

**LARGE THERMAL PLANTS POISONING NEIGHBOURING AREAS
TO GENRATE POWER FOR DISTANT CITIES.**

**A CASE STUDY OF MERCURY POLLUTION IN SINGRAULI
“URJANCHAL”**

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INTRODUCTION

- Study focuses on the Coal based Thermal Power Plant in the Singrauli area.
- The 11000 MW capacity plant involves burning of a massive 1,20,000 tons of coal.
- Coal harnessed from nature contains a number of impurities, all of them get released in environment as solid, liquid and gaseous waste.
- Among all, mercury is most dreaded due to its high toxicity and mobility in the environment.

SONBHADRA (Uttar Pradesh)

MIRZAPUR
To Chunar

VARANASI
Madhupur



BIHAR

MADHYA PRADESH

mapsindia.com

To Singrauli (Madhya Pradesh)

To Daltenganj (Bihar)

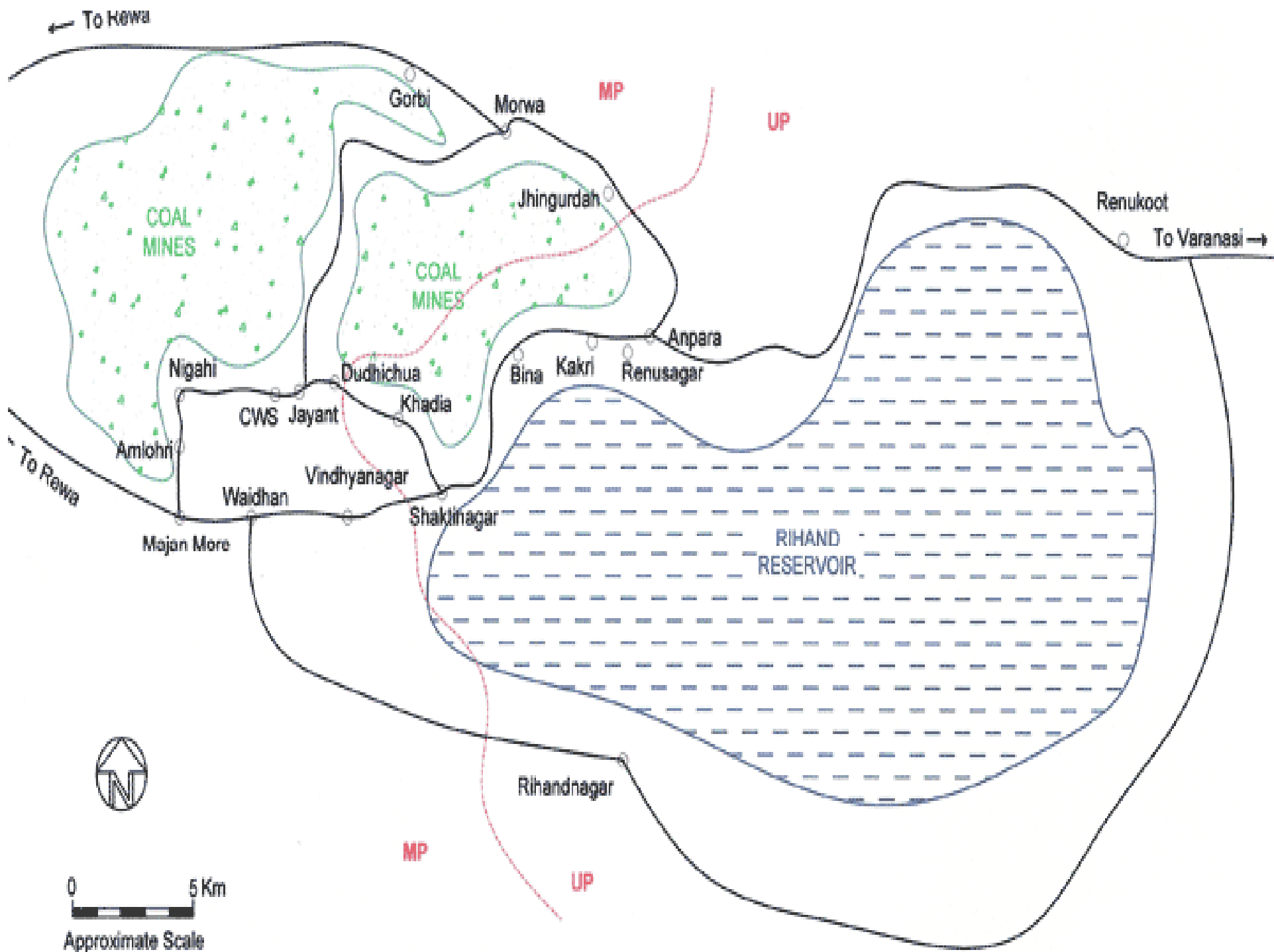
- District Boundary
- ~ River
- State Highway
- Road
- Railway Track
- District Headquarter
- Taluk Headquarter
- Town

JHARKHAND

CHATTISHGARH

PRESENT AND PROPOSED ELECTRICITY GENERATION OF SINGRAULI AREA.

S.N.	Name of power plant	Capacity MW	
		Present	Proposed
1.	Singrauli STPP, Shaktinagar (NTPC)	2500	2500
2.	Vindhyachal STPP, Vindhyanagar (NTPC)	2260	2760
3.	Rihand STPP, Rihand Nagar (NTPC)	2500	3000
4.	Anpara TPP, Anpara (UPSEB)	1630	1630
5.	Obra TPP, Obra (UPSEB)	1550	1550
6.	Renusagar TPP, Renusagar (HINDALCO)	480	670
7.	Captive TPP HINDALCO, Renukoot	100	200
8.	Captive TPP Kanodias, Renukoot	50	50
9.	ISN Inter national TPP, Kuldomri	-	2000
10.	Others in offing	-	4200
Total		11070	18,560



BACKGROUND OF THE STUDY

- A study carried out by Edf/Cdf (a French consulting agency) found high mercury concentration in the wells downstream of Rihand reservoir.
- Follow-up study by ITRC, Lucknow during the early '90s indicated a precarious situation in terms of mercury.
- ITRC study found high concentrations of mercury in samples of vegetables, food-crops, fish and cow-milk as far as 10-15 kms. away from the thermal power plant.

BACKGROUND (Contd.)

- Intensive monitoring and mass-balance studies were done by CPCB zonal office, Kanpur.
- They found 220-275 meter high stacks of super thermal power stations help disperse mercury to villages as far as 30-40 kms.
- Mercury deposits were found out in soils ,water bodies and vegetation.

EMISSIONS OF IMPURITIES

SN.	Impurity	Concentrations		Likely Total Load in 1,20,000 Tonnes coal	
		Range	Mean	Daily	Annual
1.	Ash	20-40 %	30%	36000 t	13.14X10⁶ t
2.	Sulphur	0.3-0.6 %	0.4%	480 t	1,75,200 t
3.	Fluorine	100-150 PPM	130 PPM	15,600 kg	5,694 t
4.	Boron	50-150 PPM	75 PPM	900 kg	3,285 t
5.	Arsenic	25-100 PPM	50 PPM	6000 kg	2,190 t
6.	Cobalt	20-100 PPM	40 PPM	4,800 kg	1,742 t
7.	Cadmium	5-11 PPM	8 PPM	960 kg	350 t
8.	Mercury	0.04-0.5 PPM	0.3 PPM	36 kg	13,140 kg

Summary of the Past Studies

CHARACTERISTIC	Permissible (BIS)		Different villages				
	Unit	Level	Govindpur	Nadhira	Chetwa	Naktoo	Rajo
(A) Location from Shaktinagar							
(i) Direction			ENE	ESE	ESE	ESE	ESE
(ii) Distance	Kms		40	35	20	15	18
(B) Mercury Conc. In Air	Ng/m ³		6.1	8.2	7.6	8.5	7.2
(C) Mercury in Pond water	µg/l	1.0	1.6	6.1	5.9	7.4	6.0
(D) Mercury in Soil	µg/kg		60	90	225	245	200
(E) Mercury in Crops							
(i) Wheat-grain	PPM	0.5	0.024	0.04	0.08	0.04	0.24
(ii) Arhar-seed	PPM	0.5	0.03	0.22	0.08	0.08	0.08
(iii) Vegetables	PPM	0.5	0.21	0.68	0.45	1.54	0.82
(F) Mercury in Cow milk	µg/l	1.0	0.35	1.6	1.2	1.3	0.6

MERCURY CONTENT IN THE BLOOD AND HAIR SAMPLES (ITRC)

SN	Areas	Hg in blood ng/ml		Hg in hair $\mu\text{g/gm}$	
		Range	Mean	Range	Mean
(i)	Neighbouring Areas	0.05-1500	21.37	0.0005-70	1.90
(ii)	Control Area	0.0005-16	1.75	0.005-14	0.89

RATIONALE OF THE STUDY

- All these studies paved way for comprehensive research on the mercury contamination of the Singrauli area.
- Human health impacts due to mercury became an important point of consideration.
- There had to be an apporportioned study which could lead to differential distribution of mercury in environment.

ANALYSIS OF WATER FOR MERCURY (March & April 2009)

Station Name	March, 09 Conc. ($\mu\text{g/l}$)	April, 09 Conc. ($\mu\text{g/l}$)
Rihand River near Obra	BDL	2.0104
Obra Dam	BDL	1.5796
Khamhariya	BDL	6.3184
Dudhi Chuan	BDL	6.3184
Chetva Pond	0.2872	3.4464
Anapara Ash Pond	7.8980	6.3184
Pipari Sonwani	BDL	2.2976
D/S Baliya Nala	6.6056	8.3288
Renusagar	0.8616	3.0156
NTPC Nala	2.4412	1.5796
Baliya Nala	5.7440	4.1644
Murdhwa Nala	BDL	3.8772
Dongiyan Nala	2.1540	6.6056
Shaktinagar Ash Pond	BDL	4.5952
ETP Beena	3.8772	3.7336
D/S Rihand Reservoir	2.2976	2.872
Bakuliya	0.8616	2.872
BSA Pond	BDL	1.0052
BSA Bawali	BDL	1.436
Aurangai	BDL	1.1488
ETP Kakari	4.6288	2.2976
Kirwani Pond	4.3080	2.5848

ANALYSIS OF GASEOUS & PARTICULATE MERCURY IN AIR (March & April 2009)

Station Name	March 09		April 09	
	Gaseous Hg ng/m ³	Particulate Hg ng/m ³	Gaseous Hg ng/m ³	Particulate Hg ng/m ³
Kewal	3.2588	BDL	2.8784	5.0205
Jaraha Rajo	1.7232	1.2691	2.1330	4.7569
Murdhwa	3.2588	2.6996	1.6560	2.5611
Bari Dala	0.9120	3.4963	1.7140	3.4701
Kubari Anapara	1.7136	2.1436	3.1356	4.8557
Kota	BDL	4.2356	3.2168	5.3614
Lojhara	3.9790	3.6545	3.5421	3.0634
Govindpur	1.0934	2.9162	1.4958	2.9483
Katauli	3.9790	2.0341	1.1516	4.5729

DISCUSSION

- Study indicates appreciable amount of mercury in all the environmental samples.
- Items for human consumption (Vegetable, crop, cow milk) were contaminated with mercury.
- A follow-up study on human blood and hair samples by ITRC provided the proof of bioaccumulation of mercury.

Prevalence of various dis-order and health symptoms in the exposed population of the neighbouring areas surveyed by ITRC

Dis-order/Disturbances	Prevalence	
	No. in surveyed 1186 subjects	%
Sensory Disturbances	27	2.3
Tremors	96	8.0
Halitosis	136	11.5
Oral Bleeding	150	12.6
Speech Disorder	15	1.3
Skin Disorder	50	4.2
Dental Problems	343	28.9

CONCLUSION

- Thrust on electricity generation in the Singrauli area has actually propelled a dangerous situation in terms of mercury.
- Intervention of govt./non-govt. agencies is what the people are looking for.
- It has essentially a battle between health of rural population in the neighbouring areas Vs the lust for more and more electricity on part of distant cities. The big question is “ Who Matters”?

THANK YOU

By

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