) Address of Executive Project<br>Engineer/Manager (With Pin Code &<br>Telephone/Telex/fax Nos.) | ----Do-----  |
| 6                      | Salient Features:   |  |
|                        | a) Of the Project   | Refer ANNEXURE-I   |
|                        | b) Of the Environmental Management Plans  | <a href="#">EIA/EMP Report Already Submitted.</a>  |
| 7                      | Breakup of the Project Area (Forest &<br>Non-Forest):   |  |
|                        | a) Submergence area<br>(Forest & Non-Forest)  | 111.6 Hac. at FRL.   |
|                        | b) Others   | 86.88 Hac.   |

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| 8                      | Breakup of the Project affected population with enumeration of those losing houses/dwelling units only, agricultural land only, both dwelling units and agricultural land and land less labours/artisans: |  |
|                        | Both land and house   | 3 Nos.   |
|                        | Only Home   | 35 Nos.  |
|                        | Only Land   | 233 Nos.   |
|                        | Other immovable Properties  | 6 Nos.   |
|                        | Total   | 277 Nos.   |
|                        | a) SC, ST/Adivasis  | 277 PAFS   |
|                        | b) Others   | Nil  |
| 9                      | <u>Financial Details</u>  |  |
|                        | a) Project cost as originally planned and subsequent revised estimates and the years of price reference   | Rs. 573.99 Crore at June'07 PL including IDC & FC as per CCEA Clearance.   |
|                        | b) Allocation made for Environmental Management Plans, with item-wise and years – wise breakup  | Total expenditure under head X- Environment and Ecology proposed in the Estimate as Rs.20.92 Crore                   |
|                        | c) Benefit cost ratio/internal rate of return and the year of assessment  | -----  |
|                        | (c) Whether (C) includes the cost of Environmental management as shown in (b) above.  | Yes  |
|                        | (e) Actual expenditure incurred on the Project so far.  | CCEA Clearance accorded on 06.11.2008. Major Works yet to start. Actual expenditure will be intimated in due course. |
|                        | (f) Actual expenditure incurred on the Environmental Management plans so far  | - Do -   |
| 10                     | Forest land Requirement:  |  |
|                        | a) The status of approval for a diversion of forest land for non- forestry use  | Under Process.   |
|                        | b) The status of compensatory afforestation, if any   | Under Process.   |
|                        | c) The status of clear felling  | Package Works viz. Dam, Tunnel, Power House etc. yet to be started.  |
|                        | d) Comments on the viability & sustainability of compensatory afforestation programme in the light of actual field experience so far.   | Compensatory Afforestation is viable as per field experienced in the Catchment Area.                                 |

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| 11                     | The status of clear felling in non-forest areas (such as submergence area of reservoir, approach roads), if any, with quantative information. | Reservoir works yet to be started.   |
| 12.                    | Status of Construction:   |                                      |
|                        | a) Date of commencement (actual and/or planned)   | Last quarter of 2008.                |
|                        | b) Date of completion (actual and /or planned)  | First quarter of 2012.               |
| 13                     | Reasons for the delay if the project is yet to start.   | CCEA Clearance accorded on 06-11-08. |
| 14                     | Date of Site Visits:  |                                      |
|                        | a) The dates on which the project was monitored by the regional office on previous occasions, if any  | 25th March, 2009.                    |
|                        | b) Date of site visit for this monitoring report  | -----                                |
| 15.                    | Details of correspondence with Project authorities for obtaining action plans, information & status of compliance to safeguards               | -----                                |

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**PART-II**

**Part-A Specific condition**

| <b>Sl. No.</b> | <b>Stipulations</b>   | <b>Action taken</b>   | <b>Status of compliance</b> |
|----------------|---|---|-----------------------------|
| i)             | Logerstroemia minuticarpa is a rare and endangered species in the area. Measure for conservation and propagation of the same as proposed in the EMP (Section 6.6) should be followed in toto  | Action will be taken in due course.   |                             |
| ii)            | Catchments Area Treatment Plan as has been proposed should be completed in five years   | Action Plan being initiated.  |                             |
| iii)           | Clearance from National Committee of Seismic Design Parameters (NCSDP) of CWC should be obtained.   | Proposal submitted to the Authority . Clearance awaited.  |                             |
| iv)            | Malaria is major water borne disease in the area. Though the flow of the river is very fast, but due to unforeseen situation the flow of the river may slow down at certain points due to construction activities. Occurrence of stagnant pools/slow moving water channels during construction and operation of the project providing breeding source for mosquito and other parasites. The river should be properly channelised so that no small pools poodles are allowed to be formed. Even after taking precaution, due to unforeseen situations, breeding of mosquito and resulting malaria or mosquito borne diseases can increase. If such situation arises, it will be the responsibility of the project authorities to take all corrective steps i.e residual insecticidal spray in all the project impact area and surrounding 3km area, keeping the flight range of mosquitoes in consideration. | Residential Spraying of D.D.T at Doimukh Colony, Sopo and Jampa village done in last monsoon. Site areas will be covered in coming monsoon. |                             |

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| <b>Sl. No.</b> | <b>Stipulations</b>   | <b>Action taken</b>                   | <b>Status of compliance</b> |
|----------------|---|---------------------------------------|-----------------------------|
| v)             | 277 families (all are tribal) from three villages would be affected. Out of that only three families are likely to loose both land and houses and others are loosing either only land or houses. Affected families should be rehabilitated and resettled in consultation with state government. | Action will be taken as per R&R plan. |                             |
| vi)            | A monitoring committee should be constituted which must include representatives of project affected persons from SC/ST category and a woman beneficiary.  | Is under process.                     |                             |
| vii)           | All the assurances/commitments given by the project authority in the public hearing must be honored in letter and spirit.   | Action being done.                    |                             |
| viii)          | Forest clearance should be obtained for acquiring forest land & submitted.  | Action being taken                    |                             |
| ix)            | During the lean season 10.52 cumecs water flow is available in the river. 10% of the available water should be released down stream of the dam for sustenance of aquatic life.  | Action will be taken in due course.   |                             |
| x)             | Any other clearance from any other organization if required should be obtained.   | Is under process.                     |                             |

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**Part-B General conditions**

| <b>Sl. No.</b> | <b>Stipulations</b>  | <b>Action taken</b>   | <b>Status of compliance</b> |
|----------------|--|---|-----------------------------|
| i)             | Adequate free fuel arrangement should made for the labour force engaged in the construction work at project cost so that indiscriminate felling of trees is prevented.   | Major works yet to be started . Action will be taken in due course. |                             |
| ii)            | Fuel depot may be opened at the site to provide the fuel (kerosene/LPG). Medical facilities as well as recreational facilities should also be provided to the labourers.   | --Do--  |                             |
| iii)           | All the labourers to be engaged for construction works should be thoroughly examined by health personnel and adequately treated before issuing them work permit.   | --Do--  |                             |
| iv)            | Restoration of construction area including dumping site of excavated materials should be ensured by leveling, filling up of burrow pits, landscaping etc. The area should be properly treated with suitable plantation.                    | --Do--  |                             |
| v)             | Financial provision should be made in the total budget of the project for implementation of the above suggested safeguard measures.  | --Do--  |                             |
| vi)            | A multi disciplinary committee should be constituted with representatives from various disciplines of forestry, ecology, wildlife,soil conservation, NGO etc. to oversee the effective implementation of the suggested safeguard measures. | Constitution of committee member is under process.                  |                             |
| vii)           | Six monthly monitoring reports should be submitted to the ministry and its regional office, Shillong, for review.  | Six monthly report is submitted.                                    |                             |

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**ANNEXURE-I**

**SALIENT FEATURES**

| NAME OF PROJECT |                            | PARE H E PROJECT (110 MW)   |                          |
|-----------------|----------------------------|---|--------------------------|
| <b>1</b>        | <b>Location</b>            |   |                          |
|                 | State                      | Arunachal Pradesh   |                          |
|                 | District                   | Papum Pare  |                          |
|                 | Village                    |   |                          |
|                 | Powerhouse                 | Sopo  |                          |
|                 | Dam Site                   | Jampa   |                          |
|                 | Access                     |   |                          |
|                 | Airport                    | North Lakhimpur, - around 55 km   |                          |
|                 | Rail Head                  | North Lakhimpur (MG) - around 55 km   |                          |
|                 | Road Head                  | Doimukh – 14 km   |                          |
|                 | Geographical co-ordinates  |   |                          |
|                 |                            | Dam Site  | Power House              |
|                 | Latitude (N)               | 27 <sup>0</sup> 14' 13''  | 27 <sup>0</sup> 12' 46'' |
|                 | Longitude (E)              | 93 <sup>0</sup> 48' 56''  | 93 <sup>0</sup> 48' 30'' |
|                 | Elevation (msl)            |   |                          |
|                 | Map reference              | Survey of India topo-sheets:<br>83E/3, 83E/4, 83E/7, 83E/8, 83E/11, 83E/12,<br>83E/15, 83E/16 |                          |
| <b>2</b>        | <b>Meteorology</b>         |   |                          |
|                 | Average Rainfall           | 3800 mm   |                          |
|                 | Atmospheric Temperature    |   |                          |
|                 | Average Maximum Temp.      | 31.8 <sup>0</sup> C   |                          |
|                 | Average Minimum Temp.      | 16.1 <sup>0</sup> C   |                          |
| <b>3</b>        | <b>Hydrology at Intake</b> |   |                          |
|                 | Catchment Area             | 824 sq. km of Dikrong river at Proposed Pare HEP Dam site                                     |                          |
|                 | Flood flow (PMF)           | 5000 cumec  |                          |

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|           |                                 |  |
|-----------|---------------------------------|--|
| <b>4</b>  | <b>Reservoir</b>                |  |
|           | Maximum Water Level             | 246.215 MSL  |
|           | Full Reservoir Level            | 245.15 MSL   |
|           | Minimum Drawdown Level          | 240.00 MSL   |
|           | Water Spread at FRL             | 111.6 Hectare  |
|           | Gross Storage area at FRL       | 19.425 MCM   |
| <b>5</b>  | <b>Dam</b>                      |  |
|           | Type of Dam                     | Concrete Gravity Dam   |
|           | Length of Dam                   | 142.2 m  |
|           | Overflow                        | 49.2 m   |
|           | Non-overflow                    | 93 m   |
|           | Width at the Top of Dam         | 6 m  |
|           | Top Elevation of Dam            | 248.00 m   |
|           | Deepest Foundation Level of Dam | 170.00 m   |
|           | River Bed Level (average)       | 200 MSL  |
|           | Upstream Slope                  | 0.1:1 from El 235 for NOF Blocks<br>0.4:1 from 211.408 for OF Blocks |
|           | Downstream Slope                | 0.8:1 from El 240.50   |
| <b>6</b>  | <b>Spillway</b>                 |  |
|           | Capacity                        | 5000 Cumec (PMF)   |
|           | No. of Gates                    | 3  |
|           | Size of Gates                   | 10.4m(W) X 12 m(H)   |
|           | Crest Level                     | 216 m  |
|           | Height of breast wall.          | 20 m   |
| <b>7a</b> | <b>Headrace Tunnel</b>          |  |
|           | Diameter                        | 7.5 m  |
|           | Length                          | 2810.75 m  |
|           | Design flow                     | 185 cumec  |
|           | Size & Shape                    | 7.5 m dia Modified horseshoe shaped                                  |

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|           |  |   |
|-----------|--|---|
|           | Invert Level at Intake                   | El. 225.25 m  |
|           | Invert Level at Surge Shaft              | El. 206.0 m   |
|           | Adit Details                             | One intermediate adit of 6 m dia, 125 m long at RD 778.20 and another at just downstream of Surge Shaft |
| <b>7b</b> | <b>Diversion Tunnel</b>                  |   |
|           | Size & Shape                             | 8 m dia horseshoe shaped  |
|           | Length                                   | 270 m   |
|           | Discharge                                | 430 Cumec   |
|           | Invert Level at Tunnel Inlet             | 197 m   |
|           | Invert level at Tunnel outlet            | 196 m   |
| <b>8</b>  | <b>Surge Shaft</b>                       |   |
|           | Type                                     | Restricted Orifice, Non-Overflow  |
|           | Diameter and Height                      | 18 m dia , 58 m Height (from El 215 to 273m)  |
|           | Orifice Diameter                         | 3.0 m   |
| <b>9</b>  | <b>Pressure Shaft</b>                    |   |
|           | Diameter                                 | 6.4 m   |
|           | Length                                   | 220.0 m   |
|           | Bifurcated (penstock) Diameter           | 4.5 m   |
| <b>10</b> | <b>Power House</b>                       |   |
|           | Type                                     | Surface   |
|           | Design Head                              | 67.36 m (net)   |
|           | Size of Power House                      | 68m long, 23m wide  |
|           | Type of Turbine                          | Vertical Francis  |
|           | Installed Capacity                       | 110 MW  |
|           | Turbine Floor Level                      | El. 169.50m   |
|           | Upper Generator Floor Level              | El. 178.00 m  |
|           | Lower Generator Floor Level              | El 173 m  |
|           | Service Bay Level                        | El. 181.65 m  |
|           | Tail Water Level (with one unit running) | El. 168.95 m  |

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|           |   |  |
|-----------|---|--|
|           | Tail Water Level (at Full Load)                             | El. 169.82 m   |
| <b>11</b> | <b>Tailrace Channel</b>                                     |  |
|           | Details   | Open Channel 60.62 m wide, 49 m long   |
| <b>12</b> | <b>Electro-mechanical</b>                                   |  |
|           | Turbine   |  |
|           | No. and Type  | 2 nos. Vertical Francis, rated at 55 MW                                      |
|           | Speed   | 187.5 rpm  |
|           | Inlet Valve   | Butterfly type with lattice structure (diameter 4.5 meters)                  |
|           | Generator   |  |
|           | Out put   | 55 MW rated output plus 10 % continuous overload                             |
|           | Power factor  | 0.9 lagging  |
|           | Speed   | 187.5 rpm  |
|           | Voltage   | 11 kV  |
| <b>13</b> | <b>Power</b>  |  |
|           | Design discharge  | 185 cumec  |
|           | Rated net head at Design Discharge                          | 67.36 m  |
|           | Installed Capacity  | 2 X 55 MW = 110 MW   |
|           | Annual generation in 90% Dep Year                           | 512.74 MU  |
|           | Annual generation in 90% Dep Year at 95% Plant availability | 506.42 MU  |
|           | Annual saleable energy                                      | 441.2 Mu   |
| <b>14</b> | <b>Costs</b>  |  |
|           | Project Cost  | Rs. 573.99 Cr. at June' 07 PL<br>(including IDC & FC) as per CCEA Clearance. |
|           | Cost per MW   | Rs. 5.22 Cr.   |
| <b>15</b> | <b>Generation Cost and Tariff</b>                           |  |
|           | Tariff in First year with 14% Return on Equity              | Rs. 2.38/ KWH  |
|           | Levellised Tariff   | Rs. 2.01/ KWH  |