

A Critique of the TNPCB/ CPCB Action Plan for Cuddalore

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April 2011

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Background to the report:

In January 2010, a study conducted by the Central Pollution Control Board (CPCB) along with IIT Delhi identified pollution in four industrial hubs of Tamil Nadu – namely, Vellore, Cuddalore, Manali and Coimbatore as alarming or critical. The study was part of an environmental assessment and ranking exercise in 88 industrial clusters across the country. Based on the extent of water, land and air pollution in these hubs, the study formulated a Comprehensive Environment Pollution Index (CEPI). It also took into account available data on land, water and air pollution, biodiversity, ecological damage and waste management to make this assessment. The clusters were ranked on a scale of 0-100, where a high score indicated high levels of pollution and environmental degradation. Ten out of 88 of these clusters scored above 80 indicating extremely high levels of air, water and land pollution in these regions. Thirty-three clusters had scored between 70 and 80 and were classified as "critically" polluted while at least 32 others scored between 60 and 70 and were considered as "seriously" polluted clusters. Clusters that scored between 50-60 were classified as in the "warning" zones. The top polluters from Tamil Nadu included Vellore, Cuddalore, Manali, Coimbatore, Tirupur, Mettur and Erode. While Vellore ranked 8th in the list of most polluted among the 88 hubs, Cuddalore was ranked 16th, Manali 20th, Coimbatore 34th, Tirupur 51st, Mettur 56th and Erode 78th.

Following this report, the Ministry of Environment and Forests (MoEF) imposed a moratorium on 43 industrial clusters around the country including 4 from Tamil Nadu after they were declared 'critically polluted' based on their CEPI scores¹. The purpose of the moratorium was to initiate time-bound action plans for improving the environmental quality in these industrial clusters/ areas. While the initial order for moratorium was till August 2010, for Cuddalore it was extended till 31 October 2010 due to delay in finalizing the action plans². Later on 26 October 2010, the MoEF further extended its moratorium on setting up new industries or expansion of existing units in Cuddalore till March 2011³. The reason for the extension was the delay in finalization of the action plans for environmental remediation.

While the community residents in Cuddalore appreciated the move of MoEF to extend the moratorium and were seeing this as a genuine interest of the ministry to improve the environmental conditions in the region, it came as a shock to them when the ministry lifted the moratorium on 15 February 2011⁴ almost a month and half before the earlier deadline. This decision was based on the information provided by the TNPCB and the CPCB to MoEF that the "revised action plans submitted by the respective SPCBs/ UTPCCs have been reviewed and approved" by them and that "the implementation of the action plan has been initiated."

This report is a critique of TNPCB's Action Plan for Cuddalore which formed the basis for lifting of the moratorium on 15 February 2011 for expansion of new and existing units in SIPCOT Cuddalore. At the outset it would be important to mention that despite repeated requests to MoEF and TNPCB, no community consultations were ever held to discuss the various issues of pollution and related problems in the SIPCOT Cuddalore region. No reports or action plans were shared with the communities or opinion sought from them. Even though members of SIPCOT Area Community Environmental Monitors (SACEM) voluntarily shared all data they had in their possession and reports of violations between January and December 2010, none of it is reflected in the Action Plan prepared by the TNPCB's.

¹ <http://moef.nic.in/downloads/public-information/CEPI.pdf>

² <http://moef.nic.in/downloads/public-information/CEPI-extn-moratorium.pdf>

³ <http://moef.nic.in/downloads/public-information/CEPI-extn.pdf>

⁴ <http://moef.nic.in/downloads/public-information/OM-15-02-2011.pdf>

1.0 Water Pollution:

The Action Plan of the TNPCB while discussing the status of water environment in the region on several occasions highlights the following:

1. There have been “No industrial discharges into River Uppanar”⁵.
2. There have been no discharges of effluent on land or into SIPCOT drains⁶.
3. The “treated effluents” from at least 9 of the SIPCOT units are discharged into the Bay of Bengal through the CUSECS. The Marine water quality report does not show any adverse impact due to discharge of treated trade effluent⁷
4. Parameters like COD, Fluoride and Lead are referred to for projecting the new CEPI scores.

1.1 Community Monitoring Data with regard to Water Pollution:

1.1.1 On discharge of effluent on River Uppanar, land and SIPCOT drains:

SACEM has documented at least 15 incidents of effluent discharge from the SIPCOT units on to the land, village canal or River Uppanar between January and December 2010. On two occasions these discharges caused massive fish kills in the village pond. At least 4 fishermen were injured and suffered loss of work days due to contamination of River Uppanar during this period.

On 25 August 2010, following a spell of heavy rains there was a massive discharge of effluent into SIPCOT drains contaminating the Sangolikuppam village canal. SACEM monitors and community residents took two samples of the water from the canal. Results of analysis revealed that both the samples did not meet the standards for Biological Oxygen Demand (BOD) and Oil & Grease. Total Suspended Solids (TSS), Total Dissolved Solids (TDS), Chlorides and Chemical Oxygen Demand (COD) were also above standards in one of the samples. Upon pressure from the local residents, the TNPCB was forced to take its own samples. Even though TNPCB did not disclose the results of their analysis to the public, they revealed that the canal was contaminated with the effluent from Shasun Chemicals which were discharged through its storm water drains. Later, information obtained under RTI revealed that the COD, BOD and TDS in the board’s sample from the canal were above the prescribed limits. TNPCB also issued a show-cause notice to Shasun for this specific incident and violation. Despite the fact that such a major incident took place and has been documented even by the TNPCB, it has not been taken into cognizance by the CPCB in its report and CPCB has incorrectly reported that “there have been no discharges of effluent on land or into SIPCOT drains.”

1.1.2 On CUSECS:

TNPCB also reported that treated effluent from at least 9 units in SIPCOT was being disposed in the Bay of Bengal through CUSECS. CUSECS is an illegal unit operating without a valid Consent to Establish and Consent to Operate. While in its report, the TNPCB mentions sample results of 25 October 2010 and states that only Total Residual Chlorine was above standards it has failed to mention that all 61 samples taken by TNPCB between January and October 2010 from CUSECS violated one or more standards. Total Suspended Solids (TSS), Biochemical

⁵ Refer Section – 2.1.2; 2.1.3; 2.2.1 of the Action Plan

⁶ Refer Section 2.2.4 of the Action Plan

⁷ Refer Section 2.1.2; 2.2.1 of the Action Plan

Oxygen Demand (BOD) and Chemical Oxygen Demand (COD), Nitrogen, Sulfide, Chlorine, and Ammonia in most of the analysis were above prescribed limits as per the General Standards of Discharge of Environmental Pollutants, Marine and Coastal Areas as per the Central Pollution Control Board.

1.2 Projected CEPI Score on Water by TNPCB:

In its November 2010 action plan the TNPCB has detailed a series of recommendations for infrastructural changes and better management and discharge of effluents from individual units and the CUSECS. Interestingly in the end the Board goes on to state that “after installation of full-fledged pollution control measures” the projected CEPI score for water would be 50. This statement of the TNPCB indicates that till now the “full-fledged pollution control measure” had not been installed despite the fact that the units in the region have been operating for the last twenty years. The wishful thinking of the Board to bring down the CEPI score to 50 is based on two assumptions -- that all recommendations would be strictly followed and that such compliance would automatically bring pollution under control.

In reality, results from 6 samples taken from CUSECS between November 2010 and January 2011 once again reveal violations of prescribed parameters. COD in at least 5 samples, TSS in 3 samples, lead and chlorine in 2 samples and BOD in 1 sample were above the limits. These findings challenge the foundation on which the new CEPI score has been predicted.

Even while predicting the new CEPI score the Board has not given any explanation for factoring certain parameters over others. For example the Board has taken into consideration COD, Fluorides and Lead in River Uppanar instead of TSS, BOD, COD, Ammonia, Sulphide etc from the effluent disposal at the marine discharge point of CUSECS. While water quality has to be determined by factoring in all parameters, this selective practice of considering one parameter over other for predicting the score is unscientific and is misleading. Based on the data from the Board's report and community monitoring, a CEPI score for water would work out to be 66 instead of 50.

2.0 Air Pollution:

The Action Plan of the TNPCB while discussing the status of air environment in the region highlights the following:

1. TNPCB monitors ambient air quality in SIPCOT through one Continuous Ambient Air Quality Monitoring (CAAQM) Station⁸.
2. Ambient Air Quality (AAQ)/ stack/noise levels within the premises of industries are monitored once in a year by TNPCB⁹.
3. Due to handling of organic solvents of high volatile nature, emissions of Volatile Organic Compounds (VOCs) generally exists in the ambient air in the vicinity of SIPCOT area. This mainly causes odour and is likely to affect human health due to carcinogenic effects of some hazardous air pollutants¹⁰.
4. Quantification of air pollution load in the report and for determining the projected CEPI score is based on emissions of SO₂, NO_x and SPM by various units in SIPCOT.

⁸ Refer Section – 3.1.1 of the Action Plan

⁹ Refer Section – 3.1.1 of the Action Plan

¹⁰ Refer Section – 3.2 of the Action Plan

2.1 Community Monitoring Data with regard to Air Pollution:

One CAAQM station for an industrial complex spread over 600 acres with at least 25 highly polluting and red category chemical units operating year-round is woefully inadequate. Also one annual sample from within factory premises is insufficient data to determine trends in air pollution.

Between January and December 2010, SACEM has documented and reported at least 112 incidents of air pollution including gas leaks and toxic emissions from the units in SIPCOT Cuddalore. Though the Board was made aware about these emissions, none finds mention in the report. This Action plan also clearly indicates that there has been no improvement in the air quality since September 2004 when the communities first highlighted the problems of VOCs in the air.

2.1.1 On VOC emissions and its health effects:

TNPCB recognizes VOC emissions as a major problem in the region and even quotes NEERI results of such emissions. However, it does not provide any data for the period between January and November 2010 (at the time of preparation of this report) to ascertain the levels of VOCs in the air.

During the months of July and August 2010, SACEM took three air samples from SIPCOT region and tested them for the presence of VOCs. Results of these samples reveal the presence of at least 20 toxic chemicals. At least 13 chemicals were above the standards prescribed under the US EPA and at least 7 chemicals found in these samples are known carcinogens. Some chemicals including carcinogens were found to be 1000 times above the safe limits, these were Carbon Tetrachloride, 1,2-Dichloroethane and 1,2-Dibromoethane. VOCs are known to cause multiple health problems. They target almost every part of the human body and cause damage and long-term health effects.

2.2 Projected CEPI Score on Air by TNPCB:

In its action plan the TNPCB suggests various infrastructural changes in the SIPCOT units to bring down the levels of air pollution in the region. The Board anticipated the air CEPI to be 28 on the assumptions that all these recommendations will be strictly implemented and this would bring down the levels of air pollution in the region. The flawed nature of this assumption is revealed by the results of air samples by SACEM in the months of March 2011, three months after the action plan was finalized and about two weeks after the moratorium was lifted from SIPCOT region. The samples were taken downwind of Tagros Chemicals and Shasun Chemicals. The results indicate that at least 23 VOCs were detected in various levels in the samples. At least 17 chemicals were above the standards prescribed under the US EPA and at least 7 chemicals found in these samples are known carcinogens. While the TNPCB accepts the presence of carcinogen VOCs in SIPCOT air, it uses only PM₁₀, PM_{2.5} and SO₂ to quantify the levels of air pollution in the region and the calculation of projected CEPI scores. No explanation is provided for the basis of selection of parameters for the scores and exclusion of carcinogens from the list. The score thus arrived at is clearly lower than what it ought to be.

Once again like in the case of Water pollution CEPI, these findings with regard to air pollution by the communities challenge the foundation on which the new CEPI score has been based. Based on the data from the Board's report and community monitoring, a CEPI score for air would work out to be 66 instead of 28.

3.0 Land Pollution:

The Action Plan of the TNPCB while discussing the status of land environment in the region highlights the following:

1. The concentration of Total Chromium, lead & arsenic was found higher in sample S7 collected from Tantech. The concentration of hexavalent chromium, sulphate and chloride were found higher in sample S22, S15 & S10 from Chemplast. Cadmium and mercury concentration were found higher in S14& S32 from Chemplast and Bayer respectively¹¹
2. Contamination of soil is attributed to the historical pollution load of River Uppanar¹².
3. There is no discharge of treated trade effluent on land in SIPCOT area however during raining seasons the possibilities of effluent contamination along the storm water runoff exists¹³.
4. There is no specific ground water contamination in SIPCOT area¹⁴.
5. No suggestions for treatment and management of ground water bodies are made¹⁵.
6. Quantification of land pollution load in the report and for determining the projected CEPI score is based on pH, Zinc and Lead found in SIPCOT region.

3.1 Community Monitoring Data with regard to Land Pollution:

In its report and analysis the TNPCB attributes the existing soil pollution within Tantech and other units close to River Uppanar to the historical pollution in the river itself. The data of the Board shows presence of hexavalent chromium, sulphate, chloride, cadmium and mercury in the soil samples. The upstream and downstream water sample results of the River Uppanar (as presented by the Board in the Annexure to the report) reveals that hexavalent chromium and cadmium were found below Minimum Detectable Levels (MDL) in the river samples. There were no tests conducted for mercury. In the light of the fact that the chemicals found in the soil were not even present in the results of the river water, attributing the source of these to the river is unscientific, baseless and misleading.

3.1.1 On effluent discharge on land/ village canals:

SACEM has documented at least 15 incidents of effluent discharge from the SIPCOT units on to the land, village canal or River Uppanar between January and December 2010. Out of these, at least 6 cases of effluent discharge are on land or village canals alone. Even though SACEM shared all these data and information in the form of complaints and reports with the Board officials, the Action Plan makes no mention of it.

3.1.2 On groundwater contamination:

The report claims that “there is no specific groundwater contamination in SIPCOT area” while the data of the groundwater samples attached in the Annexure of the report claims otherwise. According to the results of samples of groundwater from SPIC borewell, Kudikadu OHT and Sathya handpump reveal TDS, total iron, total hardness, lead, magnesium and calcium above the prescribed limits of drinking water standards. Presence of heavy metals like lead in the groundwater sample is a matter of concern. Lead affects the Central Nervous System, especially among the children. Despite this data being present as a part of the report, it is not

¹¹ Refer Section – 4.1 of the Action Plan; Refer to the “Soil Analysis Report done by NGRI, Hyderabad” on page 118 of the Action Plan

¹² Refer Section – 4.1 of the Action Plan

¹³ Refer Section – 4.2.2 of the Action Plan

¹⁴ Refer Section – 4.2.4 of the Action Plan

¹⁵ Refer Section – 4.2.5 of the Action Plan

quite clear why TNPCB has claimed that there is no specific groundwater contamination in the region.

3.2 Projected CEPI Score on Land by TNPCB:

Since the Board assumes that there is no groundwater contamination and hence no measures should be adopted for treatment and cleanup, no measures have been recommended for the cleanup of the soil either in the report. Based on this analysis the projected CEPI score for the land has been assigned at 32.5.

The flawed nature of arriving at such assessment is described in the discussion above. It is clear that the TNPCB is ignoring its own data and reports about presence of carcinogens like chromium and arsenic in soil and heavy metals like lead in groundwater in arriving at its conclusion of reduced CEPI score. Once again the TNPCB has not provided any justification for using pH, zinc and lead as parameters for projecting the CEPI scores even though carcinogens like chromium and arsenic were detected in the samples. Based on the data and community monitoring reports, CEPI score for land works out to be 66 instead of 32.5 as predicted by the TNPCB.

The ground water contamination is well established through the data presented in the report, even though the TNPCB has not taken cognizance of it. Even if the ambitious and wishful targets of TNPCB as indicated in the Action Plan were to be implemented, the ground water would still continue to be polluted.

4.0 Discussion:

It is clear from the report that the calculation of the new CEPI index of 54.5 for the SIPCOT area by the TNPCB has been based on unscientific methodology and by ignoring their own data. Nowhere has the Board provided any basis for selecting certain parameters over others. No explanation is provided for not factoring in the presence of carcinogens in air, water and land in calculating the scores. This despite the fact that numerous reports and TNPCB's own data have adequately established the presence of carcinogenic substances in SIPCOT's environment.

The new CEPI scores are not on the basis of assessment made and changes incorporated since January 2010 after Cuddalore was declared 16th most polluted place in the country. These are projected scores by the TNPCB based on hypothetical premise that all recommendations for improvement would be duly followed in the time-bound manner and such compliance would automatically lower pollution levels. This hypothesis seems naïve given the fact that there is plenty of evidence to exhibit that units in SIPCOT have a history of non-compliance and violating recommendations/ conditions imposed by the Board in the past. This was even further established by the fact that the Board issued at least three show-cause notices to units like Shasun Chemicals, Aurobindo Pharma and Tagros Chemicals between January and September 2010 for environmental violations. Show-cause on Shasun and Aurobindo were for violating the provisions of the MoEF imposed moratorium and expanding operations without valid consents. Show-cause on Tagros was for dumping hazardous waste illegally outside their factory premises. Barely two weeks after the moratorium was lifted from SIPCOT based on the predicted scores of TNPCB there was a major gas leak from Shasun Chemicals that injured more than 300 residents. The unit was storing chemicals and operating without a valid consent.

The TNPCB in its assessment has made a critical and fundamental omission of fact from the report. It has failed to mention that many units in SIPCOT area are illegal and do not have valid Consent to Operate. According to data submitted by the Board to the High Court of Madras in a matter related to the conditions in the SIPCOT area in September 2010, at least 20 out of 31

units did not have valid Consent to Operate. The TNPCB in its report does not mention any action plan to take action on the violating units in the SIPCOT area even though violations of Air and Water Acts are prosecutable offences.

The TNPCB while compiling this report not only ignored its own data it also did not take into cognizance community complaints of environmental violations from SIPCOT units. In the period between January and November 2010, at least 130 violations from the SIPCOT were reported to the Board. They included illegal discharge of effluent on land, canals, river, gas leaks, illegal expansions of units, dumping of hazardous wastes, fish kills, industrial accidents and injury to residents and workers. None of these have been mentioned in the report. On the contrary in many places the report claims that there were no violations reported from the region.

In conclusion it seems like the revised CEPI score of 54.5 for Cuddalore was predetermined and all the analysis in the Action Plan was designed to derive the same. Had the TNPCB genuinely considered its own data and community complaints, the CEPI score would have been around 80, even higher than what was assigned to the region in January 2010.

Under these circumstances community residents demand the following:

1. MoEF should scrap of the current CEPI scores presented by the TNPCB and re-impose the moratorium on expansion of existing facility and setting up of new units in SIPCOT Cuddalore.
2. MoEF to order a thorough investigation and take appropriate legal action on the offices involved in preparing this misleading report including the CPCB and TNPCB.

Annexure 2

CEPI Score – How it is derived:

The methodology of determining the CEPI score involves assigning values to the following factors that describe air, water and land pollution at an industrial cluster:

a POLLUTANT

Factor number A1: presence of toxin

Group A - Toxins that are not assessed as acute or systemic = 1

Group B - Organics that are probable carcinogens (USEPA Class 2 and 3) or substances with some systemic toxicity, for example, VOC's, PAHs, PCBs, PM10, and PM2.5 = 2
(refer Appendix I of Action Plan for list)

Group C - Known carcinogens or chemicals with significant systemic or organ system toxicity, for example, vinyl chloride, benzene, lead, radionuclide, hexachromium, cadmium, and organophosphate = 4
(refer appendix II of Action Plan for list)

Factor number A2: scale of industrial activities

Large = 5 (if there are
> 10 R17 per 10 km² area or fraction² or
> 2 R17 + 10 R54 per 10 km² area or fraction or
> 100 R54 per 10 km² area or fraction³)

Moderate = 2.5 (if there are 2 to 10 R17 per 10 km² area or fraction or 10–100 R54 10 km² area or fraction)

Limited = 1 (else there is any industry within 10 km² area or fraction)

These two factors are taken as multiplicative and, therefore, the overall score for this element is as follows.

SCORE A = A1 × A2 (max score = 6 × 5 = 30)

b PATHWAY

Factor number B1: Ambient Pollutant Concentration

Critical = 6 (when exceedance factor is more than 1.5)

High = 3 (when exceedance factor is between 1 and 1.5)

Moderate = 2 (when exceedance factor is between 0.5 and 1.0)

Low = 1 (when exceedance factor is < 0.5)

Factor number B2: Evidence* of adverse impact on people.

No = 0 (when no reliable evidence is available)

Yes = 3 (when evidence of symptoms of exposure)

Yes = 6 (when evidence of fatality or disease(s) leading to fatality (such as cancer) due to exposure)

Factor number B3: Reliable evidence of adverse impact on eco-geological features.

No = 0 (when no reliable evidence is available)

Yes = 3 (when evidence of symptoms of exposure)

Yes = 6 (when evidence of loss of flora/fauna/significant damage to eco-geological features, [irreparable loss/damage])

Overall score for this element is as follows:

SCORE B = B1 + B2 + B3 = (8 + 6 + 6) = 20

c RECEPTOR

Factor number C1: number of people potentially affected within 2 km boundary from the industrial pollution source.

<1000 = 1

1000 to 10 000 = 1.5

10 000 to 100 000 = 3

> 100 000 = 5

Factor number C2: level of exposure

A surrogate number which will represent level of exposure (SNLF) is calculated using per cent violation of ambient pollutant concentration, which is calculated as follows.
SNLF = (Number of samples exceeded/total number of samples) × (exceedance factor)

Low = 1 (SNLF = 0)

Moderate = 1.5 (SNLF < 0.25)

High = 2 (SNLF 0.25 - 0.5)

Critical = 3 (SNLF > 0.5)

Factor number C3: additional risk to sensitive receptors

No = 0

Yes (if > 500 sensitive people/ a sensitive historical/ archaeological/ religious/ national parks/ sanctuary/ ecological habitat are within 2 km distance from source, additional risk) = 5

d Additional high risk element

Factor number D - Additional High Risk Element (inadequacy of pollution control measures for large scale, medium, and small-scale industries and also due to unorganized sector). It is cumulative of ETPs, CETPs, air pollution control devices (APCDs) and unorganized waste disposal (maximum score = 20).

If all the industries in the area have adequately designed/operated and maintained pollution control facilities and also common facilities such as CETP/ FETP/ CHWDF are having adequate capacity and have state-of-art technology = 0

If all the large industries in the area have adequately designed/operated and maintained pollution control facilities but small and medium industries are defaulting. Common facilities such as CETP/FETP/CHWDF have adequate in capacity or operation/ maintenance = 5

If all the industries in the area have adequately designed/operated and maintained pollution control facilities but the common facilities such as CETP/FETP/CHWDF have inadequate in capacity or operation/maintenance = 10

If all the large industries in the area have adequately designed/ operated and maintained pollution control facilities but small and medium industries are defaulting. Common facilities such as CETP/FETP/CHWDF have inadequate in capacity or operation/ maintenance = 15

Inadequate facilities of individual as well as common facilities, full penalty = 20

Analysis of CEPI Score for Cuddalore by TNPCB – November 2010

When the CPCB used this methodology in December 2009 to assign a CEPI score to the SIPCOT Phase I & II Industrial Cluster, Cuddalore, it reached an overall score of 77.45, making it the 16th most badly polluted industrial cluster of 88 clusters were examined.

In November 2010, the Tamil Nadu Pollution Control Board (TNPCB) is now asserting that the new CEPI score for the SIPCOT Phase I & II Industrial Cluster, Cuddalore is 54.69. However, this claim can only be valid if TNPCB can identify substantial changes at the industrial cluster in the intervening 11 months (from December 2009 to November 2010) that justify such a dramatic change in score. CPCB and TNPCB's November 2010 report on Action Plan fails to do this.

Firstly, some of the factors used to determine a CEPI score for the SIPCOT Phase I & II Industrial Cluster, Cuddalore could not have possibly changed between December 2009 and November 2010. These factors include:

- Factor number A2: scale of industrial activities

- Factor number C1: number of people potentially affected within 2 km boundary from the industrial pollution source

- Factor number C3: additional risk to sensitive receptors

That is, between December 2009 and November 2010, there has been no significant change in the scale of industrial activities at the SIPCOT Cuddalore cluster, no significant change in the number of people potentially affected within a 2 km boundary of the SIPCOT Cuddalore cluster, and no significant change in the cluster's proximity to sensitive people. That is, the values of A2, C1 and C3 for determining the CEPI score for the SIPCOT Cuddalore cluster should be exactly the same in December 2009 as in November 2010.

What remains to examine is whether TNPCB is using appropriate values for the other factors (A1, B1, B2, B3, C2 and D).

Score for Air pollution – Factor A1, A2 and A

With regard to factor A1, a value of 4 must be assigned to if there is the presence of known carcinogens or chemicals with significant systemic or organ system toxicity, for example, vinyl chloride, benzene, lead, radionuclide, hexavalent chromium, cadmium, and organophosphate; otherwise a value of 3 may be assigned if there is there is the presence of organics that are probable carcinogens (USEPA Class 2 and 3) or substances with some systemic toxicity, for example, VOC's, PAHs, PCBs, PM10, and PM2.5.

In the case of SIPCOT with regard to air, a value of 4 should be assigned to factor A1 because air samples taken by communities reveal presence of VOCs including carcinogens in SIPCOT air even in 2010. Moreover the Board on page 22 of the report states: "in the existence of chloroform, carbon tetrachloride, methylene dichloride, toluene, hexane, chlorobenzene, ethylene dichloride and etc, in the ambient year was detected in the VOC monitoring survey conducted through TNPCB, NEERI, Nagpur and other external agencies." chloroform and carbon tetrachloride are both known human carcinogens. The data in page 115 of the report (Status of Ambient VOC level in SIPCOT area) shows the additional presence of benzene at Chemplast. Benzene is also a known human carcinogen.

At present the TNPCB has assigned the current value to factor A1 as 3 based on parameters like PM10, PM2.5 and SO₂ instead of the carcinogens that they themselves report to be present in the air.

Table1 – Air Pollution Scores:

	Pollutant		
Medium	A1	A2	A
	Presence of toxins; Maximum Score - 6 (higher the score more toxic are the chemicals found in the region)	Scale of Industrial Activities; Maximum Score – 5 (large)	A1 x A2 Maximum score – 30 (higher the score more toxic are the chemicals concentrated in the region)

Air (CEPI Jan 2010)	3 (Organics that are probable carcinogens)	5 (Large)	15
Air (according to TNPCB CEPI Nov 2010)	3 (parameters considered PM10, PM2.5 and SO2)	5 (large)	15
Air (according to community documents and the data submitted in the action plan of Nov 2010)	4 (3 air samples taken during the moratorium reveal the presence of at least 20VOCs including 7 carcinogens and 13 above prescribed standards of US EPA)	5 (large)	20

Water Pollution – Factor A1, A2 and A

In the context of SIPCOT with regard to water, a value of 3 may be assigned. The Board has not factored in several effluent discharges into the River Uppanar by the industries during the year. They have also not taken into cognizance that the effluent samples from CUSECS were also in violation of the prescribed standards on many occasions. While TNPCB has allotted a score of 2 to this factor, it has completely ignored to factor in the impacts to the marine ecology as a result of discharges through CUSECS into the ocean.

Table 2 – Water Pollution Scores:

	Pollutant		
Medium	A1	A2	A
	Presence of toxins; Maximum Score - 6 (higher the score more toxic are the chemicals found in the region)	Scale of Industrial Activities; Maximum Score – 5 (large)	A1 x A2 Maximum score – 30 (higher the score more toxic are the chemicals concentrated in the region)
Water (CEPI Jan 2010)	3 (Organics that are probable carcinogens)	5 (Large)	15
Water (according to TNPCB CEPI Nov 2010)	2(COD, Flourides, Lead – Marine ecology ignored)	5(Large)	10
Water (according to community documents and the data submitted in the action plan of Nov 2010)	4(BOD, TSS in Cusecs Marine outfall)	5(Large)	20

Land Pollution – Factor A1, A2 and A

In SIPCOT with regard to land, a value of 4 should be assigned to factor A1 because page 46 of the Board's report states: "It was informed that the concentration of total chromium, lead & arsenic was found higher in sample S7 collected from Tantech. The concentrations of hexavalent chromium ... were found higher in sample S22, S15 and S10." Arsenic and hexavalent chromium are both known human carcinogens. Once again while allotting a score the TNPCB has based its assessment without factoring in these carcinogens. The Board has used pH, zinc and lead as its parameter to assign a value of 3 to the factor and has provided no basis for not selecting the carcinogens instead.

Table 3 – Land Pollution Scores:

	Pollutant		
Medium	A1	A2	A
	Presence of toxins; Maximum Score - 6 (higher the score more toxic are the chemicals found in the region)	Scale of Industrial Activities; Maximum Score – 5 (large)	A1 x A2 Maximum score – 30 (higher the score more toxic are the chemicals concentrated in the region)
Land (CEPI Jan 2010)	4 (Organics that are known carcinogens)	5 (Large)	20
Land (according to TNPCB CEPI Nov 2010)	3 (groundwater – pH, zinc, lead)	5	15
Land (according to community documents and the data submitted in the action plan of Nov 2010)	4 (organics that are known carcinogens like Chromium and Arsenic found in the samples along with lead)	5	20

Scores for Air, Water and Land Pollution – Factor B1, B2, B3 and B

With regard to factor B1, no value less than 3 may be assigned because the report documents ambient pollutant concentrations that exceed standards for air, land and water. The only question is whether a value of 3 may be assigned to factor B1 because these exceedances are less than 1.5 the permissible level.

For air, the TNPCB has assigned a value of 2. Taking into account the data annexed to the report a value of 6 must be assigned as there are numerous exceedances of 1.5 times the permissible level documented in the report. For example, the ambient air quality standard in India for benzene is 5 micrograms per cubic meter whereas the benzene levels at Chemplast shown in page 115 of the report is 3600 micrograms per cubic meter.

With regard to water, the TNPCB has assigned a value of 3. According to the data submitted in the report a value of 6 must also be assigned. On page 72 of the report documents that as recently as 22 September 2010 the levels of BOD and TSS in trade effluent let out into sea

through CUSECS sump VI as 606 and 180 mg/L respectively, more than 1.5 the permissible limits of 100 mg/L for both parameters.

For land, the TNPCB has assigned a value of 2. Data presented in their report suggest that a value of 6 must be assigned. The groundwater monitoring data presented on pages 119-121 of the report show that numerous parameters (TDS, iron, cadmium, and acidity) exceed permissible levels by more than 1.5 times.

With regard to factor B2, evidence of adverse impact on people, a value of at least 3 must be assigned to factors for air, water and land because there is reliable evidence in the “form of media reports, hospital records, public interest litigations (PIL) and NGOs reporting, academic research reports, published literature” regarding adverse impacts to people from exposure to pollutants from the industrial cluster that have entered air, water and land.

With regard to factor B3, the November 2010 report does not examine any evidence of adverse impact on eco-geological features. It should be presumed that the values used in the December 2009 report remain valid. TNPCB has assigned this value as 0 in case of water and air pollution but has nowhere in the report provided and basis for this assumption.

Table 4:

	Pathway			
Medium	B1	B2	B3	B
	Ambient Pollutant Concentration Maximum score could be 6 and above	Evidence of adverse impact on people Maximum score could be 6	Reliable evidence of adverse impact on eco-geological features Maximum score could be 6	B1+B2+B3 Maximum score could be 20 (higher the score equals higher the adverse impact of Chemicals on people and environment)
Air (CEPI Jan 2010)	3 (high)	3 (when evidence of symptoms of exposure)	3 (when evidence of symptoms of exposure)	9
Air (according to TNPCB CEPI Nov 2010)	2(parameters considered PM10, PM2.5 and SO2)	3	0	5
Air (according to community documents and the data submitted in the action plan of Nov 2010)	6 (Parameters like VOC exceed more than 1.5 times the permissible levels)	3	3	12

Water (CEPI Jan 2010)	7.75 (Critical)	4.5 (when evidence of symptoms of exposure and of fatality and diseases)	3 (when evidence of symptoms of exposure)	15.25
Water (according to TNPCB CEPI Nov 2010)	3	3	0	6
Water (according to community documents and the data submitted in the action plan of Nov 2010)	6 (parameters like BOD, TSS in Cusecs Marine outfall is more than 1.5 times permissible limits)	3	3	12
Land (CEPI Jan 2010)	3 (high)	3 (when evidence of symptoms of exposure)	3 (when evidence of symptoms of exposure)	9
Land (according to TNPCB CEPI Nov 2010)	2 (parameters selected – pH, zinc and lead)	3	3	8
Land (according to community documents and the data submitted in the action plan of Nov 2010)	6 (reports suggest that TDS, Iron, cadmium and acidity exceeds more than 1.5 times the permissible limits in numerous samples)	3	3	12

Scores for Air, Water and Land Pollution – Factor C1, C2, C3 and C

With regard to factor C2, a value of 3 must be assigned to factors relating to air, water and land because more than half of the total number of samples exceed relevant ambient pollutant concentration standards. See, for example, page 65 (for water, parameter BOD). Since the TNPCB has not factored in the impacts of carcinogens in the air and land in their assumptions for the scores their scores for the air and land is 1 and 1.5 respectively.

Table 5:

	Receptor			
Medium	C1	C2	C3	C
	Number of people potentially affected within 2 km boundary from the industrial pollution	Level of exposure Maximum score could be 3	Additional risks to sensitive receptor Maximum score could be 5 (Yes)	(C1xC2)+ C3 Maximum score could be 30 (higher the

	source Maximum score could be 5	(critical)		score equals higher the exposure of Chemicals on people and environment)
Air (CEPI Jan 2010)	5 (population more than 1,00,000)	3 (Critical level of exposure)	5 (Yes)	20
Air (according to TNPCCB CEPI Nov 2010)	3	1	5	8
Air (according to community documents and the data submitted in the action plan of Nov 2010)	3	3	5	14
Water (CEPI Jan 2010)	5 (population more than 1,00,000)	3 (Critical level of exposure)	5 (Yes)	20
Water (according to TNPCCB CEPI Nov 2010)	3	3	5	14
Water (according to community documents and the data submitted in the action plan of Nov 2010)	3	3	5	14
Land (CEPI Jan 2010)	5 (population more than 1,00,000)	3 (Critical level of exposure)	5 (Yes)	20
Land (according to TNPCCB CEPI Nov 2010)	3	1.5	5	9.5
Land (according to community documents and the data submitted in the action plan of Nov 2010)	3	3	5	14

Scores for Air, Water and Land Pollution – Factor D

With regard to factor D, it is important to remember that all the industries in the SIPCOT Phase I & II Industrial Cluster are large industries. There are no medium, and small-scale industries in the cluster. Therefore, the only possible values for factor D are 0 (all industries are adequately designed/ operated and maintained pollution control facilities) and 20 (one or more industry is not adequately designed/ operated and maintained pollution control facilities). Since more than one large industry in the SIPCOT Phase I & II Industrial Cluster is operating without consent, a value of 20 for air, water and land should be presumed for factor D.

Final Score:

Using the values discussed above, the most probable actual CEPI score for the SIPCOT Phase I & II Industrial Cluster is likely close to 80, which is similar to the CEPI score determined in the December 2009 CPCB report (See Consolidated table of all factors in Annexure 1).