

From:

Dr. Dilip B. Boralkar

Former Member Secretary of Maharashtra PCB and
Member of the Supreme Court Monitoring Committee,
in the matter of WP[C] No. 657 of 1995.

Address: #602, Amar Residency, V.N. Purav Marg,
Punjabwadi, Deonar, Mumbai 400 088.

(Tel: 022-2555 2558, Cell: 09892542288)

(Email: dbboralkar@gmail.com Website: www.boralkar.com)

Mumbai
03.12.2015

To

The Member Secretary
Tamilnadu Pollution Control Board
76, Mount Salai, Guindy,
Chennai 600 032.

Subject: Comments on M/s Hindustan Unilever Limited (HUL), Kodaikanal
– Soil Remediation – Study Reports.

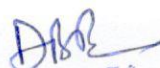
Reference: TNPCB letter no. T14/TNPCB/F.36448/27568/2015 dated
27.11.2015.

Sir,

Many thanks for your letter under reference and kind courtesy
extended to us when we called on you in your office on 26.11.2015. My
comments are as under:

1. Report of Environmental Resources Management (ERM), September,
2006, regarding on site-specific target levels (SSTLs):

Toxicity data used in the assessment in this report take into account
the mercury being present as potentially elemental and inorganic and
the resultant SSTL is effectively a "total mercury" value recommended
by ERM as 25mg/kg for residential scenario and 29 mg/kg for
recreational users. It is opined that, while deciding SSTLs, we ought to
have regard to the concern for possible migration and bio-
magnification of mercury in the organic-form which is the cause of
acute and chronic neurotoxicity when gets it in the food chain of the
ecosystem. Therefore, the standards of cleanup ought to be as
stringent as feasible and at par with local area requirements and eco-
sensitivities especially when the factory site is part of an ecologically



sensitive, watershed forest. ERM report is therefore is incomplete and cannot be relied upon in terms of deriving environmentally safe standard (i.e. SSTLs) for cleanup at HUL, Kodaikanal.

2. Report of NEERI, Nagpur, February, 2007, on the Protocol for Remediation of Mercury Contaminated site at HLL is sponsored by the HLL and is not subjected to the public scrutiny and wide consultation with the academia. Moreover, the protocol is based on the presumption that the SSTLs shall be 25 mg/kg of soil. Excavation of the soil >25 mg/kg of mercury shall be done up to a depth of 30 cm and will be subjected to clean-up up to 25 mg/kg by using various techniques such thermal retorting, soil washing, solidification/stabilization, capping, phytoremediation depending upon the situation.

The most importantly, the NEERI protocol does not talk of the post-clean up environmental monitoring over a period of time for assessment of effort of amelioration. Even though this may entail additional expenditures by the HUL, it is necessary as matter of "Precautionary Principle".

Once the issue of acceptable SSTLs is settled, the NEERI's report would require modification and the modified report shall present post-clean up monitoring schedule. As such, this report does not bring any significant value addition to the issue of Remediation and Cleanup of Mercury Contaminated site at HLL, Kodaikanal.

3. Report on Site Specific Cleanup Standards for HUL's Mercury Thermometer Manufacturing Factory at Kodaikanal, (TN) prepared by Department of Civil Engineering, IIT, Delhi in October 2010 has recommended site-specific target levels (SSTLs) as 22.42 ug/g i.e. 22.42. mg/kg based on ecological risk estimates for Quail. In fact migration and bio-magnification of mercury in various organic forms also most importantly takes place through the water, sediments, plants, cattle/animals (feeding on Hg-contaminated grass/fodder). Through this route, the organic Hg gets in to the food chain and can cause acute and chronic neurotoxicity. Since this environment related vital aspects have not been considered by the Civil Engineering Department, the conclusions drawn in this report may not be relied upon and report may be set aside. The civil engineers are not expected to possess bio-toxicology expertise of high order.
4. Report on Study on soil conservation while undertaking soil remediation process in mercury contaminated site of HLL, Kodaikanal, October, 2010 by Central Soil and Water Conservation Research & Training Institute, Institute Research Centre, Udthagamandalam:

The report deals with soil conservation study including likely impact on soil while undertaking the remediation process i.e. excavation and backfilling. Measures have been suggested to minimize the impact on soil and soil erosion during the remediation process. They have identified certain problems while excavation of mercury contaminated soil and backfilling of treated soil and suggested preventive measures. With the limited knowledge of the undersigned in this field, it is said that the recommendations contained in the said report can be considered suitably subject to the peer review by the domain expert as may be identified and engaged by the TNPCB.

5. Final Technical Report on Plant Protection Measures during Decontamination Process of mercury Polluted Soil at HUL, Kodaikanal, May, 2110-Aprl 2011:

It is said in the report that the removal of top soil up to 30 cm depth from the mercury polluted soil site of HUL, particularly from the steep slope is undesirable for growing trees as well as other associated vegetation. This is in contrast of the recommendation of the NEERI in its report on Protocol, February, 2007 which states that the excavation of the soil >25 mg/kg of mercury shall be done up to a depth of 30 cm and will be subjected to clean-up up to 25 mg/kg by using various techniques such as thermal retorting, soil washing, solidification /stabilization, capping, phytoremediation depending upon the situation. This needs to be sorted out in the interest of protection of ecology environment.

The National Programme for Rehabilitation of Polluted Sites (NPRPS) is initiated by the Ministry of Environment, Forest and Climate Change (MoEF&CC), New Delhi under the aegis of Capacity Building in Industrial Pollution Management Program (CBIPMP) supported by the World Bank. Under this programme MoEF&CC has come out with a draft guidance document suggesting screening levels of pollutants in contaminated sites. It is believed that the TNPCB is aware of this document which proposes screening levels of mercury for protection of environment and human health as 6.6 mg/kg for agricultural purpose, 6.6 mg/kg for residential and park lands. This also needs to be considered by the TNPCB while granting permission to the cleanup operations.

Since, the HUL factory is already closed; industrial/commercial standards of cleanup should not be applied. Moreover, this is based on the presumption that these levels are safe even considering the factors of migration and bio-magnification of mercury in the food chain through dynamics of the ecosystem.

It is also important to understand that Schedule IV of the Environment (Protection) Act, 1986 and Rules made there under stipulates the permissible level of mercury in the environment as 0.01 mg per liter while it is 0.001 mg/liter as per BIS Standard for Drinking Water vide no. IS 105000: 2012 (Second Revision). Since the Kodaikanal lake water is source for the drinking water and water flows from the hills contaminated with mercury finds way in to this lake as well as Levinge water stream, the cleanup standards ought to be based accordingly.

Excavation of soil needs to be performed very carefully and *in situ* soil treatment methods may be considered. It is also suggested in the report to use the hand mattock or fork cultivator hoe instead of spade for digging the soil to minimize the losses of small and fine roots and replenishment of losses. It is necessary to quickly retrieve the unavoidable damage to the rhizosphere ecology after the cleanup and post-cleanup monitoring program should be put in place. These suggestions, among other things, seem practically useful and may be included in the terms and conditions of the site remediation program as may be approved by the TNPCB.

6. Interim Report of NEERI, October, 2015 on the Assessment of Mercury Levels in Soil, Sediment and Water samples from the off-site Area of HUL, Kodaikanal:

The scope of the study cannot be comprehended as ToR of the study is not presented in the report. Study of possible migration path of mercury and its bio-magnification in the ecosystem is the most vital component and is missing in the report.

Review of literature on mercury contamination and its effects on the ecosystems especially the possible migration of mercury in the ecosystem and food chain is also not done by the NEERI. This would have been very helpful in data interpretation as certain important information relevant to this topic is available in the Indian context. For example, several studies on mercury contamination of the Kalu River and Thane Creek near Mumbai have been carried out by Prof. B.C. Haldar, Dr. B.M. Tejam and others from the Institute of Science, Mumbai during 1970s and research publications are available in the reputed scientific journals.

Based on the detailed sampling and analysis of mercury levels in soil, sediment and water samples in the off-site areas of HUL factory, NEERI reported presence of mercury in significant quantities in the samples of soil, sediments and water collected from the immediate vicinity of HUL

factory i.e. Levinge Path Area. Results are presented in the Table No.1 of the said report. Mercury concentration in water is reported as <0.0003 mg/liter (BDL), in soil 0.507 and in sediment it is 0.518.

NEERI has reported significant quantities of mercury in soil and sediments. If these values are taken as target levels, then the screening level standard should be 0.5mg/kg as a matter of "Precautionary Principle". This point needs to be considered.

NEERI has not measured mercury concentration in mollusks, zoo planktons, phytoplankton, fish, plants (vegetable/fodder etc.). This is important and necessary to understand the migration path and bio-magnification/bioaccumulation of mercury in the ecosystem and its possible entry in to the food chain which could result in to acute or chronic neurotoxicity. It is necessary to scientifically assess the possible migration of mercury and its bio-magnification/accumulation over a period of time. To this extent NEERI's report is incomplete and it is not possible to draw any meaningful conclusion of certain practical value.

Post cleanup monitoring program is not suggested by NEERI. This is necessary and should be put in place so as to assess impacts of amelioration measures undertaken. Elaborate protocol for systematically monitoring of environmental parameters over a required period of time under the supervision of TNPCB/CPCB should be stipulated while granting permission for the cleanup.

In conclusion, it is opined that:

1. The SSTLs should be stipulated at 6 mg/kg irrespective of land use pattern considering the possible migration of mercury migration path and its bio-magnification/bioaccumulation in the ecosystem and its possible entry in to the food chain which could result in to acute or chronic neurotoxicity.
2. The target level of 6 mg/kg should not be construed as final. Should long term post remediation monitoring indicate that site still remains as active source of mercury loading in to the environment, further measures for amelioration shall be undertaken by the occupier.
3. Post cleanup monitoring program is not suggested as necessary by any of the organizations so far. It should be put in place so as to assess impacts of amelioration measures undertaken. Elaborate protocol for systematic monitoring of environmental parameters

over a required period of time under the supervision of TNPCB/CPCB should be stipulated while granting permission for the cleanup.

This is submitted for your consideration, please.

Yours faithfully,



(Dr. Dilip B. Boralkar)

Copy submitted to:

1. The Chairman, Tamilnadu Pollution Control Board, 76, Mount Salai, Guindy, Chennai 600 032.
2. Dr. T. Swaminathan, Professor (Rtd), Environmental management Research laboratory, Department of Chemical Engineering, Indian Institute of technology, Madras, Chennai 600 036. (e mail: teeswami@gmail.com; Cell +91-9444636366)