Chapter-1

PRESENT ENVIRONMENTAL STATUS OF MANDI GOBINDGARH CITY

1.0 Introduction

After analyzing the Environmental Status of Industrial Clusters of the country, Central Pollution Control Board in consultation with the Ministry of Environment & Forests has identified 88 critically polluted industrial clusters, of which Mandi Gobindgarh is one of them in the State of Punjab. The Ministry of Environment & Forests vide office memorandum No.J-11013/5/2010-IA.II(I) dated 13/1/2010 has imposed a temporary restriction of 8 months on the establishment of the projects in the said critically polluted industrial clusters, which are covered in Schedule-I appended to the EIA notification dated 14/9/2006. It has been felt to assess the environmental degradation of the identified industrial clusters and to formulate a remedial action plan for abatement of pollution and restoration of the environmental quality of these clusters. The present report has been prepared in view of aforesaid motive.

1.1 GEOGRAPHICAL FEATURES

1.1.1 Location

Geographically, Mandi Gobindgarh falls in Distt. Fatehgarh Sahib, which is situated in Malwa region of Punjab. It lies between **north latitude** 30^{o}-37'-30" and 30^{o}-42'-30" and **east longitude** 76^{o}-15' and 76^{o}20'. It shares common boundaries with Distt. Mohali, Patiala, Sangrur, Ludhiana and Rupnagar.

Mandi Gobindgarh is known as 'Steel Town of India' as various categories of steel manufacturing units are operating in this town. This town is located on National Highway-I. The town is spread over an area of 10.64 Sq. Kms. and accommodates a population of 55,416 as per 2001 census.

1.1.2 Topography

The topography of the District Fatehgarh Sahib is typical representative of an Alluvial plain, it owes its origin to the aggravation work of the Sutlej River. The alluvium deposited by the river has been worked over by the wind which gave rise to a number of small dunes and sand mounds. Most of these dunes have been levelled by the brave hard working agriculturists of the district. The District can be divided into the flood plains of the Sutlej and the Up land plains.

1.1.3 Climate

The climate of the District Fatehgarh Sahib is characterized by dryness except a brief spell of monsoon season in a very hot summer and a bracing winter. The winter season is from middle of November to the early part of March. The succeeding period up-to the end of June is the hot season. July, August and half of September constitute the south west of monsoon, the period of mid September to about the middle of November may be termed as post monsoon or transitional period. June is generally the hottest month. Hot and scorching dust laden winds blow during summer season. December & January are the coldest months. The mean daily temperature varies in the range of 5.8 ^{0}C to 41.2 ^{0}C.

1.1.4 Rainfall

The rainfall in the district increases from south west towards the north east. About 70% of the rainfall is received during the period July to September. The rainfall during December to March accounts for 16% of the rainfall and the remaining 14% rainfall is received in other months of the year. The average annual rainfall is 681 mm.

1.1.5 Ground Water Scenario

The dependence on ground water is quite considerable in the area. As per Central Ground Water Authority data, the depth of water level in Distt. Fatehgarh Sahib ranges between 10 to 20 mts below ground level. As per the data available with the Central Ground Water Authority for District Fatehgarh Sahib, the net ground water availability is 10078 ham, whereas the net ground water draft is 20814 ham. Therefore, there is an over-exploitation of ground water in this district.

1.2 MAJOR WATER BODIES AROUND MANDI GOBINDGARH

1.2.1 Bhakhra Canal:

The only surface water body flowing near Mandi Gobindgarh is Bhakhra Main Line Canal, which runs throughout the year.

1.2.2 Sirhind Choe:

One non-perennial choe (storm water drain) named as Sirhind Choe also passes near Mandi Gobindgarh. It originates from Sirhind and terminates into River Ghaggar.

1.3 FLORA & FAUNA

District Fatehgarh Sahib is rich in animals and birds including some of the rare species mentioned as under :-

Mammals (Mammalia): Sambhar, Nilgai, Wild Boar, Jungle cat, Jackal, Mangoose, Palm squirrel, Hares, Rats, Mice, Rhesus Macaque, Bat, Porcupine, goat, sheep, pigs and cat are also present in the area.

Birds (Aves): Gray Babbler, Golden Oriole, Common Paraquet, Rose-ring paraquet, Pariah kite, Koel, Magpie Robin, Wren-warbler, Blue Jay, Wagtail, black patridge, peacock, Baya, Coot, Riverterm, Grayhornbill, Munia, Crow, Woodpecker, Flycatcher, Coppersmith, Brahmini duck, Cormorant (large and small), swift Swallows, Vulture, Water hen.

Reptilea (Lizards, Snakes, Turtles, etc.): Tortoise, Wall lizard, Calotes, Varanus, Cobra, Rat Snake, Krait, Python.

Pises (Fishes): Labeo rohia (Rohu), Cirrhinus mrigala (Mugal), Catla (Katla), Hypophthalmichthys molitrix (Silver carp), Aorichthys seenghala (Singhara), Puntius saran (Puthi), Puntius stigma (Chidhu), Channa marulius (Sol), Mastacembelus armatus (Bam).

1.4 SENSITIVE RECEPTORS

As per report of Central Pollution Control Board on the Comprehensive Environmental Assessment of Industrial Clusters, the frame work of the CEPI is based on three factors i.e. pollutant, pathway and receptor. The high density of population in and around Mandi Gobindgarh city has been identified, as one of

the major sensitive receptors. The population of the Mandi Gobindgarh as per 2001 census city is 60,677 and the expected population upto 2009 is 76,677. The people residing in the city are not only being influenced by the industrial air pollution. There is no eco-park / protected monuments / wild life sanctuary within the MC limits. Wild life sanctuary, Bir Bhadson is situated at a distance of about 22 Kms from Mandi Gobindgarh.

1.5 DEMARCATION OF GEOGRAPHICAL BOUNDARIES OF THE INDUSTRIAL CLUSTERS

Mandi Gobindgarh city is one of the highly industrialized towns in Northern India. The predominant industries operating in the city are induction furnace units, re-rolling mills and cupola furnaces having high air pollution potential. The Punjab Pollution Control Board has identified following 8 industrial clusters within the jurisdiction of critically polluted area of Mandi Gobindgarh and Khanna area. The identified clusters of Mandi Gobindgarh and Khanna area are as under:

CLUSTER NO.	NAME OF THE INDUSTRIAL CLUSTER
I	Area near RIMT starting from M/s Cold Drip Pvt. Ltd. to M/s JTG Alloys Ltd.
II	Area between RIMT road (upto M/s Pushpanjali Steel) to Talwara Road (upto M/s M.R. Alloys) on one side of G.T. Road and upto Rajwaha on the other side of the G.T. Road
III	Area on G.T. Road (right side - Rajpura to Ludhiana) covered between M/s IMT, M/s Gian Steel Rolling Mills, M/s Baba Balak Nath Steel Rolling Mills, M/s Bansal Iron and Steel Rolling Mills (on left side) and area starting from M/s Patiala Casting to M/s Bansal Iron upto Rajwaha.

IV	Area bound between M/s Gopal Mills, M/s Kailash Steel Rolling Mills, M/s Northern India Pvt. Ltd. and M/s Aarti Strips in Guru Ki Nagri
V	Area on both sides of Amloh Road covered between M/s Doaba Steel Rolling Mills, M/s Janta Steel & Agro Industries, M.C. disposal point, M/s Vishnu Steels and M/s R.K. Steel and Allied Industry
VI	Area on both sides of G.T. Road on Khanna side starting from M/s Ganesh Steel Industry to M/s Karam Steel to M/s Shri Ganesh Steel Rolling Mills to M/s Dhiman Steel Industry to M/s M.T.C. Steel Industry to M/s Kumar Hammer and Model Town.
VII (Khanna area)	Area covered between old octroi post, Bhadla Road to Railway Line (including right side of Bhadla Road upto limits of Khanna), along railway line upto Focal Point closing at G.T. Road near M/s Watson Engg. Works.
VIII (Khanna area)	Right side of G.T. Road (opposite Bhadla Road) covered between M/s Modern Alloys to M/s Natraj Indl. Corp. to M/s Sat Pal Manku and closing at G.T. Road near M/s Aggarwal Iron & Steel.

1.6 IDENTIFICATION OF VARIOUS POLLUTION SOURCES

1.6.1 WATER POLLUTION

As per the report of Central Pollution Control Board, the cumulative environmental pollution index has been observed to be 55.50 for water pollution, which falls under the category of severely polluted in respect of water environment. The higher level of the said index may be due to the presence of water pollutants due to non-installation of sewage treatment facilities and improper disposal of wastewater into drains by the Deptt. of Local Bodies. The majority of the industries situated in Mandi Gobindgarh are of air polluting nature and not water polluting. As far as, water polluting industries are concerned, there are only 11 such industries.

1.6.1(a) Industrial Water Pollution

The category wise detail of these industries is given as under:

S.N.	Category	No. of Industries
1.	Milk Plant	1
2.	Pickling Units	6
3.	Galvanizing units	4
	Total	**11**

Category Wise Status of Water Polluting Industries :

(i) Milk Plant:

There is only one milk plant in Mandi Gobindgarh. About 428 Kl/day of wastewater is generated from this milk plant, which is discharged into sewer after treatment. The main pollutants in the wastewater discharged by the industry are BOD, COD, TSS, TDS & Oil and grease.

(ii) Pickling Units:

There are 6 pickling units situated in Mandi Gobindgarh, which use hydrochloric acid for cleaning the surface of the products. About 9 Kl/day of wastewater is generated by these units. The main pollutants in the wastewater discharged by the industry are pH & TDS.

(iii) Galvanizing Units:

There are 4 galvanizing units situated in Mandi Gobindgarh, which use hydrochloric acid for cleaning the surface of the products. About 10 Kl/day of wastewater is generated by these units. The main pollutants in the effluent discharged by the industry are pH and zinc.

1.6.1(b) Domestic Pollution :

About 17 MLD of sewage is generated in the town. Presently, the town is having two no. disposal points, one at Amloh Road and second at Guru ki Nagri. From Amloh Road disposal, about 12 MLD of sewage is discharged into Sirhind Choe through underground pipeline of about 8 kms. From Guru ki Nagri disposal, part of 5 MLD of sewage is discharged into main disposal at Amloh Road. However, during no demand period, a part of sewage gets stagnated in the area near Sector 10, Mandi Gobindgarh.

1.6.1(c) Wastewater from sewerage system of Focal Point :

There is only one Focal Point in Mandi Gobindgarh which has been developed by the Punjab Small Industries & Export Corporation (PSIEC). About 50 industries situated in this Focal Point discharge their domestic wastewater into the sewerage system provided by PSIEC. But most of the time, the sewerage system remains choked resulting into stagnation of wastewater in the vacant plots in the Focal Point.

1.6.2 AIR POLLUTION :

The environment of Mandi Gobindgarh has degraded a lot during the last few years due to rapid urbanization, industrialization, increase in population, vehicles and commercialization of land available within the town. The main stationary sources of air pollution are the industrial units, which are emitting particulate matter, sulphur di-oxide and oxides of nitrogen etc. As per the inventory prepared by the Board, there are 510 (i.e. 404 in Mandi Gobindgarh & 106 Khanna area) air polluting industries in Mandi Gobindgarh which are using coal /

furnace oil as fuel in their furnaces emitting the aforesaid pollutants, besides the process / fugitive emissions. In addition to this, burning of rice and wheat straw by the farmers in the agricultural fields surrounding Mandi Gobindgarh is also affecting the ambient air quality of the town. The degradation in the quality of ambient air of Mandi Gobindgarh has taken place due to unplanned and improper development of the city. As per report of Central Pollution Control Board, the Cumulative Environmental Pollution Index (CEPI) in respect of air has been calculated as 62 for Mandi Gobindgarh Industrial Cluster, on the basis of which Mandi Gobindgarh has been declared as critically polluted area. The major contribution to the said index is due to inadequate/ irregular operation of air pollution control systems provided by the industrial units. The category wise detail of air polluting industries situated in Mandi Gobindgarh and Khanna area around it is given as under:

Sr. No.	**Category**	**Number of Industries**	
		Mandi Gobindgarh	**Khanna area**
1.	Arc Furnace	01	--
2.	Induction Furnaces	89	1
3.	Steel Rolling Mills	247	94
4.	Cupola Furnaces	38	7
5.	Refractories	13	--
6.	Forging Industry	13	3
7.	Lead Extraction Units	03	1
	Total :	**404**	**106**

1.6.2.1 Category Wise Status of Air Polluting Industries :

(a) Arc Furnaces :

There is only one arc furnace in Mandi Gobindgarh. During the melting of scrap in the arc furnace, lot of emissions containing oxides of metals etc are emitted. The industry has installed the air pollution control device but secondary emissions are still there for which upgradation of air pollution control device is required.

(b) Induction Furnaces :

Iron scrap is melted in electrically heated induction, which results into lot of emissions containing oxides of metals etc. There are 90 induction furnace units situated in Mandi Gobindgarh and Khanna area. All these units have installed air pollution control devices to control the air emissions from their furnaces. But it has been observed that the suction efficiency of air pollution control devices is not adequate. The main reason for inadequate suction of emissions through the hood provided over the crucible of the induction furnace is due to improper design of suction system, poor maintenance of air pollution control devices and high speed of cooling fan provided behind the working platform near the crucible for charging of raw material. The cooling fan disturbs the entry of emissions generated from the furnace into the hood resulting into spreading of fugitive emissions in the working shed and escaping into atmosphere through the opening in the shed. Besides, as per the survey conducted by the Board, 10 units are required to carryout minor repairs in their emission control systems so as to ensure that no emissions escape the control mechanism. Similarly, 3 units are required to carryout major repairs in their emissions control system so as to

ensure that no emissions escape the control mechanism. The metal contents especially iron present in the solid waste generated in the form of slag from these units, are recovered through physical processes such as grinding, sieving etc. and reused back into the process. The remaining solid waste, which is non-hazardous in nature, is disposed off into low lying areas as land filling material.

(c) Rolling Mills :

There are 341 rolling mills situated in Mandi Gobindgarh and Khanna area. These rolling mills use furnace oil / pulverized coal / lump coal as fuel in their furnaces resulting into emission of SPM. 10 rolling mills have recently installed gasifier for producing the producer gas and using the same as fuel in their furnaces. All the steel rolling mills have installed air pollution control devices to control the emissions from their furnaces. But, it has been observed that in some of the steel rolling mills, smoke emissions escape through the charging doors (from where the re-rollable material is fed into the reverberatory furnace for heating) of the furnace. It has also been observed that sometimes coal powder emissions take place from the coal pulverizers installed by the rolling mills due to damaged bags in the bag filter houses provided by the them to trap the coal powder emissions.

(d) Cupola Furnace :

There are 45 Cupola furnace units situated in Mandi Gobindgarh and Khanna area. These industries use hard coke as fuel in the cupola furnaces resulting into emission of SPM. All these industries have installed air pollution control devices. But poor maintenance / improper operation of the air pollution control devices leads to discharge of emissions.

(e) Refractory Units:

There are 13 refractory units situated in Mandi Gobindgarh. These refractory unit are of two types i.e. one having down draft kilns and the other having tunnel type kilns for baking of refractory goods. These industries use coal as fuel in their kilns resulting into emission of SPM. All these industries have installed the air pollution control device to control the emissions from the kilns. But it has been observed that the refractory units having down draft kiln emit black smoke at regular intervals inspite of the fact that these units have installed air pollution control devices. However, no black smoke emissions are emitted from the refractory units having tunnel type kiln.

(f) Forging Units :

There are 16 Forging units situated in Mandi Gobindgarh and Khanna area. These industries use coal as fuel in their heating furnaces resulting into emission of SPM. All these industries have installed air pollution control devices to control the emissions from the furnaces. But it has been observed that significant emissions escape through the charging door as the door has to be kept open due to large size of the jobs to be heated up. These industries have also installed boilers in which wood is used as fuel. All these units have provided the air pollution control devices to control the emissions from their boilers and furnaces.

(g) Lead Extraction Units:

There are 4 lead extraction units situated in Mandi Gobindgarh and Khanna area. These industries use hard coke as fuel in their furnaces for melting the lead scrap extracted from used lead batteries, which results into emission of SPM and

oxides of lead. All these units have installed the air pollution control devices to control the emissions from their furnaces. They have also obtained user certificates from the Central Pollution Control Board for recycling of hazardous waste.

1.6.2.2 Other sources of Air Pollution :

(a) Mobile sources :

With the development of industries, growth of population and rise in living standards, the demand of two wheelers and four wheelers has increased manifolds. National Highway-I passes through Mandi Gobindgarh and very heavy traffic on this National Highway is one of the major contributors towards the deteriorating ambient air quality of the town. The industries, in and around Mandi Gobindgarh, are developing along the link roads & katcha rastas in agricultural land. Due to the movement of heavy goods vehicles like Trucks, Trolleys etc. on these link / katcha roads, lot of dust / vehicular emissions are generated which are also contributing to the deterioration of ambient air quality of the town and adjoining villages.

(b) Stationary Point Sources :

(i) The Railway Authorities have set up coal handling yards at Mandi Gobindgarh. Due to increased demand of coal in the city because of increase in the no. of industries as well as their production capacities, the loading and unloading of coal in the city has increased a lot. The coal handling yard of Mandi Gobindgarh is now surrounded by the residential / commercial area. Therefore, the loading and unloading operations of the

coal in railway wagons is creating lot of air pollution resulting into deteriorating ambient air quality of the town.

(ii) Mandi Gobindgarh is surrounded by agricultural fields and burning of rice/ wheat straw by the farmers in the fields is also adversely affecting the ambient quality of the town.

(iii) Although no major construction activities are going on in Mandi Gobindgarh, still the private or public sector organizations carrying out any construction activity in the town need to take necessary steps to ensure that no dust emissions are emitted from their activities and the debris generated as a result of these activities are disposed off at a proper place instead of dumping the same in an haphazard manner.

1.6.3 Ambient Air Quality Monitoring Data of Mandi Gobindgarh:

In order to determine the status of quality of the ambient air in Mandi Gobindgarh, the Board is monitoring the ambient air quality of Mandi Gobindgarh for the last 15 years. The ambient air quality monitoring analysis of last 7 years (as given below) reveals that the annual average concentration of Respirable Suspended Particulate Matter (RSPM) is in the range of 214 – 272 $\mu g/m^3$ against annual average prescribed standard of 120 $\mu g/m^3$ for industrial area, 60 $\mu g/m^3$ for residential, rural & other area and 50 $\mu g/m^3$ for sensitive area. So, the concentration of RSPM in ambient air is more than the prescribed limits.

Location of Ambient Air Station	**Para-meters**	**Annual Average Conc. ($\mu g/m^3$)**							**Permissible limits**	
		2003	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**Old**	**New**
M/s Raj Steel Rolling	RSPM	272	257	235	230	214.1	219	205.8	120	PM_{10}-60,

Mills, Guru ki Nagri, Mandi Gobindgarh (Industrial Area)										$PM_{2.5}$-40
	SO_2	11	14	17	11	11	11.6	10	80	50
	NO_x	34	39	31	29	25.8	28	28.9	80	40
M/s United Steel Rolling Mills, Amloh Road, Mandi Gobindgarh (Mixed Use Area)	RSPM	-	-	-	226	251.8	216	203.7	60	PM_{10}-60, $PM_{2.5}$-40
	SO_2	-	-	-	11	12.8	11.7	9.8	60	50
	NO_x	-	-	-	30	30.1	28	28.9	60	40
M/s Modi Oil & General Mills, Railway Road, Mandi Gobindgarh (Residential-cum-commercial Area)	RSPM	271	252	242	223	249.2	-	-	60	PM_{10}-60, $PM_{2.5}$-40
	SO_2	10	14	16	11	12.6	-	-	60	50
	NO_x	33	40	31	30	30.5	-	-	60	40

In addition to the industrial air pollution, the other factors contributing towards the ambient air quality deterioration of Mandi Gobindgarh are:

i) Rapid increase in the vehicular density due to industrialization and commercialization.

ii) Haphazard growth of the industries in and around Mandi Gobindgarh along the link roads & katcha rastas in agricultural land.

iii) Lack of proper infrastructure such as roads, green belts, buffer zones etc.

1.6.4 Status of Soil/Ground Water Pollution

As per report of Central Pollution Control Board, the Commutative Environment Pollution Index for land (soil and ground water) has been calculated as 62 for Mandi Gobindgarh and it has been declared take critical but as per the analysis results of the samples of ground water collected by the Board from different localities of the town on 15/1/2009 and 21/4/2010, the ground water is free from any contamination. It is pertinent to mention here that two of the three samples have been collected from the premises of industrial units situated in the biggest industrial area of the town. The analysis results are given are as under :-

S. N.	Point of sample collection	pH	TDS mg/l	F′ mg/l	Cl^{-1} mg/l	SO^{2-}_4 mg/l	T.H. mg/l	Ca. mg/l	Mg. mg/l	Na mg/l	NO_3-N
	15.1.2009										
1.	Hand pump in the premises of M/s Sangam Steel Industries, R.G. Mill Road, Mandi Gobindgarh	7.3	628	0.16	42	28	312	75	30	57	0.9
2	Hand pump at the backside boundary wall of S.N.A.S. Sr. Sec. School, Railway Road, Mandi Gobindgarh	7.1	683	0.11	39	20	324	85	27	46	0.17
3	Hand pump in the remises of M/s D.R. Casting Guru Ki Nagri, Mandi Gobindgarh	7.3	624	0.1	30	23	304	74	29	52	0.19
	21.4.2010										
1.	Hand pump in the premises of M/s Sangam Steel Industries, R.G. Mill Road, Mandi Gobindgarh	6.9	660	1.0	70	28	360	80	38	50	2.8
2.	Hand pump at the backside boundary wall of S.N.A.S. Sr. Sec. School, Railway Road, Mandi Gobindgarh	6.7	624	0.8	70	22	310	80	38	42	2.4
3.	Hand pump in the remises of M/s D.R. Casting Guru Ki Nagri, Mandi Gobindgarh	7.1	841	1.4	45	18	440	124	31	54	2.8
	Permissible Limits	***6.5 to 8.5***	***500***	***1.0***	***250***	***200***	***300***	***70***	***30***	-	45

NOTE: Ni, Cr, Pb. were not detected in all the samples

As per above said analysis results, no heavy metal has been detected and only TDS and hardness are beyond the permissible limits, which cannot be linked to industrial activity. Still, in order to improve the ground water quality, the following areas need corrective action:

(i) Stagnation of M.C. sewage / sullage

(ii) Unscientific disposal of municipal solid waste

(iii) Improper disposal of industrial solid waste

1.7 Noise Pollution :

National Highway-I passes through the centre of Mandi Gobindgarh and a very heavy traffic on this road is primarily responsible for noise pollution in the town, especially in the areas situated along the National Highway. As per the noise monitoring carried out by the Board recently, the noise level has been found to be 80.3 dBA against the permissible limit of 75 dBA prescribed for industrial areas. The noise monitoring results further indicate that the noise levels in the commercial area (65.4 dBA against permissible limit of 65 dBA) are beyond the permissible limits and in the silence zone (46.5 dBA against permissible limit of 50 dBA), these are within the permissible limits prescribed for such areas. Therefore, there is a need to reduce the noise levels along the National Highway and to take precautionary measures in other areas where the noise levels are at the border line.

1.8 Hazardous Waste :

There are 475 units situated in Mandi Gobindgarh and in Khanna area generating hazardous waste. The main hazardous waste is generated from arc / induction furnaces as dust from air pollution control device i.e. Category 34.1 of Schedule-I. Also, in steel rolling mills, air pollution control device dust is considered as hazardous waste, which is also covered under 34.1 category of Schedule-I of Hazardous Wastes (Management, Handling and Transboundary Movement) Rules, 2008. About 3 TPD of hazardous waste is generated by these industries.

1.9 Bio-medical Waste :

There are 9 hospitals operating in Mandi Gobindgarh. About 20 Kg/day of bio-medical waste pertaining to category No.1,4,5,6,7 and 8 is generated in the town.

1.10 Municipal Solid Waste :

About 44 T/day of municipal solid waste is generated from the Mandi Gobindgarh town. The Municipal Council has not made any arrangements for proper treatment & disposal of the said waste. Presently, the solid waste is disposed off on 1.25 acre of open land located on Agni Casting Road (link road from G.T. Road on Sirhind Side).

1.11 Industrial Solid Waste :

The solid wastes in the shape of solid sludges generated from the cooling water recirculation tanks of re-rolling mills are disposed off along the road sides.

1.12 E-Waste :

The e-waste is generally generated from dismantling activities of various electrical / electronics appliances / gadgets such as audiovisual components, televisions, VCRs, stereo equipment, mobile phones and computer components. But till date, no inventory of such waste has been prepared. However, for the proper disposal of such type of waste, the Ministry of Environment & Forest has included this waste in the Hazardous Wastes (Management, Handling & Transboundary Movement) Rules, 2008.

Chapter-2

Identification of Role of the Different Departments in Abatement of Pollution

Due to complex problem of pollution, different Departments of the State Govt. are required to take preventive / corrective measures in the area of their operation to improve the environment of the Mandi Gobindgarh and to help in reduction of Comprehensive Environment Pollution Index (CEPI). The various departments / authorities and work to be done by them, are identified as under:

S.N.	Name of the Department	Main Areas
1.	Punjab Pollution Control Board	➢ Control of Water, Air and Solid Waste Pollution. ➢ Regular monitoring/ ensuring the regular operation of effluent treatment plant and air pollution control devices installed by industries. ➢ Upgradation of existing air pollution control devices, so as to achieve the prescribed standards, wherever required. ➢ Monitoring of the installation of the sewage treatment plant in a time bound manner. ➢ Monitoring of ambient air quality, ground water and surface water quality. ➢ Ensuring proper management and handling of hazardous waste/ bio-medical waste. ➢ Preparation of inventory of E-Waste.
2.	Local Bodies	➢ Installation of sewage treatment plant and disposal of treated wastewater onto land for irrigation/plantation. ➢ Laying of sewer lines in the areas not covered by the sewerage system.

		➢ Development of engineered municipal solid waste dump site and compliance of provisions of the Municipal Solid Waste (Management & Handling) Rules, 2000. ➢ Improvement of road infrastructure for better and smooth traffic movement. ➢ Upgrading traffic lights for smooth traffic movement. ➢ Steps for compulsory installation of rainwater harvesting structure by the different establishment within the city and encouragement to construction of green buildings. ➢ Steps for improvement of percolation of rainwater from sides of roads/ pavements and through green cover. ➢ Increasing green cover in city and provision of green belt/ buffer zones separating the industrial areas from residential areas. ➢ Mandatory requirement to provide canopies on the existing D.G sets alongwith stacks as per norms fixed by the Punjab Pollution Control Board and not to allow any shop, office / commercial establishment to install D.G. sets without canopy and to take policy decision regarding regulation of D.G. set in residential houses.
3.	Transport	➢ Plan for effective traffic management including provision of traffic lights, introduction of one way traffic, parking of vehicles at the designated place, challaning of polluting vehicles etc.

		➢ Plan for phasing out old polluting vehicles. ➢ Impounding and challan of vehicles running without permission/ registration. ➢ Shift to cleaner fuels viz. CNG etc. ➢ Increased monitoring of vehicles running without P.U.C certificate and implementation of applicable emission norms. ➢ Banning of pressure horns.
4.	Police	➢ Increased monitoring of vehicles running without pollution under control certificate. ➢ Formation and implementation of proper traffic management plan for smooth flow of traffic. ➢ Impounding and challan of vehicles running without permission/ registration. ➢ Implementation of Noise (Prevention & Control of Pollution) Act, 2000 for control of noise from D.G. sets and other non-point sources.
5.	Department of Forests	➢ Preparation of afforestion plan for increasing forest/ green cover in areas under their jurisdiction. ➢ Organizing trainings / seminars / awareness camps for increasing green cover in city. ➢ Providing green belt around the industrial areas and the pollution sources. ➢ Providing more plants / saplings free of cost in Mandi Gobindgarh. ➢ A systematic study to keep the track of status of flora and fauna and to prepare inventory for the same. ➢ Formulating and implementing more projects of afforestation under NREGA in Rural areas adjoining Mandi Gobindgarh.

6.	Deptt. of Industries and Commerce / Punjab Small Industries & Export Corporation / Punjab State Industrial Development Corporation.	➢ Shifting of industries, which are located in the non-designed areas to the designated areas in a time bound manner. ➢ Provision of environment infrastructure in Focal Point, Mandi Gobindgarh including wastewater treatment facilities, improved water supply, road infrastructure, parking facilities and green cover within the Focal Point. ➢ Creation of awareness to increase green cover in industrial areas. ➢ Scout for improved technologies.
7.	PWD	➢ Improving road conditions for smooth movement of traffic. ➢ Increasing green cover on roadside under their jurisdiction.
8.	District Administration	➢ To impose complete ban on the stubble burning in the agricultural fields around Mandi Gobindgarh. ➢ Regulation on use of loud speaker and sound system by the religious places and marriage palaces during night time.
9.	Punjab State Council for Science and Technology	➢ Evolving cost effective cleaner technologies and installation of pilot plants for effective control of water and air pollution.
10.	Central Ground Water Authority	➢ To stop the over-exploitation of ground water.
11.	Department of Agriculture	➢ Promotion of bio-methanization and compost facilities for the agricultural residue and awareness regarding ill effects of stubble burning.

Chapter-3

ACTION PLAN FOR CONTROL OF POLLUTION

3.1 Approach and agenda for Action Plan

To accomplish the task, emphasis should be laid on integrated approach involving preventive, promotion and mitigative measures. Thus, the keyword for the pollution abatement will be Prevention, Promotion and Mitigation (PPM). Instead of dealing with the pollution problems on case to case basis, an integrated approach involving preventive, promotional as well as mitigation (PPM) measures will be propagated. Pollution abatement responsibilities of concerned development departments / organizations such as Punjab Pollution Control Board, Department of Local Bodies, Municipal Committee, Mandi Gobindgarh, Punjab Small Industries & Export Corporation, Improvement Trust, Deptt. of Soil Conservation, Deptt. of Forest, Deptt. of Irrigation, Deptt. of Transport, District Administration, Traffic Police, Punjab State Council for Science and Technology, PWD (B&R), Central Ground Water Authority and Indian Medical Association, need to be articulated in their development programmes.

Prevention

- Restriction on polluting technologies
- Restriction on siting of polluting industries

Promotion

- Clean technologies/ improved house keeping
- Compatible industries
- Training & awareness programmes.

Mitigation

- Control at source (in plant/ add on system)
- Reduction of waste, recovery and recycling.
- Restoration/ reclamation.

3.2 Agenda

The agenda for the action plan shall centre around major problem specific and sector specific programme having significant bearing on the environmental status and living conditions. Keeping in view these considerations, the priorities should focus on the followings:

Problem Specific Programme (P.S.P.)

1. Action plan for control of industrial pollution.
2. Hazardous Waste Management.
3. Municipal Waste (Waste water & solid waste).
4. Noise pollution.

Area Specific Programme (A.S.P.)

1. Identified problematic areas.
2. Sensitive zones.

Sector Specific Programme (S.S.P.)

1. Highly polluting industries.
2. Agriculture, sewage farming, agricultural run off, burning of agro waste.
3. Vehicular traffic.

Public Involvement :

Participatory programmes for public support and involvement in cleaning of neighbourhood areas especially in case of Municipal wastes shall be promoted.

3.3 Action Plan for Different Departments

The degradation in quality of environment of Mandi Gobindgarh has been brought out by the various activities and in order to upgrade the quality of

environment and for the betterment of eco-system, the various departments need to play their role in the development activities at the micro as well as macro level to bring about a definite change.

3.3.1 Punjab Pollution Control Board

(A) Technological Intervention :

a) Improvement of Emission Collection System in Induction Furnaces:

All the induction furnace units have provided air pollution control system consisting of wet scrubber or bag filter house to control the process emissions. The emissions are captured through hood and are brought to the wet scrubber or bag filter house. However, the design of the hood is not so effective to capture 100 % emissions as a result of which, about 30-40% secondary / fugitive emissions escape the hood and cannot be captured and are spread in the shed resulting in poor visibility especially in the winter season. In order to get rid of the problem of fugitive emissions from induction furnace units, Indian Institute of Technology, Roorkee has been assigned the job of redesigning / modifying the existing air pollution control systems installed by these units at an estimated cost of Rs.7.87 Lacs. The design of modified air pollution control system is likely to be finalized by IIT, Roorkee by 15.11.2010. The Board requests the Ministry of Environment & Forests for providing necessary funds for installation of demonstration plant (redesigned / modified air pollution control systems) in an induction furnace unit at Mandi Gobindgarh. The estimated cost of this demo plant is Rs.48.61 lacs.

b) Use of CNG as fuel in the Induction Furnaces in place of electricity

There are 90 induction furnace units situated in Mandi Gobindgarh and Khanna area. All these units use electricity for melting of scrap in the induction furnaces. Therefore, huge amount of power is used by these units in the process of melting. The power used by these units is drawn from the thermal power plants, which in turn use huge amount of coal to produce electricity. With the burning of coal in thermal power plants, lot of air pollution is caused for which control measures have to be taken involving expenditure of crores of rupees. Moreover, the State Electricity Boards are unable to meet out the demand of power by these units as these are power intensive units. In order to find out an alternative to power, the Board is taking up the matter with the Indian Institute of Technology, Delhi to explore the possibility of use of CNG as fuel in the induction furnace units. IIT, Delhi is being approached to submit a detailed project report (DPR) in this regard by 31.12.2010. The DPR will be submitted to the Ministry of Environment & Forests, New Delhi/Deptt. of Science & Technology, New Delhi for appraisal. In case, the DPR is approved by the MoEF/DST, the same will be got implemented in the State. It will not be out of place to mention here that the CNG will not only be cost effective, but will also be easily available to the industries at Mandi Gobindgarh as a CNG pipeline is being laid by the Gas Authority of India Ltd. (GAIL) from Bawana to Nangal and the work on this pipeline is likely to be completed by May/June, 2011.

c) Installation of Online Monitoring System :

The Board is also pursuing the large scale highly polluting industries to install GPS-GIS based on-line monitors. A pilot project for installation of online monitors

for the measurement of pH, DO and ammonia parameters of the treated wastewater has been proposed for M/s National Fertilizer Ltd., Naya Nangal as the area is close to eco-sensitive zone. The proposed date of commissioning of the pilot project is 30/9/2010. After the successful commissioning of the online monitors at the said industry, the online monitoring system shall be made mandatory for the large scale highly polluting industries in Mandi Gobindgarh on need basis in a time bound manner.

(B) Infrastructure Renewal :

i) As per the survey conducted by the Board, 3 induction furnace units require major repairs and 10 require minor repairs of their air pollution control systems. All the induction furnace units which require major repairs of their Air Pollution Control Systems shall be asked to carryout the same by 31/12/2010 and all the units which require minor repairs of their Air Pollution Control Systems, shall be asked to carryout the same by 30/9/2010.

ii) There are 13 refractory units situated in Mandi Gobindgarh. These refractory units are of two types i.e. one having down draft kilns and the other having tunnel type kilns for baking the refractory goods. It has been observed that the refractory units having down draft kilns emit black smoke at regular intervals despite having installed the air pollution control devices. However, no black smoke emissions are emitted from the refractory units having tunnel type kilns. Therefore, all the refractory units which are having down draft kilns shall be

persuaded to switch over to tunnel type kiln to control the emissions more effectively by 30/6/2011.

iii) All the steel rolling mills will be educated to provide blower of optimum speed to avoid escaping of emissions from charging door of their reveberatory furnaces by 31/3/2011.

iv) The rolling mills have installed coal pulverizers with cyclone followed by bag filter house as an integral part of coal pulverizing unit, so as to trap the coal powder emissions generated during the process of pulverization. Sometimes, the coal powder emissions escape the bag filters due to damaged bags. Therefore, all these industries would be asked to maintain their bag filter houses in good condition, so as to rule out the possibility of any coal powder emissions. As far as the provision of conveyor belts for transportation of pulverized coal is concerned, these have not been provided in Mandi Gobindgarh and the pulverized coal is transported through a closed conduit.

v) All the industries, which have installed coal gasifiers to produce gas will be asked to take necessary steps to ensure that no incident of fire takes place in the industry. All those industries, which would be proposing to install the gasifiers in future would be asked to locate the gasifiers in such a manner that these are kept away from the manufacturing activities to avoid any fire hazards.

vi) All the forging units shall be persuaded to optimize their suction systems so as to ensure that no emissions escape the charging door by 31/3/2011.

vii) In order to check the problem of air pollution caused by the Railway Coal Yard at Mandi Gobindgarh due to loading and unloading of coal from the coal wagons, the matter has been taken up with the Ministry of Railways to relocate the railway coal yard at some other suitable place away from the habitation area or the consignments of coal may be taken to a destination, which is previous to Mandi Gobindgarh railway station from where the coal may be transported by road through trucks.

viii) All the industries which are using coal/rice husk as fuel in their furnaces would be asked to make adequate and appropriate arrangements to dispose off the fuel ash in an environmentally sound manner either inside the industrial premises or at a common place to be developed by the Industrial Associations for this purpose.

(C) Regular Monitoring:

a) All the water and air polluting industries shall be monitored vigorously so as to ensure the regular operation of their pollution control systems. An exclusive mobile laboratory will be deputed at Mandi Gobindgarh to conduct frequent monitoring of effluents / emissions discharged by the industries. It is pertinent to mention here that the Board has recently established a separate Regional Office at Mandi Gobindgarh to step up the monitoring.

b) All the Health Care establishments covered under the provisions of Bio-Medical Waste (Management & Handling) Rules, 1998, shall be monitored vigorously so as to ensure that no bio-medical waste is mixed with the Municipal Solid Waste.

c) All the industries will be persuaded to shift their stored hazardous waste to common TSDF by 31/12/2010.

The feasibility studies to provide GPS based tracking system for keeping a track on the hazardous waste going to TSDF shall be carried out by 31.3.2011. Subsequently, this scheme would be implemented on long term basis in case the same is found successful.

d) Preparation of inventory of e-waste shall be carried out as per the guidelines by 31.3.2011.

e) The monitoring of noise levels in different localities of the town will be stepped up so as to keep a constant watch on the noise levels.

f) All the industries which are disposing off their solid waste generated from cooling water recirculation tanks or any other solid waste shall be asked to make adequate and appropriate arrangements to store the same in their premises in an environmentally sound manner by 31/3/2011.

g) All the air polluting industries will be pursued to interlock their pollution control devices with the main manufacturing process, wherever feasible, so as to ensure the regular and continuous operation of the same.

h) All the industries would be asked to stabilize the kutcha areas inside their industrial premises so as to ensure that no dust emissions are emitted due to movement of vehicles.

(i) Although no major construction activities are going on in Mandi Gobindgarh, still the private or public sector organizations carrying out any construction activity in the town would be asked to take all necessary steps including wind breaking curtains to ensure that no dust emissions are emitted from their activities and the debris generated as a result of these activities are disposed off at a proper place instead of dumping the same in an haphazard manner.

(j) All the existing industries which have not provided canopies on their D.G. Sets would be asked to provide the same by 31.3.2011. All the prospective entrepreneurs would be asked to provide the latest D.G. sets with the facility of having sound proofing arrangements before they are allowed to operate.

(k) During the process of melting of the scrap in induction furnace units, the impurities collected at the surface of the molten metal are removed in the form of slag. The metal contents especially iron present in the slag, are recovered through physical processes such as grinding, sieving etc. and the remaining solid waste, which is non-hazardous in nature is disposed off into low lying areas as land filling material. All the induction furnace units would be asked to make adequate and appropriate arrangements to store this solid waste either inside their industrial premises in an environmentally

sound manner or to create a common facility for disposal of the same at Association level.

(D) Upgradation of Air & Water Monitoring Network

The Punjab Pollution Control Board will continue to carry out regular monitoring of ambient air quality, surface water and ground water. At present, the Board does not have sufficient manpower and adequate laboratory facilities at Mandi Gobindgarh, which may be matching to the requirement of continuous monitoring in the critically polluted areas regarding monitoring of industries, analysis of water, air and ground water parameters. The capacity enhancement of the various infrastructural facilities at Mandi Gobindgarh is need of the hour. The Board shall fix eight ground water monitoring stations in different localities of the town to keep a constant watch on the quality of groundwater. The groundwater quality shall be monitored on quarterly basis. This task will be completed by 31.12.2010. The quality of surface water in the water bodies shall also be monitored on regular basis including the bacteriological contamination (in terms of E-colli) to assess the pollution load in those water bodies. The Board is already operating 4 no. ambient air quality monitoring stations in Mandi Gobindgarh. Besides, four new ambient air quality monitoring stations and one continuous ambient air quality monitoring station will be provided to step up the ambient air quality monitoring network. In order to find out the contribution of various sources in respect of air pollution in Mandi Gobindgarh, the source apportionment studies are required to be carried out. Therefore, Central Pollution Control Board shall be requested to lay down certain guidelines to carry out such studies on uniform basis throughout the country. The Board shall complete this task within a period of two years after the aforesaid guidelines are laid down by the CPCB.

Therefore, the Board proposes to enhance the infrastructural facilities as per details given below:

Sr. No.	Description	Cost (Approx.)
i)	Purchase of one mobile lab for vigorous monitoring of air pollution control devices installed by the industries in Mandi Gobindgarh a) Cost of vehicle – Rs.7.00 lacs b) Cost of equipment – Rs.20.00 lacs c) Staff salaries – Rs.15.00 lacs (for 5 years)	Rs.42.00 lacs
ii)	Purchase of two vehicles to step-up monitoring of industries in Mandi Gobindgarh (a) Cost of two vehicles - Rs.15.00 Lacs (b) Operation & Maintenance - Rs.5.00 Lacs Cost for 5 years	Rs.20.00 lacs
iii)	Installation of continuous ambient air quality monitoring station (for analyzing all the 12 parameters) at Mandi Gobindgarh **(a) Cost of Equipment - Rs.33.00 Lacs** (b) Operation & Maintenance - Rs.15.00 Cost for 5 years	**Rs.48.00 lacs**
iv)	Installation of four new ambient air quality monitoring stations at Mandi Gobindgarh a) Cost of equipment - Rs.28.00 lacs b) Staff salaries - Rs.50.00 lacs (for 5 years)	Rs.78.00 lacs
	TOTAL	**188.00 Lacs**

With the availability of above infrastructure, the Board will be in position to increase the frequency of the monitoring and maintenance of data. The Board requests the Ministry of Environment & Forests / Central Pollution Control Board for providing the said funds. The upgradation work of ambient air quality

monitoring network will be completed by 30.9.2011 in case funds are received by the Board.

3.3.2 Department of Industries & Commerce/ Punjab Small Industries & Export Corporation / PSIDC :

(A) Development of New Infrastructure:

(a) Supply of CNG to the industries at Mandi Gobindgarh

Gas Authority of India Ltd. (GAIL) is laying a CNG pipeline from Dadri to Nangal, which will pass nearby Mandi Gobindgarh. This gas pipeline project is likely to be completed during the next 2 years. GAIL vide its letter dated 15.10.2009 has informed All India Steel Rerollers Association that the natural gas supply to the Steel Rolling Mills shall be made available when Dadri-Bawana-Nangal gas pipeline is commissioned. This fuel will not only be cost effective but least polluting also. Therefore, all the rolling mills and forging units shall be persuaded to use CNG as fuel in their furnaces. The work of laying the pipeline from Bawana to Nangal has already been started by GAIL and the same is likely to be completed by May-June, 2011. A tapping point for supply of CNG to the industries will be available at Mandi Gobindgarh. With the use of CNG as fuel by the rolling mills and forging units, the ambient air quality of Mandi Gobindgarh is likely to be improved to a large extent.

(b) Provision of Environmental Infrastructure in the various designated areas :

There is only one Focal Point in Mandi Gobindgarh which has been developed by the Punjab Small Industries & Export Corporation (PSIEC). About 50 industries situated in this Focal Point discharge their domestic wastewater into the

sewerage system provided by PSIEC. But most of the time, the sewerage system remains choked resulting into stagnation of wastewater in the vacant plots in the Focal Point. The Department of Industries & Commerce should undertake measures to provide environment infrastructure in Focal Point, Mandi Gobindgarh including wastewater treatment facilities, improved water supply, road infrastructure, parking facilities and green cover within the industrial areas. The PSIEC shall take all necessary steps to repair the sewerage system by 31.3.2011 and to provide the necessary wastewater treatment and disposal facilities by 31.12.2011.

(B) Other issues:

(a) Shifting of Industries :

The Deptt. of Town and Country Planning is in the process of preparing the Master Plan of Mandi Gobindgarh. Once the Master Plan is finalized, the Department of Industries & Commerce shall take necessary steps for shifting of industries, which are located in the non-designed areas of Mandi Gobindgarh, to the designated areas in a time bound manner as per the Zoning Regulations of Master Plan of Mandi Gobindgarh.

(b) Awareness for Increase of Green Cover in Industrial Areas

The Punjab Small Industries & Export Corporation Ltd. undertakes drive to plant trees on the road side of the Focal Point and the green parks being maintained in the Focal Point and industrial areas. Further, a scheme in the shape of proposed legislation is already under preparation for the maintenance of industrial area by the Industrial Associations themselves.

3.3.3 Department of Local Bodies :

(A) Development of New Infrastructure :

(a) Installation of Sewage Treatment Plant, laying of sewer lines and disposal of treated wastewater onto land for irrigation / plantation.

The Municipal Council, Mandi Gobindgarh has prepared a scheme for laying down of sewerage system (in the areas where the same is not available) and installation of sewage treatment plant of 55 MLD capacity at an estimated cost of Rs.87.31 crores. The STP proposed to be installed by the M.C. shall be based on Sequential Batch Reactor (SBR) Technology. The Municipal Council, Mandi Gobindgarh has been directed by the Board to submit a time bound action plan for installation of sewage treatment plant and for utilization of treated wastewater onto land for irrigation / plantation by 31/7/2010. The M.C. has also been asked to submit a bank guarantee of Rs.2.00 lacs by 31/7/2010 as an assurance to submit the aforesaid action plan. As per the scheme prepared by the Deptt. of Local Bodies, the STP is likely to be installed by 31.12.2011. The facility of D.G. set shall also be provided at the STP site to ensure regular operation of the STP in case of power failures. The monitoring of STP to be installed by Deptt. of Local Bodies shall be carried out on regular basis by the Board to ensure its proper functioning and achievement of effluent standards.

(b) Development of Engineered Landfill site :

The Municipal Council will take adequate steps for development of engineered landfill site so as to comply with the provisions of the Municipal Solid Waste (Management & Handling) Rules, 2000. The Punjab Govt. has divided the State into 8 clusters for the managements of municipal solid waste. The project

involves door to door collection of garbage, its segregation, transportation, treatment and recycling. Mandi Gobindgarh is covered under the facility to be developed for Patiala cluster for which the land is being identified. Once this facility is developed, the problem of municipal solid waste in Mandi Gobindgarh will be solved. The land fill site will be identified by 30/9/2010 and the municipal solid waste management facility will be developed by 31/12/2011.

(B) Infrastructural Renewal :

(a) Improvement in Road Infrastructure and Traffic Lights

Presently, the condition of most of the roads is not so good and requires lot of improvement such as re-carpeting, filling of the patches etc. The over-bridges should also be constructed, wherever possible, for smooth and speedy flow of traffic. This activity will not only result in lower consumption of fuel but also lesser wear and tear of the vehicles. It is a on going process which is carried out by the various agencies like municipal corporation as well as PWD (B&R) on a continuous basis.

Traffic load in Mandi Gobindgarh has increased manifold. There is need for traffic lights at some of the cross sections of the roads to ease traffic bottlenecks. The Municipal Council, Mandi Gobindgarh should provide traffic lights on cross sections as per requirement on a continuous basis so that smooth movement of traffic may be ensured.

(b) Rainwater Harvesting in the City

The total rainfall in a year is 600-700 mm in Mandi Gobindgarh. The Punjab Govt. has recently made it mandatory for the owners of plots of 200 Sq. yards or

more to provide rainwater harvesting structures at the time of construction of the houses. The building plans are approved by the Local Authority only with the proposal for rainwater harvesting. The implementation shall be monitored vigorously. As a result, in the coming times, rain water harvesting shall contribute to improve the groundwater quality in Mandi Gobindgarh.

(c) Provisions of green cover in the City and Industrial area

The Municipal Council, Mandi Gobindgarh shall undertake a special drive to identify the areas and make plantation thereby increasing the green belt in and around the industrial areas, residential areas and road sides etc. in collaboration with the Deptt. of Forests.

3.3.4 Department of Transport :

In order to control the air pollution caused due to vehicular emissions, the Deptt. of Transport has proposed the following measures :-

(a) Effective Traffic Management :

To check traffic congestion in the bazaars, yellow line marking for parking area shall be done, so that the traffic moves un-interrupted and without un-necessary stoppages. The traffic lights installed in the main / city roads shall be so programmed that there is minimum required stopping of the vehicular traffic on the roads.

(b) Phasing out old polluting vehicles :

All the commercial transport vehicles which are 15 years old shall not be passed and declared non-roadworthy.

(c) Increased monitoring of vehicles running without PUC certificate

Pollution Under Control (PUC) certificates of the vehicles are checked during routine traffic checking. There are 13 pollution check centres operating in the district. At the time of passing of vehicles also, it shall be ensured that the pollution check certificates are examined and the vehicles found without PUC certificate shall be asked to obtain the same before these are passed. The latest computerized equipment for checking of pollution level of the vehicles shall purchased. The estimated cost of this equipment is Rs.10.00 lacs. The vehicles, especially three-wheelers, using adulterated fuel will be impounded and check on adulteration will be carried out on fuel stations regularly.

3.3.5 Department of Police :

(a) Increased monitoring of vehicles running without PUC certificate.

There are lot of vehicles in Mandi Gobindgarh running without PUC certificates. The Department of Police shall undertake drives for challaning of vehicles running without PUC certificates on a continuous basis.

(b) Improved traffic management and Upgrading traffic lights

There is a need for identification of cross sections / points where the traffic lights need to be introduced with time controllers for better control of traffic. By introducing the time controllers, the fuel consumption of the vehicles shall be minimized.

(c) Implementation of Noise Rules, 2000

The department shall ensure the proper implementation of Noise Rules 2000 for control of pollution from D.G. sets and other non-point sources.

3.3.6 Department of Forests :

The Deptt. of Forests in Distt. Fatehgarh Sahib have prepared a comprehensive action plan for greening Mandi Gobindgarh. The salient features of the action plan are encapsulated as under :-

a) In Phase-I, 50,000 saplings shall be planted by the Forest Department in collaboration and with various departments in the urban areas by 31/8/2010 and in Phase-II, saplings in 35 hac. in rural areas around Mandi Gobindgarh shall be planted by 31/3/2011.

b) 50,000 saplings of trees, shrubs and herbs shall be distributed free of cost by the Forest Department through its nurseries to the Educational Institutions, Medical Institutions, NGOs etc. to be planted on public / private lands in and around Mandi Gobindgarh. Massive plantation drive in schools, colleges, residential colonies, villages, hospitals, and other public and private lands shall be launched as a part of 'Van Mahotsava' celebrations.

c) Plantation of hardy, shade giving, long living and pollution abating species in the polluting clusters shall be done.

d) More emphasis will be laid on plantation of indigenous fruit trees like Neem, Mango, Piple, Jamun etc. to increase avian population. Special species shall be selected for plantation under the electric lines and telephone lines.

3.3.7 PWD (B & R) :

(a) Improvement in the road conditions and provision of green belt along the road

For smooth flow of traffic and to avoid any crowding and reduction in the consumption of fuel and consequently decrease in the pollution level, it is utmost essential that the roads be widened to the extent possible and duly carpeted. The damaged roads must be repaired and re-carpeted. The plantation is done along the road sides as per availability of land. The Deptt. of PWD (B&R) is undertaking such activities under its jurisdiction on a regular basis. A bye-pass from Amloh Road to G.T. Road in Mandi Gobindgarh area is being planned at a cost of Rs.9.0 Crores. The project proposal has been sent to Punjab Mandi Board for funding the same.

3.3.8 District Administration, Fatehgarh Sahib :

The District Administration, Fatehgarh Sahib will be requested to monitor the implementation the various development schemes of the Government in a time bound manner, so as to improve the environment of Mandi Gobindgarh. The various activities to be monitored by the Distt. Administration are listed as under:

i) To impose complete ban on the stubble burning in the agricultural fields around Mandi Gobindgarh.

ii) Continuous monitoring regarding the use of loud speaker and sound system by the religious places and marriage palaces.

3.3.9 Punjab State Council for Science & Technology :

The Punjab State Council for Science & Technology will take necessary steps for evolving cleaner technologies for abatement of pollution at the source by installing pilot plants so as to encourage the entrepreneurs.

3.3.10 Central Ground Water Authority :

The Central Ground Water Authority shall take necessary steps to stop the over exploitation of ground water.

3.3.11 Department of Agriculture

The Department of Agriculture propagate sustainable technology for the bio-methanization of the agricultural waste including the compost facilities so as to avoid un-controlled burning of agricultural residue and emitting of gases like methane. The department will also undertake a campaign in the rural areas of Mandi Gobindgarh through print as well as electronic media to make the farmers aware regarding the ill effects of stubble burning.

3.3.12 Department of Health & Family Welfare

The Department shall plan to carryout health study in and around Mandi Gobindgarh during the implementation of the Action Plan in order to understand the impact of abatement of pollution on the health of residents of Mandi Gobindgarh. In the study, biannual health camps will be organized in different locations of Mandi Gobindgarh, wherein, the data regarding the ailments prevailing among the population related to pollution problems will be collected. Two camps each shall be organized in different localities like industrial area, slum areas and city areas separately. The first such camps will be organized in

the month of August, 2010 and thereafter in January, 2011 followed by camps at six months interval.

3.4 Time Lines for Implementation of Action Plan

S.No.	Name of the Department	Ref. of Point No. & Page No. in the Action Plan	Activity	Target date
1.	Punjab Pollution Control Board	Point No.3.3.1 (A)(a) at Page-25	Upgradation of fugitive emission collection system of induction furnaces.	(a) Preparation of design of modified air pollution control system by IIT, Roorkee by **15.11.2010** (b) Installation, **commissio n-ning & monitoring** of pilot plant by **28.2.2011.** (c) Replication by other similar units by **30.9.2011**.

		Point No.3.3.1 (A)(b) at Page-26	Use of CNG as fuel in induction furnaces in place of electricity.	IIT, Delhi to explore the possibility and submit report in this regard by 31.12.2010.
		Point No.3.3.1 (A)(c) at Page-26	Installation of online monitoring system.	(i) Pilot project in NFL, Naya Nangal by 31.3.2011 (ii) To be emulated by the large scale polluting industries in Mandi Gobindgarh within six months after successful commission-ing of the pilot project.
		Point No.3.3.1 (B)(i) at Page-27	Major/Minor repairs of air pollution control systems	By 31.12.2010.

		Point No.3.3.1 (B)(ii) at Page-27	Switching over to tunnel type kiln by refractory units.	By 30.6.2011.
		Point No.3.3.1 (B)(iii) at Page-28	Optimization of blower speed by the re-rolling mills to control fugitive emissions from the charging door.	By 31.3.2011.
		Point No.3.3.1 (B)(vi) at Page-29	Optimization of suction system by the forging units to control fugitive emissions from the charging door.	By 31.3.2011.
		Point No.3.3.1 (C)(a) at Page-29	Vigorous monitoring of the air and water polluting industries.	Continuous process.
		Point No.3.3.1 (C)(c) at Page-30	(i) Shifting of hazardous waste to the Common TSDF by the industries. (ii) To carry	By 31.12.2010. By 31.3.2011.

			out feasibility studies for GPS based tracking system for hazardous waste going to TSDF.	
		Point No.3.3.1 (C)(d) at Page-30	Preparation of inventory of E-waste	By 31.3.2011
		Point No.3.3.1 (C)(f) at Page-30	Proper management of solid waste generated from cooling water recirculation tanks	By 31.3.2011.
		Point No.3.3.1 (C)(j) at Page-31	Provision of canopy on the D.G. sets installed by the existing industries.	By 31.3.2011.
		Point No.3.3.1 (D) at Page-32-34	(i) Upgradation of groundwater monitoring network. (ii) Upgradation of ambient air quality monitoring	By 31.12.2010. By 30.9.2011 subject to availability of funds.

			network. (iii) Regular monitoring of surface water bodies. (iv) Source apportionment studies.	Continuous process. Within two years after the framing of guidelines by the CPCB in this regard.
2.	Deptt. of Industries and Commerce/ Punjab Small Industries & Export Corporation / PSIDC	Point No.3.3.2 (A)(a) at Page-34	➢ Supply of CNG to rolling mills and forging units through the gas pipeline being laid by GAIL (Gas Authority of India Ltd.)	Completion of work of laying the gas pipeline by June, 2011 and supply of gas to the industries immediately thereafter.
		Point No.3.3.2 (A)(b) at Page-34	➢ Provision of environmental infrastructure in Focal Point, Mandi Gobindgarh including wastewater treatment facilities, improved water supply,	(i) Repair of sewerage system by 31.3.2011. (ii) Provision of treatment & disposal facilities by 31.12.2011.

			road infrastructure, parking facilities and green cover within the industrial areas.	
		Point No.3.3.2 (B)(a) at Page-34	➢ Shifting of industries, which are located in the non-designed areas, to the designated areas	As per provisions of Master Plan to be notified by the Govt. for Mandi Gobindgarh.
		Point No.3.3.2 (B)(b) at Page-34	➢ Awareness campaign to increase green cover in industrial areas.	Continuous
3.	Local Bodies	Point No.3.3.3 (A)(a) at Page-35	➢ Installation of STP and disposal of treated wastewater onto land for irrigation / plantation.	31/12/2011

			➢ Laying of sewer lines in remaining areas and connecting with the sewage treatment facilities.	31/12/2011
		Point No.3.3.3 (A)(b) at Page-35	➢ Development of engineered municipal solid waste dump site and compliance of provisions of the Municipal Solid Waste (Management & Handling) Rules, 2000.	➢ Identification of land fill site by 30.9.2010. ➢ Development of land fill site by 31.12.2011.
		Point No.3.3.3 (B)(a) at Page-36	➢ Improvement of road infrastructure for better and smooth traffic movement.	Continuous
			➢ Upgrading traffic lights for smooth traffic movement.	• Identification of congested traffic cross sections by 30/9/2010. • Upgradation

				and implementation of plan by 31/12/2010.
		Point No.3.3.3 (B)(b) at Page-36	➢ Steps for compulsory installation of rainwater harvesting structure by the different establishments within the city.	Continuous
		Point No.3.3.3 (B)(c) at Page-36	➢ Increasing green cover in city and provision of green belt / buffer zones separating industrial areas from residential areas.	➢ First phase of plantation by 31/8/2010. ➢ Second phase of plantation by 28/2/2011. ➢ Plantation shall be done regularly.
		-	➢ Mandatory requirement to provide canopies with the exiting D.G sets alongwith	➢ Existing D.G. sets by 31/12/2010.

			stacks as per norms fixed by the Punjab Pollution Control Board and not to allow any shop, office / commercial establishment to install D.G. sets without canopy and to take policy decision regarding regulation of D.G. sets in residential houses.	
4.	Deptt. of Transport	Point No.3.3.4 (a) at Page-37	➢ Plan for effective traffic management including provision of traffic lights, notification of one way traffic, parking of vehicles at	Traffic management plan to be prepared by 31/12/2010 and to be implemented thereafter on regular basis.

			the designated place, challaning of polluting vehicles etc.	
		Point No.3.3.4 (b) at Page-37	➢ Phasing out of 15 years old commercial transport vehicles.	Continuous
		Point No.3.3.4 (c) at Page-37	➢ Increased monitoring of vehicles running without P.U.C certificates.	Continuous
			➢ Banning of pressure horns.	Continuous
		Point No.3.3.4 (c) at Page-37	➢ Checking the use of adulterated fuel and impounding of such vehicles.	Continuous

5.	Police	Point No.3.3.5 (a) at Page-38	➢ Increased monitoring of vehicles running without pollution under control certificate.	Continuous
		Point No.3.3.5 (b) at Page-38	➢ Formation and implementation of proper traffic management plan for smooth flow of traffic.	30/9/2010
		Point No.3.3.5 (c) at Page-38	➢ Implementation of Noise (Prevention & Control of Pollution) Act, 2000 for control of noise from D.G. sets and other non-point sources.	Continuous
6.	Deptt. of Forests	Point No.3.3.6 (a) at Page-39	➢ Implementation of Action Plan for greening	31.3.2011.

			Mandi Gobindgarh	
7.	PWD (B&R)	Point No.3.3.7 (a) at Page-39	➢ Improving road conditions for smooth movement of traffic and provision of flyovers / underpasses etc.	➢ Identification of traffic bottlenecks and preparation of scheme by 31/12/2010. ➢ Implementation of scheme regarding flyovers / underpasses by 31/12/2012.
			➢ Increasing green cover on roadside under their jurisdiction.	➢ Identification of vacant land for plantation by 30/9/2010. ➢ Preparation of plan for plantation by 30/9/2010. ➢ Plantation in the entire vacant land by 31/3/2011.
8.	District Administration	Point No.3.3.8 (i) at Page-40	➢ To impose complete ban on the stubble burning in the agricultural	30/9/2010.

			fields around Mandi Gobindgarh.	
		Point No.3.3.8 (ii) at Page-40	➢ Regulate the use of loud speaker and sound system by the religious places and marriage palaces.	Immediate
9.	Punjab State Council for Science and Technology	Point No.3.3.9 at Page-40	➢ Evolving of cleaner technologies and installation of pilot plants for improved effluent/ emissions treatment technologies.	Continuous
10.	Central Ground Water Authority	Point No.3.3.10 at Page-40	➢ To stop the over exploitation of ground water.	➢ To create awareness among the masses regarding exploitation of ground water through print and electronic

				media.
11.	Deptt. of Agriculture	Point No.3.3.11 at Page-41	➢ To propagate sustainable technology for bio-methanization of agricultural waste including compost facilities.	➢ To launch awareness campaign in the rural areas of Mandi Gobindgarh through print and electronic media.
12.	Department of Health & Family Welfare	Point No.3.3.12 at Page-41	➢ Organization of Health Camps	➢ First phase will be started in August, 2010. Thereafter in January, 2011 followed by every six months.

The activities to be carried out by the various departments shall be coordinated by the Punjab Pollution Control Board to implement the action plan.

With the implementation of the above Action Plan, it is expected that the major environmental problems being faced by Mandi Gobindgarh will be addressed by 31.12.2011 and it will go a long way in improving the environment of Mandi Gobindgarh making it health as well as green.

Chapter-4

Financial Aspects of Mandi Gobindgarh Action Plan

To implement the Mandi Gobindgarh Action Plan for abatement of pollution, a lot of infrastructure as well as capacity enhancement activities at the organization level are required to be undertaken. The various components of the Action Plans have already been discussed in the previous chapters. A comprehensive summary of the financial outlay of the Mandi Gobindgarh Action Plan is given as under:

Sr. no.	Proposed Activities	Executing Agency	Finance required (In Rs.)	Funding pattern	Status of Project
1.	Improvement of Emission Collection System in Induction Furnaces (Installation of two pilot plants in two induction furnace units of Mandi Gobindgarh as per design of IIT, Roorkee)	Punjab Pollution Control Board	48.61 Lacs	50% by MoEF & 50% by the concerned industry	Detailed project report submitted to the Ministry of Environ-ment & Forests.
2.	Purchase of one mobile laboratory for vigorous monitoring of pollution control devices installed by the industries at Mandi Gobindgarh	Punjab Pollution Control Board	42.00 lacs	100% by MoEF	DPR under preparation.

3.	Purchase of two vehicles to step up monitoring of industries in Mandi Gobindgarh	Punjab Pollution Control Board	20.00 lacs	100% by MoEF	DPR under preparation.
4.	Installation of continuous Ambient Air Quality Monitoring station (for analyzing all the 12 parameters) at Mandi Gobindgarh	Punjab Pollution Control Board	48.00 lacs	100% by MoEF	DPR under preparation.
5.	Installation of four new Ambient Air Quality Monitoring stations at Mandi Gobindgarh	Punjab Pollution Control Board	78.00 lacs	100% by MoEF	DPR under preparation.
6.	Installation of STP at Mandi Gobindgarh	Deptt. of Local Bodies	87.31 Crores	100% by MoEF	DPR has been prepared and submitted to NRCD (MoEF) for approval
7.	Purchase of latest computerized analyzers for checking pollution levels of petrol and diesel driven vehicles.	Deptt. of Transport	10.00 lacs	100% by MoEF	DPR under preparation
Total			**89.78 Crores**	**-**	**-**

Chapter - 5

EXPECTED IMPACT ON THE COMPREHENSIVE ENVIRONMENT POLLUTION INDEX

The present action plan for abatement of pollution in the critically polluted area of Mandi Gobindgarh has been prepared keeping in view the present environmental quality based on the Comprehensive Environment Pollution Index (CEPI). The CEPI score for Mandi Gobindgarh has been observed to be 75.08 by CPCB, which is cumulative score of the environment pollution index calculated for the Air (62.0), Water (55.50) and Land (62.0), separately.

While calculating the score for Comprehensive Environment Pollution Index for Air Environment Quality for Mandi Gobindgarh, pollutants like RSPM, SOx and NOx have been taken as the critical pollutants. RSPM and SOx pollutants belong to Group-B pollutants (organics probable Carcinogens), whereas NOx is Group-A pollutant. The Exceedence Factor in regard to these pollutants has been observed to be more than 1.5. Also, symptoms of exposure to eco-geological features have been observed. A part of the population (20,000) residing in Mandi Gobindgarh has been observed to be potentially affected and the level of exposure has been observed to be critical. The additional high risk element has been assigned due to lack of common action plan for control of the pollutants. The presence of these critical pollutants is basically related to the pollution caused mainly due to the fugitive emissions generated from the Arc/Induction furnaces as well as Rolling Mills. Vehicular traffic passing through the town (on NH-1) is also contributing to the pollution levels.

Environment Pollution Index calculations for Water Environment Quality have considered BOD, Fecal Colli. and Ammonium Nitrate as the critical pollutants, which belong to Group-B of the pollutants (organics probably carcinogens). The identification of critical pollutants is based on "Surface water quality monitoring data of Ghaggar River near Mandi Gobindgarh by PPCB, from Status of Water Quality in India – 2007 report, Monitoring of Indian Aquatic Resources, Series: MINARS/29/2008-2009 (Table 18.5)". The ambient pollutant conc. has been calculated to be high as the Exceedence Factor is between 1.0 - 1.5. Some evidence of symptoms of exposure on the people and eco-geological features has been reported. Non-availability of the common sewage treatment plant facilities has been considered as the additional high risk factor. The moderate score of water environment pollution index indicates the requirement of installation of adequate common sewage treatment plant for the domestic effluent in order to improve the water environment quality.

The high score of Land CEPI is due to the presence of TDS, Chloride and SO_4 in the ground water of Mandi Gobindgarh. Symptoms of exposure and adverse impact on eco-geological features have also been reported.

On perusal of the above discussion, it has been observed that the air, water and land environment of the Mandi Gobindgarh has been affected mainly due to the pollution caused by the fugitive emissions from the steel and allied industries, lack of common sewage treatment plant and engineered common municipal solid waste disposal site, respectively.

The action plan has been prepared keeping in view all the above factors. Action Plan includes installation of the sewage treatment plant for the

domestic effluent, development of engineered common municipal solid waste treatment and disposal facility, improvement/upgradation in the pollution control devices installed by the various industries and management of the vehicular traffic. With the implementation of the Action Plan, majority of the pollutants reported to be critical will reduce significantly resulting in the overall improvement of the environment in the area.

The Punjab Pollution Control Board expects that the Comprehensive Environment Pollution Index score will come down to 43.90 with the implementation of the Action Plan. The detailed calculations regarding the expected Comprehensive Environmental Pollution Control Index are annexed as per Annexure-A, B, C & D. The comparative chart of expected CEPI Score of after the implementation of Action Plan is annexed as Annexure-E.

Chapter-6

RECOMMENDATIONS

The Action Plan for abatement of pollution in critically polluted area of Mandi Gobindgarh will be implemented within the municipal limits of Mandi Gobindgarh and adjoining Khanna area with a special emphasis on the pollution control in the industrial clusters. The various sources of pollution effecting the environment of Mandi Gobindgarh have been identified in the Action Plan, which mainly include water pollution, air pollution and ground water pollution. The areas of work for different departments with time frame have also been mapped out. The major requirements for the improvement of the environmental parameters are upgradation of air pollution control devices, especially by induction furnace units, installation of sewage treatment plant and proper disposal of municipal solid waste.

Some funds are being requested through this Action Plan. It is requested that the funds may be provided immediately for the speedy and time bound implementation of the Action Plan.

Regarding the moratorium on the establishments of new/ expansion of existing industries in the project area, the following recommendations are made:

(i) Moratorium on establishment and expansion of industries falling under the following Red Categories of industries as defined vide Board's circular No.GPC/NIP/F-10/2010/4 dated 17.2.2010 will be imposed within the municipal limits of Mandi Gobindgarh and adjoining Khanna area (Cluster VII & VIII) till 31/12/2010. However, the Govt. of Punjab may review the

decision on moratorium after 31/12/2010 based on progress in the implementation of Action Plan:

(I) Part-A categories (17 category highly polluting industries)

(II) Part-B categories as under:

(a) Industrial process involving foundry operations.

(b) Lead re-processing & manufacturing including lead smelting.

(c) Steel and steel products including coke plants involving use of any of the equipments such as blast furnaces, open hearth furnace, induction furnace or an arc furnace etc. or any of the operations or processes such as heat treatment, acid pickling, rolling or galvanizing etc.

(d) Ferrous and Non-Ferrous Metal Extraction, Refining, Melting, Smelting, Coating, Forging, Alloy making process etc.

(ii) The remaining red category industries and orange category industries identified by the Board, will be allowed to establish or expand after detailed scrutiny with proposal for reuse/ recycle/ recovery of wastes, within the designated industrial areas.

(iii) All the green category of industries will be allowed to establish or expand within the designated industrial areas.

(iv) In order to monitor the implementation of the Action Plan, a High Level Steering Committee of all the stakeholders i.e. the participating departments, representative of SPV/ Industrial Association will be constituted under the chairmanship of the Chief Secretary, Govt. of Punjab. The Steering Committee shall meet on quarterly basis to monitor the progress of implementation of the Action Plan.

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ANNEXURE-A

Calculation details of expected CEPI after the implementation of Action Plan for Mandi Gobindgarh, Punjab

I. Calculation of CEPI in respect of air environment

Present Calculation of CEPI by CPCB			**Calculations of expected CEPI by PPCB as on 31.12.2010**		
(A) POLLUTANTS			**(A) POLLUTANTS**		
Pollutants	**Category**		**Pollutants**	**Category**	
RSPM`	B		RSPM`	B	
SOx	B		Sox	B	
NOx	A		NOx	A	
A1 = 4 (2+2)			**A1 = 3 (2+1)**		
R17	-		R17	-	
R54	354		R54	354	
A2 = 5			**A2 = 5**		
A = 4 x 5 = 20			**A = 3 x 5 = 15**		
(B) PATHWAY			**(B) PATHWAY**		
Pollutants	**Average Conc.***	**Exceedence Factor**	**Pollutants**	**Average Conc.***	**Exepcted Exceedence Factor**
RSPM`	237	3.95	RSPM`	-	> 1.5
SOx	12.2	0.244	Sox	-	
NOx	29.2	0.73	NOx	-	
Source: Ambient Air Quality Data Annual Average for MGG by PPCB, *Annexure I-Table 1			***The samples will be collected through the implementation of the Action Plan.**		
B1= 6			**B1= 6**		
B2 = 3 (Symptoms of exposure on People)			**B2 = 3 (Symptoms of exposure on People)**		
B3 = 6 (Symptoms of exposure on Eco-geological features)			**B3 = 0 (No reliable evidence of exposure on eco-geological features)**		
B = $B_1+B_2+B_3$ = 6+3+6=15			**B = 6+3+0=9**		

(C) RECEPTOR			**(C) RECEPTOR**		
Population Exposed: 20,000			**Population Exposed: 25,500**		
C1 = 3			**C1 = 3**		
Pollutants	**Samples Exceeded/ total no. of samples x EF**	**SNLF**	**Pollutants**	**Samples Exceeded/ total no. of samples x EF**	**Expected SNLF**
RSPM`	9/9 x 3.95	3.95	RSPM`	-	≥ 0.5
SOx	0/9 x 0.244	0	SOx	-	
NOx	2/9 x 0.73	0.162	NOx	-	
C2 = 3+1=4			**C2 = 3+1= 4**		
C3 = 5 (Risk to sensitive receptors = Yes)			**C3 = 5 (Risk to sensitive receptors = Yes)**		
C = $(C_1 x C_2)+C_3$= (3x4) + 5= 17			**C = (3 x 4) + 5= 17**		
D. Additional High Risk Exposure					
D = 10			**D = 10**		
Air CEPI = A+B+C+D = 62			**Expected Air CEPI =15+9+17+10= 51**		

II. <u>Calculation of CEPI in respect of water environment</u>

Calculations by CPCB		**Expected Calculations**	
(A) POLLUTANTS		**(A) POLLUTANTS**	
Pollutants	**Category**	**Pollutants**	**Category**
BOD	B	BOD	B
FC	B	FC	B
NH_3-N	B	NH_3-N	B
A1 = 2+1=3		**A1 = 2+1 = 3**	
R17	-	R17	-
R54	354	R54	354
A2 = 5		**A2 = 5**	
A = 3 x 5 = 15		**A =3 x 5 = 15**	

(B) PATHWAY			**(B) PATHWAY**		
Pollutants	**Average Conc.***	**Exceedence Factor**	**Pollutants**	**Average Conc.***	**Expected Exceedence Factor**
BOD	5.1	1.02	BOD	-	1.0 - 1.5
NH_3-N	1.9	1.26	NH_3-N	-	
*Source: Surface water quality monitoring data of Ghaggar River near MGG by PPCB, from Status of Water Quality in India – 2007 report, Monitoring of Indian Aquatic Resources, Series: MINARS/29/2008-2009 (Table 18.5)			***The samples will be collected during the implementation of the Action Plan.**		
B1= 3+1=4			**B1= 3+1=4**		
B2 = 3 (Symptoms of exposure on People)			**B2 = 0 (No reliable evidence of exposure on people)**		
B3 = 4.5 (Symptoms of exposure on eco-geological features)			**B3 = 0 (No reliable evidence of exposure on eco-geological features)**		
B = $B_1+B_2+B_3$ = 4+3+4.5=11.5			**B = 4+0+0=4**		
(C) RECEPTOR			**(C) RECEPTOR**		
Population Exposed: 20,000			**Population Exposed: 25,500**		
C1 = 3			**C1 = 3**		
Pollutants	**Samples Exceeded/ total no. of samples x EF**	**SNLF**	**Pollutants**	**Samples Exceeded/ total no. of samples x EF**	**Expected SNLF**
BOD	1/2 x 1.02	0.51	BOD	-	0.25 – 0.5
NH_3-N	1/2 x 1.26	0.63	NH_3-N	-	
C2 = 2+1=3			**C2= 2+1=3**		
C3 = 5 (Risk to sensitive receptors = Yes)			C3 = 0 (Risk to sensitive receptors = No)		
C = (C1x C2) + C3 = (3 x3) + 5= 14			**C = (3 x 3) + 0 = 9**		

D = 15 (Small/medium scale industries having inadequate treatment facilities as well as common treatment facilities are not existing)	**D** = 10
Water CEPI = A+B+C+D = 15+11.5+14+15 = 55.50	**Water CEPI = 15+4+9+10= 38**

III. <u>Calculation of CEPI in respect of land environment</u>

Calculation by CPCB			**Expected Calculations**		
(A) POLLUTANTS			**(A) POLLUTANTS**		
Pollutants	**Category**		**Pollutants**		**Category**
TDS	B		TDS		B
Cl	B		Cl		B
SO_4	B		SO_4		B
A1 = 4			**A1 = 2+1=3**		
R17	-		R17		-
R54	354		R54		354
A2 = 5			**A2 = 5**		
A = 4 x 5 = 20			**A = 3 x 5 = 15**		
(B) PATHWAY			**(B) PATHWAY**		
Pollutants	**Average Conc.***	**Exceedence Factor**	**Pollutants**	**Average Conc.***	**Expected Exceedence Factor**
TDS	645	1.29	TDS	-	1.0 - 1.5
Cl	37	0.148	Cl	-	
SO_4	23.6	0.118	SO_4	-	
*Source: Ground water quality data for MGG by PPCB, Annexure-1 – Table-3)			***The samples will be collected during the implementation of the Action Plan.**		
B1= 3+1=4			**B1= 3+1=4**		
B2 = 3(Symptoms of exposure on People)			**B2 = 0 (No reliable evidence of exposure on People)**		
B3 = 4.5 (Symptoms of exposure on Eco-geological features)			**B3 = 0 (No reliable evidence of exposure on Eco-geological features)**		
B = B1+B2+B3= 4+3+4.5= 11.5			**B = 4+0+0=4**		

(C) RECEPTOR			**(C) RECEPTOR**		
Population Exposed: 20,000			**Population Exposed: 25,500**		
C1 = 3			**C1 = 3**		
Pollutants	**Samples Exceeded/ total no. of samples x EF**	**SNLF**	**Pollutants**	**Samples Exceeded/ total no. of samples x EF**	**Expected SNLF**
TDS	3/3 x 1.29	1.29	TDS	-	0.25 – 0.5
Cl	0/3 x 0.148	0	Cl	-	
SO_4	0/3 x 0.118	0	SO_4	-	
C2 = 2+1=3.5			**C2 = 2+1=3**		
C3 = 5 (Risk to sensitive receptors = Yes)			C3 = 0 (No Risk to sensitive receptors)		
C = (C_1xC_2)++C_3 = (3x3.5)+5=15.5			**C = (3x3)+0=9**		
D = 15 (Small/medium scale industries having inadequate treatment facilities as well as common treatment facilities are not existing)			**D** = 10		
Land CEPI = A+B+C+D= 20+11.5+15.5+15=62			**Expected Land CEPI = 15+4+9+10=38**		

Cumulative Environment Pollution Index

CEPI = i_m+[(100 - i_m) x (i_2/100 x i_3/100)]

As Calculated by Central Pollution Control Board	**Expected after implementation of Action Plan**
CEPI=62+[(100-62)x (55.5/100x62/100)] = 75.08	**CEPI=51+[(100-51)x (38/100x38/100)] = 58.07**

ANNEXURE-B

Calculation details of expected CEPI after the implementation of Action Plan for Mandi Gobindgarh, Punjab

I. Calculation of CEPI in respect of air environment

<table>
<tr><td colspan="3">Present Calculation of CEPI by CPCB</td><td colspan="3">Calculations of expected CEPI by PPCB as on 30.6.2011</td></tr>
<tr><td colspan="3">(A) POLLUTANTS</td><td colspan="3">(A) POLLUTANTS</td></tr>
<tr><td>Pollutants</td><td colspan="2">Category</td><td>Pollutants</td><td colspan="2">Category</td></tr>
<tr><td>RSPM`</td><td colspan="2">B</td><td>RSPM`</td><td colspan="2">B</td></tr>
<tr><td>SOx</td><td colspan="2">B</td><td>Sox</td><td colspan="2">B</td></tr>
<tr><td>NOx</td><td colspan="2">A</td><td>NOx</td><td colspan="2">A</td></tr>
<tr><td colspan="3">A1 = 4 (2+2)</td><td colspan="3">A1 = 3 (2+1)</td></tr>
<tr><td>R17</td><td colspan="2">-</td><td>R17</td><td colspan="2">-</td></tr>
<tr><td>R54</td><td colspan="2">354</td><td>R54</td><td colspan="2">354</td></tr>
<tr><td colspan="3">A2 = 5</td><td colspan="3">A2 = 5</td></tr>
<tr><td colspan="3">A = 4 x 5 = 20</td><td colspan="3">A = 3 x 5 = 15</td></tr>
<tr><td colspan="3">(B) PATHWAY</td><td colspan="3">(B) PATHWAY</td></tr>
<tr><td>Pollutants</td><td>Average Conc.*</td><td>Exceedence Factor</td><td>Pollutants</td><td>Average Conc.*</td><td>Exepcted Exceedence Factor</td></tr>
<tr><td>RSPM`</td><td>237</td><td>3.95</td><td>RSPM`</td><td>-</td><td rowspan="3">1.0 – 1.5</td></tr>
<tr><td>SOx</td><td>12.2</td><td>0.244</td><td>Sox</td><td>-</td></tr>
<tr><td>NOx</td><td>29.2</td><td>0.73</td><td>NOx</td><td>-</td></tr>
<tr><td colspan="3">*Source: Ambient Air Quality Data Annual Average for MGG by PPCB, Annexure I-Table 1</td><td colspan="3">*The samples will be collected through the implementation of the Action Plan.</td></tr>
<tr><td colspan="3">B1= 6</td><td colspan="3">B1= 3+1=4</td></tr>
<tr><td colspan="3">B2 = 3 (Symptoms of exposure on People)</td><td colspan="3">B2 = 3 (Symptoms of exposure on People)</td></tr>
<tr><td colspan="3">B3 = 6 (Symptoms of exposure on Eco-geological features)</td><td colspan="3">B3 = 0 (No reliable evidence of exposure on eco-geological features)</td></tr>
<tr><td colspan="3">B = $B_1+B_2+B_3$ = 6+3+6=15</td><td colspan="3">B = 4+3+0=7</td></tr>
</table>

(C) RECEPTOR			**(C) RECEPTOR**		
Population Exposed: 20,000			**Population Exposed: 26,000**		
C1 = 3			**C1 = 3**		
Pollutants	**Samples Exceeded/ total no. of samples x EF**	**SNLF**	**Pollutants**	**Samples Exceeded/ total no. of samples x EF**	**Expected SNLF**
RSPM`	9/9 x 3.95	3.95	RSPM`	-	≥ 0.5
SOx	0/9 x 0.244	0	SOx	-	
NOx	2/9 x 0.73	0.162	NOx	-	
C2 = 3+1=4			**C2 = 3+1= 4**		
C3 = 5 (Risk to sensitive receptors = Yes)			**C3 = 5 (Risk to sensitive receptors = Yes)**		
C = $(C_1 x C_2)+C_3$= (3x4) + 5= 17			**C = (3 x 4) + 5= 17**		
D. Additional High Risk Exposure					
D = 10			**D = 10**		
Air CEPI = A+B+C+D = 62			**Expected Air CEPI =15+7+17+10= 49**		

II. <u>Calculation of CEPI in respect of water environment</u>

Calculations by CPCB		**Expected Calculations**	
(A) POLLUTANTS		**(A) POLLUTANTS**	
Pollutants	**Category**	**Pollutants**	**Category**
BOD	B	BOD	B
FC	B	FC	B
NH_3-N	B	NH_3-N	B
A1 = 2+1=3		**A1 = 2+1 = 3**	
R17	-	R17	-
R54	354	R54	354
A2 = 5		**A2 = 5**	
A = 3 x 5 = 15		**A =3 x 5 = 15**	

(B) PATHWAY			**(B) PATHWAY**		
Pollutants	**Average Conc.***	**Exceedence Factor**	**Pollutants**	**Average Conc.***	**Expected Exceedence Factor**
BOD	5.1	1.02	BOD	-	1.0 - 1.5
NH_3-N	1.9	1.26	NH_3-N	-	
*Source: Surface water quality monitoring data of Ghaggar River near MGG by PPCB, from Status of Water Quality in India – 2007 report, Monitoring of Indian Aquatic Resources, Series: MINARS/29/2008-2009 (Table 18.5)			***The samples will be collected during the implementation of the Action Plan.**		
B1= 3+1=4			**B1= 3+1=4**		
B2 = 3 (Symptoms of exposure on People)			**B2 = 0 (No reliable evidence of exposure on people)**		
B3 = 4.5 (Symptoms of exposure on eco-geological features)			**B3 = 0 (No reliable evidence of exposure on eco-geological features)**		
B = $B_1+B_2+B_3$ = 4+3+4.5=11.5			**B = 4+0+0=4**		
(C) RECEPTOR			**(C) RECEPTOR**		
Population Exposed: 20,000			**Population Exposed: 26,000**		
C1 = 3			**C1 = 3**		
Pollutants	**Samples Exceeded/ total no. of samples x EF**	**SNLF**	**Pollutants**	**Samples Exceeded/ total no. of samples x EF**	**Expected SNLF**
BOD	1/2 x 1.02	0.51	BOD	-	0.25 – 0.5
NH_3-N	1/2 x 1.26	0.63	NH_3-N	-	
C2 = 2+1=3			**C2= 2+1=3**		
C3 = 5 (Risk to sensitive receptors = Yes)			C3 = 0 (Risk to sensitive receptors = No)		
C = (C1x C2) + C3 = (3 x3) + 5= 14			**C = (3 x 3) + 0 = 9**		

D = 15 (Small/medium scale industries having inadequate treatment facilities as well as common treatment facilities are not existing)	**D** = 10
Water CEPI = A+B+C+D = 15+11.5+14+15 = 55.50	**Water CEPI = 15+4+9+10= 38**

III. Calculation of CEPI in respect of land environment

Calculation by CPCB			**Expected Calculations**		
(A) POLLUTANTS			**(A) POLLUTANTS**		
Pollutants	**Category**		**Pollutants**	**Category**	
TDS	B		TDS	B	
Cl	B		Cl	B	
SO_4	B		SO_4	B	
A1 = 4			**A1 = 2+1=3**		
R17	-		R17	-	
R54	354		R54	354	
A2 = 5			**A2 = 5**		
A = 4 x 5 = 20			**A = 3 x 5 = 15**		
(B) PATHWAY			**(B) PATHWAY**		
Pollutants	**Average Conc.***	**Exceedence Factor**	**Pollutants**	**Average Conc.***	**Expected Exceedence Factor**
TDS	645	1.29	TDS	-	1.0 - 1.5
Cl	37	0.148	Cl	-	
SO_4	23.6	0.118	SO_4	-	
*Source: Ground water quality data for MGG by PPCB, Annexure-1 – Table-3)			***The samples will be collected during the implementation of the Action Plan.**		
B1= 3+1=4			**B1= 3+1=4**		
B2 = 3(Symptoms of exposure on People)			**B2 = 0 (No reliable evidence of exposure on People)**		
B3 = 4.5 (Symptoms of exposure on Eco-geological features)			**B3 = 0 (No reliable evidence of exposure on Eco-geological features)**		
B = B1+B2+B3= 4+3+4.5= 11.5			**B = 4+0+0=4**		

(C) RECEPTOR			**(C) RECEPTOR**		
Population Exposed: 20,000			**Population Exposed: 26,000**		
C1 = 3			**C1 = 3**		
Pollutants	**Samples Exceeded/ total no. of samples x EF**	**SNLF**	**Pollutants**	**Samples Exceeded/ total no. of samples x EF**	**Expected SNLF**
TDS	3/3 x 1.29	1.29	TDS	-	1.0 – 1.5
Cl	0/3 x 0.148	0	Cl	-	
SO_4	0/3 x 0.118	0	SO_4	-	
C2 = 2+1=3.5			**C2 = 2+1=3**		
C3 = 5 (Risk to sensitive receptors = Yes)			C3 = 0 (No Risk to sensitive receptors)		
C = (C_1xC_2)++C_3 = (3x3.5)+5=15.5			**C = (3x3)+0=9**		
D = 15 (Small/medium scale industries having inadequate treatment facilities as well as common treatment facilities are not existing)			**D** = 10		
Land CEPI = A+B+C+D= 20+11.5+15.5+15=62			**Expected Land CEPI = 15+4+9+10=38**		

Cumulative Environment Pollution Index

CEPI = i_m+[(100 - i_m) x (i_2/100 x i_3/100)]

As Calculated by Central Pollution Control Board	**Expected after implementation of Action Plan**
CEPI=62+[(100-62)x (55.5/100x62/100)] = 75.08	**CEPI=49+[(100-49)x (38/100x38/100)] = 56.36**

ANNEXURE-C

Calculation details of expected CEPI after the implementation of Action Plan for Mandi Gobindgarh, Punjab

I. Calculation of CEPI in respect of air environment

<table>
<tr><td colspan="3">Present Calculation of CEPI by CPCB</td><td colspan="3">Calculations of expected CEPI by PPCB as on 31.12.2011</td></tr>
<tr><td colspan="3">(A) POLLUTANTS</td><td colspan="3">(A) POLLUTANTS</td></tr>
<tr><td>Pollutants</td><td colspan="2">Category</td><td>Pollutants</td><td colspan="2">Category</td></tr>
<tr><td>RSPM`</td><td colspan="2">B</td><td>RSPM`</td><td colspan="2">B</td></tr>
<tr><td>SOx</td><td colspan="2">B</td><td>Sox</td><td colspan="2">B</td></tr>
<tr><td>NOx</td><td colspan="2">A</td><td>NOx</td><td colspan="2">A</td></tr>
<tr><td colspan="3">A1 = 4 (2+2)</td><td colspan="3">A1 = 3 (2+1)</td></tr>
<tr><td>R17</td><td colspan="2">-</td><td>R17</td><td colspan="2">-</td></tr>
<tr><td>R54</td><td colspan="2">354</td><td>R54</td><td colspan="2">354</td></tr>
<tr><td colspan="3">A2 = 5</td><td colspan="3">A2 = 5</td></tr>
<tr><td colspan="3">A = 4 x 5 = 20</td><td colspan="3">A = 3 x 5 = 15</td></tr>
<tr><td colspan="3">(B) PATHWAY</td><td colspan="3">(B) PATHWAY</td></tr>
<tr><td>Pollutants</td><td>Average Conc.*</td><td>Exceedence Factor</td><td>Pollutants</td><td>Average Conc.*</td><td>Exepcted Exceedence Factor</td></tr>
<tr><td>RSPM`</td><td>237</td><td>3.95</td><td>RSPM`</td><td>-</td><td rowspan="3">0.5 – 1.0</td></tr>
<tr><td>SOx</td><td>12.2</td><td>0.244</td><td>Sox</td><td>-</td></tr>
<tr><td>NOx</td><td>29.2</td><td>0.73</td><td>NOx</td><td>-</td></tr>
<tr><td colspan="3">*Source: Ambient Air Quality Data Annual Average for MGG by PPCB, Annexure I-Table 1</td><td colspan="3">*The samples will be collected through the implementation of the Action Plan.</td></tr>
<tr><td colspan="3">B1= 6</td><td colspan="3">B1= 1+1=3</td></tr>
<tr><td colspan="3">B2 = 3 (Symptoms of exposure on People)</td><td colspan="3">B2 = 3 (Symptoms of exposure on People)</td></tr>
<tr><td colspan="3">B3 = 6 (Symptoms of exposure on Eco-geological features)</td><td colspan="3">B3 = 0 (No reliable evidence of exposure on eco-geological features)</td></tr>
<tr><td colspan="3">B = $B_1+B_2+B_3$ = 6+3+6=15</td><td colspan="3">B = 3+3+0=6</td></tr>
</table>

(C) RECEPTOR			**(C) RECEPTOR**		
Population Exposed: 20,000			**Population Exposed: 26,500**		
C1 = 3			**C1 = 3**		
Pollutants	**Samples Exceeded/ total no. of samples x EF**	**SNLF**	**Pollutants**	**Samples Exceeded/ total no. of samples x EF**	**Expected SNLF**
RSPM`	9/9 x 3.95	3.95	RSPM	-	0.25 – 0.5
SOx	0/9 x 0.244	0	Sox	-	
NOx	2/9 x 0.73	0.162	NOx	-	
C2 = 3+1=4			**C2 = 2+1= 3**		
C3 = 5 (Risk to sensitive receptors = Yes)			**C3 = 5 (Risk to sensitive receptors = Yes)**		
C = $(C_1 x C_2)+C_3$= (3x4) + 5= 17			**C = (3 x 3) + 5= 14**		
D. Additional High Risk Exposure					
D = 10			**D = 10**		
Air CEPI = A+B+C+D = 62			**Expected Air CEPI =15+6+14+10= 45**		

II. <u>Calculation of CEPI in respect of water environment</u>

Calculations by CPCB		**Expected Calculations**	
(A) POLLUTANTS		**(A) POLLUTANTS**	
Pollutants	**Category**	**Pollutants**	**Category**
BOD	B	BOD	B
FC	B	FC	B
NH_3-N	B	NH_3-N	B
A1 = 2+1=3		**A1 = 2+1 = 3**	
R17	-	R17	-
R54	354	R54	354
A2 = 5		**A2 = 5**	
A = 3 x 5 = 15		**A =3 x 5 = 15**	

(B) PATHWAY			**(B) PATHWAY**		
Pollutants	**Average Conc.***	**Exceedence Factor**	**Pollutants**	**Average Conc.***	**Expected Exceedence Factor**
BOD	5.1	1.02	BOD	-	1.0 - 1.5
NH_3-N	1.9	1.26	NH_3-N	-	
*Source: Surface water quality monitoring data of Ghaggar River near MGG by PPCB, from Status of Water Quality in India – 2007 report, Monitoring of Indian Aquatic Resources, Series: MINARS/29/2008-2009 (Table 18.5)			***The samples will be collected during the implementation of the Action Plan.**		
B1= 3+1=4			**B1= 3+1=4**		
B2 = 3 (Symptoms of exposure on People)			**B2 = 0 (No reliable evidence of exposure on people)**		
B3 = 4.5 (Symptoms of exposure on eco-geological features)			**B3 = 0 (No reliable evidence of exposure on eco-geological features)**		
B = $B_1+B_2+B_3$ = 4+3+4.5=11.5			**B = 4+0+0=4**		
(C) RECEPTOR			**(C) RECEPTOR**		
Population Exposed: 20,000			**Population Exposed: 26,500**		
C1 = 3			**C1 = 3**		
Pollutants	**Samples Exceeded/ total no. of samples x EF**	**SNLF**	**Pollutants**	**Samples Exceeded/ total no. of samples x EF**	**Expected SNLF**
BOD	1/2 x 1.02	0.51	BOD	-	0.25 – 0.5
NH_3-N	1/2 x 1.26	0.63	NH_3-N	-	
C2 = 2+1=3			**C2= 2+1=3**		
C3 = 5 (Risk to sensitive receptors = Yes)			C3 = 0 (Risk to sensitive receptors = No)		
C = (C1x C2) + C3 = (3 x3) + 5= 14			**C = (3 x 3) + 0 = 9**		

D = 15 (Small/medium scale industries having inadequate treatment facilities as well as common treatment facilities are not existing)	**D** = 10
Water CEPI = A+B+C+D = 15+11.5+14+15 = 55.50	**Water CEPI = 15+4+9+10= 38**

III. Calculation of CEPI in respect of land environment

Calculation by CPCB			**Expected Calculations**		
(A) POLLUTANTS			**(A) POLLUTANTS**		
Pollutants	**Category**		**Pollutants**	**Category**	
TDS	B		TDS	B	
Cl	B		Cl	B	
SO_4	B		SO_4	B	
A1 = 4			**A1 = 2+1=3**		
R17	-		R17	-	
R54	354		R54	354	
A2 = 5			**A2 = 5**		
A = 4 x 5 = 20			**A = 3 x 5 = 15**		
(B) PATHWAY			**(B) PATHWAY**		
Pollutants	**Average Conc.***	**Exceedence Factor**	**Pollutants**	**Average Conc.***	**Expected Exceedence Factor**
TDS	645	1.29	TDS	-	1.0 - 1.5
Cl	37	0.148	Cl	-	
SO_4	23.6	0.118	SO_4	-	
*Source: Ground water quality data for MGG by PPCB, Annexure-1 – Table-3)			***The samples will be collected during the implementation of the Action Plan.**		
B1= 3+1=4			**B1= 3+1=4**		
B2 = 3(Symptoms of exposure on People)			**B2 = 0 (No reliable evidence of exposure on People)**		
B3 = 4.5 (Symptoms of exposure on Eco-geological features)			**B3 = 0 (No reliable evidence of exposure on Eco-geological features)**		
B = B1+B2+B3= 4+3+4.5= 11.5			**B = 4+0+0=4**		

<table>
<tr><td colspan="3">(C) RECEPTOR</td><td colspan="3">(C) RECEPTOR</td></tr>
<tr><td colspan="3">Population Exposed: 20,000</td><td colspan="3">Population Exposed: 26,500</td></tr>
<tr><td colspan="3">C1 = 3</td><td colspan="3">C1 = 3</td></tr>
<tr><td>Pollutants</td><td>Samples Exceeded/ total no. of samples x EF</td><td>SNLF</td><td>Pollutants</td><td>Samples Exceeded/ total no. of samples x EF</td><td>Expected SNLF</td></tr>
<tr><td>TDS</td><td>3/3 x 1.29</td><td>1.29</td><td>TDS</td><td>-</td><td rowspan="3">1.0 – 1.5</td></tr>
<tr><td>Cl</td><td>0/3 x 0.148</td><td>0</td><td>Cl</td><td>-</td></tr>
<tr><td>SO_4</td><td>0/3 x 0.118</td><td>0</td><td>SO_4</td><td>-</td></tr>
<tr><td colspan="3">C2 = 2+1=3.5</td><td colspan="3">C2 = 2+1=3</td></tr>
<tr><td colspan="3">C3 = 5 (Risk to sensitive receptors = Yes)</td><td colspan="3">C3 = 0 (No Risk to sensitive receptors)</td></tr>
<tr><td colspan="3">C = (C₁xC₂)++C₃ = (3x3.5)+5=15.5</td><td colspan="3">C = (3x3)+0=9</td></tr>
<tr><td colspan="3">D = 15 (Small/medium scale industries having inadequate treatment facilities as well as common treatment facilities are not existing)</td><td colspan="3">D = 10</td></tr>
<tr><td colspan="3">Land CEPI = A+B+C+D= 20+11.5+15.5+15=62</td><td colspan="3">Expected Land CEPI = 15+4+9+10=38</td></tr>
</table>

Cumulative Environment Pollution Index

CEPI = i_m+[(100 - i_m) x (i_2/100 x i_3/100)]

As Calculated by Central Pollution Control Board	Expected after implementation of Action Plan
CEPI=62+[(100-62)x (55.5/100x62/100)] = 75.08	**CEPI=45+[(100-45)x (38/100x38/100)] = 52.94**

ANNEXURE-D

Calculation details of expected CEPI after the implementation of Action Plan for Mandi Gobindgarh, Punjab

I. Calculation of CEPI in respect of air environment

<table>
<tr><td colspan="3">Present Calculation of CEPI by CPCB</td><td colspan="3">Calculations of expected CEPI by PPCB as on 30.6.2012</td></tr>
<tr><td colspan="3">(A) POLLUTANTS</td><td colspan="3">(A) POLLUTANTS</td></tr>
<tr><td>Pollutants</td><td colspan="2">Category</td><td>Pollutants</td><td colspan="2">Category</td></tr>
<tr><td>RSPM`</td><td colspan="2">B</td><td>RSPM`</td><td colspan="2">B</td></tr>
<tr><td>SOx</td><td colspan="2">B</td><td>Sox</td><td colspan="2">B</td></tr>
<tr><td>NOx</td><td colspan="2">A</td><td>NOx</td><td colspan="2">A</td></tr>
<tr><td colspan="3">A1 = 4 (2+2)</td><td colspan="3">A1 = 3 (2+1)</td></tr>
<tr><td>R17</td><td colspan="2">-</td><td>R17</td><td colspan="2">-</td></tr>
<tr><td>R54</td><td colspan="2">354</td><td>R54</td><td colspan="2">354</td></tr>
<tr><td colspan="3">A2 = 5</td><td colspan="3">A2 = 5</td></tr>
<tr><td colspan="3">A = 4 x 5 = 20</td><td colspan="3">A = 3 x 5 = 15</td></tr>
<tr><td colspan="3">(B) PATHWAY</td><td colspan="3">(B) PATHWAY</td></tr>
<tr><td>Pollutants</td><td>Average Conc.*</td><td>Exceedence Factor</td><td>Pollutants</td><td>Average Conc.*</td><td>Exepcted Exceedence Factor</td></tr>
<tr><td>RSPM`</td><td>237</td><td>3.95</td><td>RSPM`</td><td>-</td><td rowspan="3">0.5 – 1.0</td></tr>
<tr><td>SOx</td><td>12.2</td><td>0.244</td><td>Sox</td><td>-</td></tr>
<tr><td>NOx</td><td>29.2</td><td>0.73</td><td>NOx</td><td>-</td></tr>
<tr><td colspan="3">*Source: Ambient Air Quality Data Annual Average for MGG by PPCB, Annexure I-Table 1</td><td colspan="3">*The samples will be collected through the implementation of the Action Plan.</td></tr>
<tr><td colspan="3">B1= 6</td><td colspan="3">B1= 2+1=3</td></tr>
<tr><td colspan="3">B2 = 3 (Symptoms of exposure on People)</td><td colspan="3">B2 = 3 (Symptoms of exposure on People)</td></tr>
<tr><td colspan="3">B3 = 6 (Symptoms of exposure on Eco-geological features)</td><td colspan="3">B3 = 0 (No reliable evidence of exposure on eco-geological features)</td></tr>
<tr><td colspan="3">B = $B_1+B_2+B_3$ = 6+3+6=15</td><td colspan="3">B = 3+3=6</td></tr>
</table>

(C) RECEPTOR			**(C) RECEPTOR**		
Population Exposed: 20,000			**Population Exposed: 27,000**		
C1 = 3			**C1 = 3**		
Pollutants	**Samples Exceeded/ total no. of samples x EF**	**SNLF**	**Pollutants**	**Samples Exceeded/ total no. of samples x EF**	**Expected SNLF**
RSPM`	9/9 x 3.95	3.95	RSPM`	-	0.25 – 0.50
SOx	0/9 x 0.244	0	SOx	-	
NOx	2/9 x 0.73	0.162	NOx	-	
C2 = 3+1=4			**C2 = 2+1= 3**		
C3 = 5 (Risk to sensitive receptors = Yes)			**C3 = 5 (Risk to sensitive receptors = Yes)**		
C = $(C_1 x C_2)+C_3$= (3x4) + 5= 17			**C = (3 x 3) + 5= 14**		
D. Additional High Risk Exposure					
D = 10			**D = 5**		
Air CEPI = A+B+C+D = 62			**Expected Air CEPI =15+6+14+5= 40**		

II. <u>Calculation of CEPI in respect of water environment</u>

Calculations by CPCB		**Expected Calculations**	
(A) POLLUTANTS		**(A) POLLUTANTS**	
Pollutants	**Category**	**Pollutants**	**Category**
BOD	B	BOD	A
FC	B	FC	A
NH_3-N	B	NH_3-N	A
A1 = 2+1=3		**A1 = 1+1 = 2**	
R17	-	R17	-
R54	354	R54	354
A2 = 5		**A2 = 5**	
A = 3 x 5 = 15		**A =2 x 5 = 10**	

(B) PATHWAY			**(B) PATHWAY**		
Pollutants	**Average Conc.***	**Exceedence Factor**	**Pollutants**	**Average Conc.***	**Expected Exceedence Factor**
BOD	5.1	1.02	BOD	-	0.5 – 1.0
NH_3-N	1.9	1.26	NH_3-N	-	
*Source: Surface water quality monitoring data of Ghaggar River near MGG by PPCB, from Status of Water Quality in India – 2007 report, Monitoring of Indian Aquatic Resources, Series: MINARS/29/2008-2009 (Table 18.5)			***The samples will be collected during the implementation of the Action Plan.**		
B1= 3+1=4			**B1= 2+1=3**		
B2 = 3 (Symptoms of exposure on People)			**B2 = 0 (No reliable evidence of exposure on people)**		
B3 = 4.5 (Symptoms of exposure on eco-geological features)			**B3 = 0 (No reliable evidence of exposure on eco-geological features)**		
B = $B_1+B_2+B_3$ = 4+3+4.5=11.5			**B = 3+0+0=3**		
(C) RECEPTOR			**(C) RECEPTOR**		
Population Exposed: 20,000			**Population Exposed: 27,000**		
C1 = 3			**C1 = 3**		
Pollutants	**Samples Exceeded/ total no. of samples x EF**	**SNLF**	**Pollutants**	**Samples Exceeded/ total no. of samples x EF**	**Expected SNLF**
BOD	1/2 x 1.02	0.51	BOD	-	< 0.25
NH_3-N	1/2 x 1.26	0.63	NH_3-N	-	
C2 = 2+1=3			**C2= 1.5+1=2.5**		
C3 = 5 (Risk to sensitive receptors = Yes)			C3 = 0 (Risk to sensitive receptors = No)		
C = (C1x C2) + C3 = (3 x3) + 5= 14			**C = (2.5x 3) + 0 = 7.5**		

D = 15 (Small/medium scale industries having inadequate treatment facilities as well as common treatment facilities are not existing)	**D** = 5
Water CEPI = A+B+C+D = 15+11.5+14+15 = 55.50	**Water CEPI = 10+3+7.5+5= 25.5**

III. Calculation of CEPI in respect of land environment

Calculation by CPCB			**Expected Calculations**		
(A) POLLUTANTS			**(A) POLLUTANTS**		
Pollutants	**Category**		**Pollutants**	**Category**	
TDS	B		TDS	A	
Cl	B		Cl	A	
SO_4	B		SO_4	A	
A1 = 4			**A1 = 1+1=2**		
R17	-		R17	-	
R54	354		R54	354	
A2 = 5			**A2 = 5**		
A = 4 x 5 = 20			**A = 2 x 5 = 10**		
(B) PATHWAY			**(B) PATHWAY**		
Pollutants	**Average Conc.***	**Exceedence Factor**	**Pollutants**	**Average Conc.***	**Expected Exceedence Factor**
TDS	645	1.29	TDS	-	).5 - 1.0
Cl	37	0.148	Cl	-	
SO_4	23.6	0.118	SO_4	-	
*Source: Ground water quality data for MGG by PPCB, Annexure-1 – Table-3)			***The samples will be collected during the implementation of the Action Plan.**		
B1= 3+1=4			**B1= 2+1=3**		
B2 = 3(Symptoms of exposure on People)			**B2 = 0 (No reliable evidence of exposure on People)**		
B3 = 4.5 (Symptoms of exposure on Eco-geological features)			**B3 = 0 (No reliable evidence of exposure on Eco-geological features)**		
B = B1+B2+B3= 4+3+4.5= 11.5			**B = 3+0+0=3**		

(C) RECEPTOR			**(C) RECEPTOR**		
Population Exposed: 20,000			**Population Exposed: 27,000**		
C1 = 3			**C1 = 3**		
Pollutants	**Samples Exceeded/ total no. of samples x EF**	**SNLF**	**Pollutants**	**Samples Exceeded/ total no. of samples x EF**	**Expected SNLF**
TDS	3/3 x 1.29	1.29	TDS	-	< 0.25
Cl	0/3 x 0.148	0	Cl	-	
SO_4	0/3 x 0.118	0	SO_4	-	
C2 = 2+1=3.5			**C2 = 1.5+1=2.5**		
C3 = 5 (Risk to sensitive receptors = Yes)			C3 = 0 (No Risk to sensitive receptors)		
C = (C_1xC_2)++C_3 = (3x3.5)+5=15.5			**C = (2.5x3)+0=7.5**		
D = 15 (Small/medium scale industries having inadequate treatment facilities as well as common treatment facilities are not existing)			**D** = 10		
Land CEPI = A+B+C+D= 20+11.5+15.5+15=62			**Expected Land CEPI = 10+3+7.5+5=25.5**		

Cumulative Environment Pollution Index

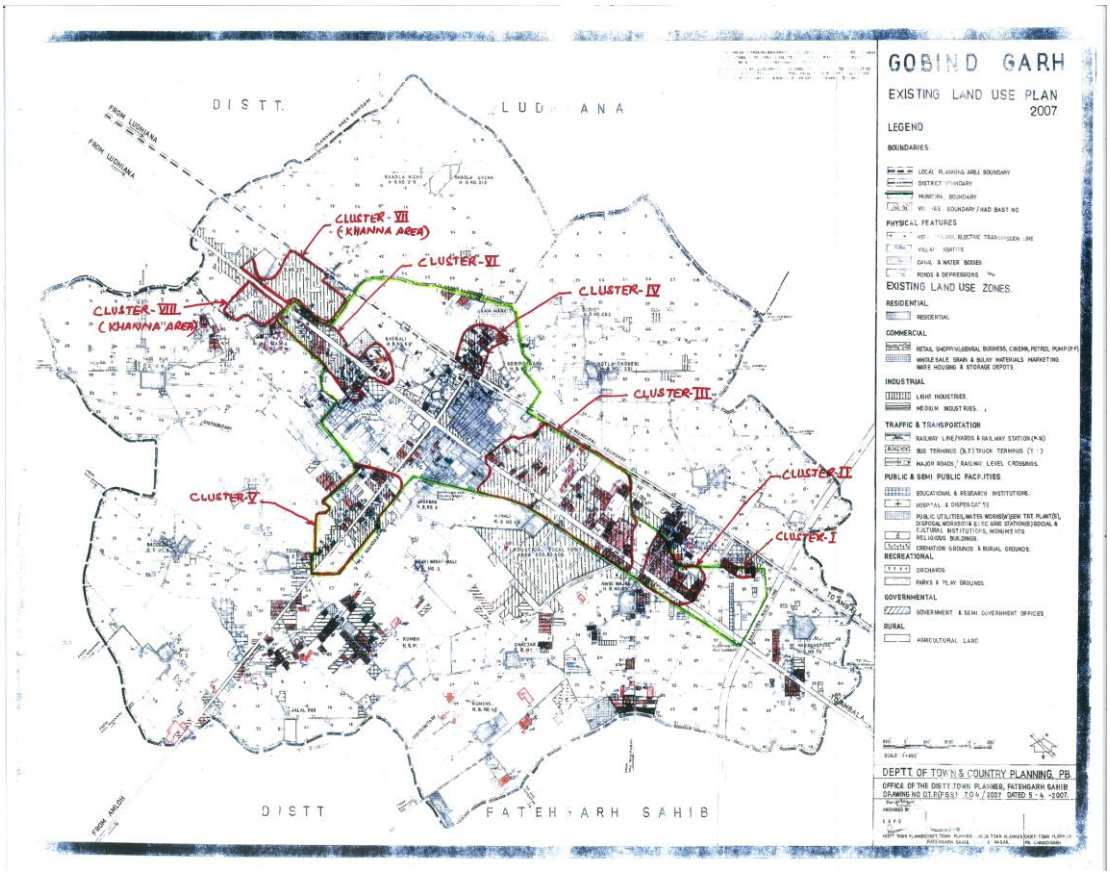
CEPI = i_m+[(100 - i_m) x (i_2/100 x i_3/100)]

As Calculated by Central Pollution Control Board	**Expected after implementation of Action Plan**
CEPI=62+[(100-62)x (55.5/100x62/100)] = 75.08	**CEPI=40+[(100-40)x (25.5/100x25.5/100)] = 43.90**

ANNEXURE-E

Expected Comprehensive Environment Pollution Index Score through the implementation of Action Plan of Mandi Gobindgarh

Parameters	CEPI Calculations on			
	31/12/2010	30/6/2011	31/12/2011	30/6/2012
A	15	15	15	15
B	9	7	6	6
C	17	17	14	14
D	10	10	10	5
AIR CEPI	51	49	45	40
A	15	15	15	10
B	4	4	4	3
C	9	9	9	7.5
D	10	10	10	5
WATER CEPI	38	38	38	25.5
A	15	15	15	10
B	4	4	4	3
C	9	9	9	7.5
D	10	10	10	10
LAND CEPI	38	38	38	25.5
OVERALL CEPI	**58.07**	**56.36**	**52.94**	**43.90**


GOBIND GARH
EXISTING LAND USE PLAN
2007
LEGEND
BOUNDARIES
PHYSICAL FEATURES
EXISTING LAND USE ZONES.
RESIDENTIAL
COMMERCIAL
INDUSTRIAL
TRAFFIC & TRANSPORTATION
PUBLIC & SEMI PUBLIC FACILITIES
RECREATIONAL
GOVERNMENTAL
RURAL
DISTT.
LUDHIANA
DISTT
FATEHGARH SAHIB
CLUSTER- VII
(KHANNA AREA)
CLUSTER- VI
CLUSTER- IV
CLUSTER- VIII
(KHANNA AREA)
CLUSTER- III
CLUSTER- II
CLUSTER- V
CLUSTER- I
DEPTT OF TOWN & COUNTRY PLANNING, PB.