

APPENDIX I

Ethical clearance

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Brief report of the clinical studies carried out by the Project team NEIST –Jorhat CSIR as a part of the ongoing Network project-NWP-0017 and the outcome of the studies

Title of the Project: Environmental contaminants: New screening technologies and effect on Human health

Nodal Laboratory: Indian Institute of Toxicology Research (formerly ITRC), Lucknow

Participating Laboratories: Central Institute of Mining & Fuel Research (CIMFR), Dhanbad; Central Food Technological Research Institute (CFTRI), Mysore; Institute of Genomics & Integrative Biology (IGIB), New Delhi; National Botanical Research Institute (NBRI), Lucknow; National Physical Laboratory (NPL), New Delhi; and North East Institute of Science & Technology (NEIST), Jorhat

Duration: Five Years (2007-2012)

Nature of the Project: It is a network project under the title "Environmental Contaminants: New Screening Technologies and Effect on Human Health" under CSIR, coordinated by Industrial Toxicology Research Centre (ITRC), Lucknow. There are six CSIR laboratories including NEIST, as the participating laboratory for the project. These laboratories are NEIST, Jorhat; IGIB, New Delhi; NPL, New Delhi; CIMFR, Dhanbad; CFTRI, Mysore; and NBRI, Lucknow.

Objectives:

- 1) To survey and monitor the polluted environments to study the impact of pollution and other toxic chemicals on the human populations.
- 2) Analysis of health hazard components, trace heavy metals, toxic volatile components from air, water (ground and surface water), soil, vegetables and fruits etc of oil belt region, oil drilling sites, from the vicinity of paper and pulp factory and coal mine areas.
- 3) The symptoms developed if any, will also be surveyed by screening and clinical examination from all these belts/locations. Pathological, clinical and biochemical analysis of blood, and other specific tests with urine and gastric samples collected from the human population from the different locations around the polluted areas. Biochemical assays and molecular studies/aspects of vital organs (i.e., liver, heart, lungs, kidneys and thyroid) functional tests with the help of selective enzymes assays as markers will be studied.

Aim of the Project: The aim of the project is to "assess the impact of polluted environment on Human Health with special reference to population in the vicinity of oil refineries, paper and pulp factories, colliery (coal mine sites) oil fields and oil drilling sites.

Health Check Up and other analysis:

1) Survey at the Sites

Detailed health surveys were carried out in all the three sites oil drilling sites, Borholla, open cast coal mine sites, Ledo and paper and pulp factories, Jagiroad by detailed interaction with the local people; with special concern on health related problems, daily habits, occupation etc. More than 3500 people were interacted during the survey in all the sites.

Among the villagers surveyed near the drilling site, 26% are found to be diseased as compared to 11% in control area. The most predominant disease reported from Borholla is body and joint pain


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suffered by 22% of the total diseased population. In the coal mine site, 35 % people were found to be diseased mainly related to respiratory disorders (29%) which include cough and sputum, chest pain, asthma, blood in sputum and T.B and 25% of the diseased population were found to be suffering from gastrointestinal problem. Whereas in the paper mill site, most of the people were found to be suffering from stomach problem (25%) and joint and body pain. A large no. of people was found to be suffering from neurological problem also.

2) Details about the health camps:

The project team of NEIST, Jorhat organized a health camp at Gorajan Tea Estate situated near the oil drilling site in Borholla with the help of the local Primary Health Centre. About 450 persons attended the camp. In Ledo the health camp was organised at Sarbajanin Prathamik Vidyalaya, Tirap, Ledo. The health camp was attended by 550 villagers residing near the coal mining sites. Health camp in Jagiroad was organised at Bangphor Lower Primary School and was attended by about 500 numbers of persons. The villagers attending the health camp were examined by the doctors. Higher mental function was evaluated, general examination (BMI, Pulse, BP, Nutrition, Pallor, Oedema, Jaundice etc) and Systemic examination: Cardiovascular, Respiratory, GI Systems, CNS, Locomotor etc) were done. Free medicines were provided to them. Blood samples (about 5 cc) were collected from the patients during the Health camp and tested for organ function and mineral analysis. The Lung function tests for the patients were also done with the Spirometer during the health camp.

3) Outcome of the health camp based on the clinical studies:

Health camp held at Borholla

Analysis of the blood samples showed that most of the people have problem in liver functioning and about 68% of the people were found to be anemic. Mineral analysis of the blood samples showed high amount of selenium and manganese. Spirometry results also showed that the villagers staying in the vicinity have poorer lung functioning.

Health camp held at Ledo

The biochemical analysis of blood samples collected during health camp at Ledo, with respect to various organs showed abnormalities in lipid profile (15.5%), followed by liver function (14.4%) and renal function (6.8%). Toxic/ Mineral analysis of the collected blood samples showed that most of the people have high selenium content.

Health camp held at Jagiroad

In Jagiroad health camp, 60 blood samples were collected and various biochemical analysis were carried out. About 64% of the people were found to be anemic and 75% people were having lower total protein and albumin content and 55% people were having high HDL cholesterol. Mineral analysis of blood showed that most of the people have high mercury content. However, in the urine samples lead was found higher in most of the samples.

Outcome of the studies/Remedial measures:

- The health surveys carried out so far are the first kind of observations collected by us in this area.
- Some of the toxic metals detected in the drinking water helped us to provide information to take proper care of using filtered water.


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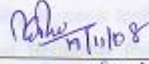
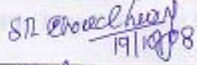

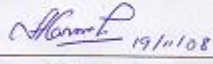


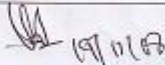
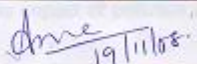
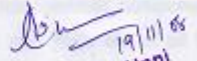
- The biochemical analysis of food/ vegetables analyzed from the polluted site found toxic contaminants and very low level of nutritional parameters, helped us to advise the villagers to use better vegetables instead of using the contaminated vegetables or cultivated by them.
- The health Camp and free checkup also helped the villagers to diagnose diseases at the initial level and provided free medicines.
- The overall studies provided a good impact and awareness in the area of health sector, how to take care of their daily habits and other habits in a better way.
- Some of the findings and their preventive measures can be brought out at the panchayat level/Govt. level to check the level of pollution.
- In conclusion, the studies undertaken by us have given a good impact in the health sector and to facilitate their upliftment of day to day life.

The detail report of the clinical studies carried out by the Project team NEIST as a part of the ongoing Network project-NWP-0017 and the outcome of the studies were presented in detail by Dr. B. G. Unni, the nodal scientist of the project from NEIST- CSIR Jorhat. It was discussed with the Members of IEC and the progress made by the project team was very well appreciated.

Members	Name & Designation	Approved / Signature
Chairman	Dr. Mridul Hazarika, Director, TRA, Jorhat, Assam	
Member (General)	Dr. P. G. Rao, Director, NEIST-Jorhat, Assam	
Member (Medical Scientist/ Pharmacology)	Prof. S. R. Choudhury, Former Head, Deptt. of Pharmacology, AMC, Dibrugarh	
Member (Clinicians)	1. Dr. P. K. Baruah, NEIST, Jorhat 2. Dr. Adinath Sarmah, Tarajan, Jorhat, Assam	
Member (Legal Expert)	Mr. M. C. Khound, Senior Advocate, Jorhat Court, Jorhat, Assam	
Member (Social Scientist)	Prof. Ananta Kr. Baruah, Retd. Vice Principal, Bahona College, Jorhat, Assam	
Member (Philosopher)	Dr. K. Hazarika, Principal, DCB College, Jorhat, Assam	
Member	Dr. P. C. Borah, Principal, C.K.B. Commerce College, Jorhat, Assam	
Member (Epidemiology)	Dr. (Mrs.) Anuja Baruah, MD, Jorhat Medical College, Jorhat, Assam	
Member (Secretary)	Dr. B. G. Unni, Sc.'G' & Area Coordinator (Biotechnology/ Biological Sciences) NEIST, Jorhat, Assam	

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The project proposal is critically discussed and evaluated by us and recommended to take up further studies. The outcome of the project will certainly provide benefit to the society.

Members	Name & Disgnation	Approved/ Signature
Chairman	Dr. Mridul Hazarika, Director, TRA, Jorhat	
Member (General)	Dr. P. G. Rao, Director, NEIST	 17/11/08
Member (Medical Scientist/ Pharmacology)	Prof. S. R. Choudhury, Former Head, Deptt. of Pharmacology, AMC, Dibrugarh	 19/11/08
Member (Clinicians)	1. Dr. P. K. Baruah, NEIST, Jorhat	 19/11/08
	2. Dr. Adinath Sarmah, Tarajan, Jorhat	 19/11/08
Member (Legal Expert)	Mr. M. C. Khound, Advocate, Jorhat Court, Jorhat	
Member (Social Scientist)	Prof. Ananta Kr. Baruah, Retd. Vice Principal, Bahona College, Jorhat	 19/11/08
Member (Philosopher)	Dr. H. K. Hazarika, Principal, DCB College, Jorhat	
Member	Dr. P. C. Borah, Principal, C.K.B. Commerce College, Jorhat	 19/11/08
Member (Epidemology)	Dr. (Mrs.) Anuja Baruah, Medical & Health Officer, 3 rd Assam Police Battalion, Jorhat.	 19/11/08
Member (Secretary)	Dr. B. G. Unni, NEIST, Jorhat	 19/11/08

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APPENDIX II

List of publications/communications

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Publications/communications : (National /International)

(i)**Minakshi Bhattacharjee**, B.G.Unni, S.Das, Manab Deka and S.B.Wann (2011).“Lung Function Decline: A Cohort Study In A Population Exposed To Coal Dust”. IJES 2(2):957-964.

(ii)**Minakshi Bhattacharjee** , B. G. Unni, P. K. Baruah, S. Das, T.Borah , M. Deka and P. G. Rao (2011). “Antioxidant Gene Polymorphism And Coal Dust Exposure: Role In Chronic Obstructive Pulmonary Disease”. JERAD (Under review).

(iii)**Minakshi Bhattacharjee**, B.G.Unni, S.Das, Manab Deka and P.G.Rao (2011). “LungFunction Decline: Screening of Alpha-1-Antitrypsin gene in A Population Exposed To Coal Dust”. IJBMBR (**In Press**)

(iv) **Minakshi Bhattacharjee**, B.G.Unni, S.Das, P.K.Baruah, P.Sharma, D.Gogoi, M.Deka, S.B.Wann and P.G.Rao.“Alpha 1 Antitrypsin Gene: A case-control study in Chronic Obstructive Pulmonary Disease. (2011).” *Afr. J. Biotech* .(**In Press**)

(v)Sangeeta Das, Balagopalan Unni, **Minakshi Bhattacharjee**, Sawlang B. Wann,(2011).”Coal Dust Induced Respiratory Symptoms in an Indian Population: An Associative Study”. *Research Journal of Chemistry and Environment*. (Under Review)

(vi) **Minakshi Bhattacharjee**, Balagopalan Unni , Sangeeta Das, Pranab K. Baruah, Anamika Das Chutia, Sawlang B. Wann, Thaneshwar Borah, Paruchuri G. Rao and Manab Deka;” (2011).Role Of GST Gene Polymorphism And Coal Dust Exposure In Chronic Airflow Obstruction: A Study In An Open-Cast Coal Mine Area”. *Current Science* (Under review)

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(vii) Sangeeta Das, Balagopalan Unni, **Minakshi Bhattacharjee**, Pranab K. Baruah, Thaneshwar Borah, Sawlang B. Wann and Paruchuri G. Rao (2011). Environmental Health Impacts from Exposure to Some Heavy Metals in oil drilling, Open Cast Coal Mining and paper Mill sites in Assam. *Wageningen Journal of Life Sciences* (Under Review)

(viii) **Minakshi Bhattacharjee**, B.G.Unni, S.Das, M.Deka and P.G.Rao (2011). “Smoking And GST Gene Polymorphism : Synergistic Role In COPD”, *Scottish Medical Journal*. (Under review).

Abstracts: (National/International)

(i) S.B.Wann, B. G. Unni, A. Das Chutia, P.K. Baruah, Sangeeta Das, **M.Bhattacharjee**, G. Rajkhowa, M.Goswami, and P. G. Rao (2008). “ *A case study of environmental contamination in Oil Drilling Sites of Borholla (Assam)*”; In proceedings of International Congress on Recent Trends in Environmental Impact Assessment NEERI, Nagpur,(pp-16) November 23-25.

(ii) B.G Unni, H.R Singh, S.B Wann, **M. Bhattacharjee**, B. Devi, Sangeeta Das, G.Rajkhowa,A Das Chutia and M Goswami (2008). “*Detection of Polymorphic Patterns of Genomic DNA Amplified by PCR-based RAPD primers in Non Mulberry Silkworms, Antheraea assama and Samia Cynthia ricini*. in proceedings 77th Society of Biological Chemists Conference at Indian Institute of Technology , Madras, December 18-20.

(iii) B. G. Unni, A. Das Chutia, P. K. Baruah, Sangeeta Das, **M. Bhattacharjee**, M.Das, S. B. Wann, N.C. Dey, T. Borah and P. G. Rao. (2009).“*Impact of Pollution On Environment And Health: A Case Study*”. In proceedings International Conference on Emerging Technologies in

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Environmental Science and Engineering, Aligarh Muslim University, Aligarh, (pp-131).26-28thOctober.

(iv) B.G.Unni ,**Minakshi Bhattacharjee** ,Anamika Das Chutia, Sangeeta Das,Gitashree Rajkhowa, Momi Das,S.B.Wann,N.C.Dey,P.K.Baruah and P.G.Rao (2010). “Environmental Health Implications of pollutants From Oil Drilling Sites: An Epidemiological and Biochemical Studies”. In proceedings 4th International Congress of Chemistry and Environment, Thailand,(pp55) January 21-23.

(v) B. G. Unni, **M. Bhattacharjee**, S. Das , A. Das Chutia, P. K. Baruah,T. Borah, Momi Das, S. B. Wann, O. P.Sahu and P. G. Rao (2010). Hazards of Heavy Metal Exposure on Human Health. Abstract at International Conference on Environment, Energy and Development PG Department of Environmental Sciences (Autonomous) Sambalpur University, Jyoti Vihar 768 019, Orissa (India) (pp-94). December 10-12.

(vi)Sangeeta Das, **M. Bhattacharjee**, B. G. Unni, A. Das Chutia, P. K. Baruah, S. B. Wann, and P. G. Rao (2010).“Acute Effects of arsenic exposure on Hematological and Biochemical profiles in *Channa punctatus*”.In proceedings of 79th SBC (I) Annual Meeting Organised by J N Tata Auditorium , IISc. Campus, Bangalore, (pp-105) December 13-15.

(vii)B. G. Unni, **M. Bhattacharjee**, A. Das Chutia, P. K. Baruah, Sangeeta Das, S. B. Wann, T. Borah, and P. G. Rao (2010). “Chronic Obstructive Pulmonary Disease: Gene-Environment Interaction?: A sensitive issue in coalminers. Abstract at International Conference on Applied Biology, Sudan, October 25-27.)

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(viii) B. G. Unni, **M. Bhattacharjee**, A. Das Chutia, P. K. Baruah, T. Borah, Sangeeta Das, Momi Das, S. B. Wann, G. Rajkhowa, O. P. Sahu and P. G. Rao (2010). “Anthropogenic Emissions: Environmental Exposure and Impact on Human Health”. Abstract at 3rd International Congress of Environmental research, University of Mauritius, Reduit, Mauritius september 16-18.

(ix) B. G. Unni, **Minakshi Bhattacharjee**, Sangeeta Das, Anamika Das Chutia, P. K. Baruah, T. Borah, S.B. Wann, P. G. Rao (2011). “Associative study of GST gene polymorphism and lung function decline in coal miners”. In proceedings of 98th Session of the Indian Science Congress at SRM University, (pp9) Chennai January 3-7.

(x) B. G. Unni, **M. Bhattacharjee**, P. K. Baruah, Sangeeta Das, A. Das , P. G. Rao and S. B. Wann (2011). “Alpha-1-Antitrypsin Deficiency: role in Chronic Obstructive Pulmonary Disease”. Abstract at PepCon (pp168) at Beijing, China March 18th to 21st .

(xi) **Minakshi Bhattacharjee** , B. G. Unni, P. K. Baruah, Sangeeta Das, T. Borah and P. G. Rao (2011). “Polymorphism of Glutathione S-Transferase M1 And T1 Gene Loci In COPD: An Immunogenetic Study”. Proceedings of the World Congress of Biotechnology, 2011 to be held at International Convention Centre, Hyderabad;(pp438), 21st to 23rd March.

(xii) **Minakshi Bhattacharjee** , B. G. Unni, , S. Das, P. K. Baruah, T. Borah , M. Deka and P. G. Rao (2011). “Study of Alpha 1 Antitrypsin gene in Chronic Obstructive Pulmonary Disease. Abstract at International Seminar on Bioresources and human sustenance, Cotton College, in collaboration with Zoological society of Assam,(pp99) October 20th to 22nd .

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(xiii) Sangeeta Das, B. G. Unni, **M. Bhattacharjee**, and P. G. Rao. “Toxicological Effects and Molecular Changes due to Arsenic Toxicity in Freshwater Snakehead *Chana Punctatus*.” (2011).Abstract at International Seminar on Bioresources and human sustenance, Cotton College, in collaboration with Zoological society of Assam,(pp168) October 20th to 22nd .

(xiv) B. G. Unni, Sangeeta Das, **M. Bhattacharjee**, P. K. Baruah, R.Hazarika, O.P.Sahu, S. B. Wann and P.G. Rao (2011).“Impact of Environmental pollution on Human health: Epidemiological and biochemical studies”. Abstract at National conference on interface of science and environment: emerging public health challenges & 13th annual meeting of society of science and environment .(Scienviron-11), Kolkata, (Pp 38-39) November 24th -26th.

(xv)**Minakshi Bhattacharjee** , B. G. Unni, P. K. Baruah, S. Das, T.Borah , M. Deka and P. G. Rao (2011). “Antioxidant Gene Polymorphism And Coal Dust Exposure: Role In Chronic Obstructive Pulmonary Disease”.Abstract at International Congress of Environmental Research ,December 15-17, Surat , Gujarat.

(xvi) S. Das, B. G. Unni, **M. Bhattacharjee**, P.K.Baruah, S.B.Wann and P. G. Rao (2011).” Evaluation of Acute toxicity levels and biochemical changes under heavy metal arsenic exposure in fresh water teleost, *Channa punctatus*”.Abstract at International Congress of Environmental Research .December 15-17, Surat , Gujarat.

(xvii)Pallavi Dowarah, B. G. Unni, R.Hazarika, S.Das and **M. Bhattacharjee**. “Isolation and characterization of extracellular protein(Coagulase) from a bacterial species” Abstract at International Seminar on Bioresources and human sustenance, Department of Zoology, Cotton College, in collaboration with Zoological society of Assam, (Pp98)October 20th to 22nd , 2011.

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(xviii)B. G. Unni, **M. Bhattacharjee**, Sangeeta Das, P. K. Baruah, and P.G. Rao. “Environmental Pollution: Impact of Environmental Pollutants on Human Health: Epidemiological Molecular and Biochemical Studies”. Abstract accepted in 3rd International Conference on climate change forest resource and Environment (ICCFRE) organized by the Department of Environmental Sciences, University of Kerela, Thiruvananthapuram, 9th to 11th December, 2011.(pp38-39).

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