REPORT

National Conference
Toxic Chemicals Management: Availing Opportunities under Stockholm Convention

Gulmohar, India Habitat Center, Lodi Road, New Delhi
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1. BACKGROUND

The Stockholm Convention (2001 / 2004) is an important global treaty to protect human health and environment from the Persistent Organic Pollutants (POPs). India is a signatory to this Convention (Signed May 14, 2002; ratified on January 13, 2006). The treaty finally came into the force on 12 April 2006. Including India, the convention has 151 signatory countries.

Since 2001, a total of 22 molecules have been identified as POPs, with endosulfan being the latest one on the list. India as a signatory to the convention has already taken steps to execute action on these molecules as per the clauses of the treaty. However, the major concern in POPs that still remains is their sound management and disposal at the end of life.

Further, there are some molecules for which exemptions have been provided in the treaty and India is one of the countries availing these exemptions. India still uses DDT and Lindane. After the listing of Endosulfan under the convention in 2011, the Supreme Court of India imposed ban on its production and use within the country. However, these three molecules still remain a concern for the country. We also have issues in dealing with dioxins and furans.

In August 2010, nine new POPs those were added to the Convention are of very different nature. Flame retardants are the trickiest ones to deal with. Moreover, there is not much India specific information available on these new POPs.

The National Implementation Plan that was submitted by India in April 2011 brought some new information regarding ‘Dirty Dozen’. However, the independent evaluation of this report by UNIDO suggests glaring gaps in NIP and its future process of implantation such as, inventory buildup, research and financing mechanism. This needs to be discussed by the stakeholders.

In the above backdrop Toxics Link, New Delhi organized this conference, with an aim to find opportunities for collective effort in identifying solutions and draw up a roadmap for sound chemicals management in the country in the changed global chemical regime and in the spirit of various international treaties, particularly the Stockholm Convention.

The objectives were:

**Objectives**

I. Initiate dialogue process on POPs and opportunities under Stockholm Convention with key stakeholders in India;
II. Discuss India’s NIP on POPs and the future roadmap, including our action plan on New POPs;
III. Have critical dialogue on outstanding concerns on POPs – such as inventory, research agenda, financing mechanism;
IV. Through the dialogue process set agenda and plan of action for sound management of POPs in particular and toxic chemicals in general.
2. CONFERENCE REPORT

Inaugural Session:

The inaugural session started with the welcome address by **Mr. Ravi Agarwal** (Director, Toxics Link) where he briefed on the pressing issue of hazardous chemicals and the gamut of laws and legislations on relating such chemicals. There are many chemicals that have long term exposure even at very low levels. These chemicals have adverse impacts over life time, posing pertinent questions of dealing with them through concrete policy initiatives, he said.

Touching on the Stockholm Convention he said that it provides a framework on how to deal with the chemicals of this (toxic) nature. The convention started with the list of twelve chemicals which has now expanded and will continue to expand, with the latest controversial one being Endosulfan. Highlighting the positive features of the convention he rebutted the notion that the convention and the movement is a barrier to trade, market growth and economic wellbeing while seeing it as an opportunity to act in favor of the public health. He also stressed that the convention lays major thrust on public information, as it’s ultimately a public health issue and people must be aware about it. People must know what is happening, he said.

**Mr. Agarwal** pointed out that India has one of the largest chemical industries in the world and ranks among the top five and is growing. He further said that there is a whole array of chemicals which for most part people are unaware. These chemicals are deeply entrained in our system and changing them would change the very nature of the financial structure of production system.

He hoped that the conference would provide a platform for discussing various dimensions of these chemicals and their management, to come forth through the discussions.

He seconded the recent statement by the honorable Prime minister Dr. Manmohan Singh that China is ahead of us in terms of science, and also said they are certainly much more aware about dealing with POPs and other toxic chemicals. We must also learn from them.

He said that a lot of responsible work needs to be done in chemicals management and also lot of political will is needed to make them safer for human health and environment. He hoped that in the process the scientific fraternity and the decision makers of this country must be ready to take on questions, howsoever foolish they may seem at present; as this is a public health concern.

In the end he introduced the other panelist of the inaugural session and invited **Prof. SP Gautam, Ex. Chairperson, CPCB** and **Mr. Robert Donkers, Minister Counsellor for Env, Delegation of the EU to India** and **Prof. KC Gupta, Director IITR Lucknow** to deliver their inaugural address respectively.
Prof S.P Gautam (Ex-Chairperson, Central Pollution Control Board) talking about POPs said that the country seriously lacks on the management aspect on the issue. Despite the legislation and regulatory regime being in place, monitoring seems missing; and attributed it to the fragile law enforcing agencies. Also the country lacks in science due to lack of appropriate infrastructure for analysis, collections and study.

Giving a brief insight into the bleak scenario of the country’s pollution record, he said that out of 88 industrial cities (that CPCB studied for developing comprehensive pollution index in 2009-10), 43 are critically polluted in terms of toxicity and health burden and 20 more touching the criticality line. He however, said that the public health studies in such sites could not be conducted, reemphasizing on the lack monitoring at social scale (despite regulatory regime and legislation being in place).

Expressing concern over the issue he said that while the absorbance rate of POPs is extremely high as its gets saturation in the body, flushing them out takes years and thus has large health affliction. Further, these molecules get attached with other general toxicants and become more dangerous. Hence, in his opinion there are unfathomable chemical combinations possible through these POP molecules posing grave risk to ecology and life.

In the end he had following suggestions to deal with toxic chemicals in our life:

- Strengthen monitoring and regulatory system and invest on health impact analysis;
- Research needs to be directed towards toxicity – for example COD in water should be analyzed critically as they define toxicity;
- Gradually switch over to Bio- Systems and use Biocides, biochemicals. He was of the opinion that the research to this switchover is not tough and is only a matter of orientation. Replacing one chemical with another would not lead to sustainable solutions.

Mr. Robert Donkers, (Minister Counsellor for Env, Delegation of the EU to India) expressed his appreciation for the fact that the focus of the conference was on the Stockholm Convention. He briefed that the EU has been a very active player in the field of POPs and gave an insight into the various negotiations done on the issue of POPs and the Convention in the past. However, despite the number of negotiations that gave birth to the convention, and was also applauded by the governments, NGOs and various countries, little has been manifested on ground, he expressed with concern.

He argued that the world cannot live without chemicals. But what we don’t like is the side effects of these chemicals. This is how we need to find the answers on the safer chemicals he said. Elaborating on the issue of POPs, he said that phasing out of certain POPs is a huge challenge and requires deliberate efforts. It is also imperative to make sure that new POPs are not created by replacing one molecule with the other and was also particularly concerned about the endocrine and gene disrupting chemicals. He viewed concerns about obsolete POPs and pesticides and their waste as the most critical in this part of the world. Mr Donkers also raised the critical issue of Brominated Flame Retardents (BFRs) and poiting towards one of the ads of CPCB, said that not all BFRs are POPs / bad chemicals as projected by the ad. Nonetheless, Prof. Gautam, Ex-CPCB chairperson during whose tenure the ad came out, argued that in his opinion, a longer term study would be required to assess the toxicity of chemicals like BFRs.

In the end Mr. Donkers suggested “green chemistry”, as a much safer approach for health and environment. He pointed out the benefits of having a world market based on green chemistry and said that it would be a great economic opportunity creating numerous livelihood prospects for nations, particularly for India.
Mr. Rajeev Betne from Toxics Link delivered the vote of thanks.

**Session I – Stockholm Convention – Opportunities for India**

Mr. Ravi Agarwal, Director, toxics Link delivered a brief overview on the Stockholm Convention. He gave a brief background of the Stockholm Convention and said that the Convention was signed in the year 2001 and ratified in 2006 by India. While the National Implementation Plan (NIPs) finally came into being from April 2011 and was submitted to the Stockholm Convention.

Here, Mr. Agarwal did raise the issue of non-involvement of the civil societies during the preparation of NIP as a serious omission in the process and expressed hope that in future the civil societies and other interest groups would be involved in the national interest.

On POPs, he pointed out that there are three chemicals which, are of particular concern to India - DDT, dioxins/furans and PCBs. In case of dioxins the concerns lies in the fact that there are no rectifying mechanisms to mitigate dioxins and furans emitted from waste incinerators (both hazardous waste and medical waste incinerators), which happen to be the primary source of emissions. He also pointed that even metal recycling industry poses grave threat, particularly copper recycling as copper acts like a catalyst in the production of dioxins.

We also need to fix gaps in the data he said.

In case of DDT Mr. Agarwal said that India being the largest producer of DDT in the world and also exports for the vector control, has major challenge in doing away with it as apart from it being a POP molecule, studies show it has become ineffective in vector control. Further, the challenge also lies in dealing with the DDT stockpiles in an appropriate manner as it degrades into much more toxic compounds (DDD and DDE) over time.

On PCBs (through the imported transformers in the old times) he said that India specific studies on media contamination and health impact are quite rare. Scientists need to take note of this fact. Thus overall, he had the following point made for the discussion and future action:

- Although the NIP reveals a lot about the status of POPs in India, there is much more to be done in terms of inventory, research and the implementation plan. As far as implementation of the plan is concerned, the issue of finance (which is very critical) needs to be looked at very carefully and in a realistic way. The future financial assessment of the work look conservative as of now and the scientists must see if this is good enough for carrying forth the implementation plan;

- He also had the view that the budget for public awareness must be increased, as it is one of the most important drivers for the change;

- He advocated for good regulation, intervention policies and public awareness that would play a critical role as far as POPs are concerned;

- Investment in technology is a public investment challenge. For example the waste incinerators.
Mr. Rajeev Betne taking over from Mr. Agarwal, presented the critique of NIP (National Implementation Plan) done by UNIDO. He said that the main point of the UNIDO critique is the lack of proper quantification and qualification of the problem, apart from other management related issues such as project coordination, consultations with the stakeholders, awareness and capacity creation. Further, the NIP was done in complete isolation without involving the civil society in the process, a critical observation by the independent UNIDO analysis.

The major challenge is to build proper inventory of these/ toxic chemicals and quickly so because inventory and baseline creation is crucial to finding solutions, he said. Mr. Betne also pointed that the analysis of molecules was slow, especially due to conventional HRGC/MS approach compared to some of the improved technology available. UNIDO suggests “Bio-detection Screening Method” which is a globally acceptable approach and faster than conventional methods in sample analysis. The cost also goes down drastically by about 80%.

Dr. Neeta Thacker, (Chief Scientist and Head - AI Div. NEERI) made the next presentation on “Persistent Organic Pollutants - India’s Research Agenda”. She begun briefing about NEERI, its area of work in respect to POPs and the large collaborative effort among CPCB, NEERI, NIIST, HIL and CPRI that was realized during the preparation of NIP. While the project started in 2007, the actual time for work was only about 18 months, she said. The study was done mostly on the secondary data gathered.

She elaborated the purpose of Stockholm Convention and listed down various POPs under the Convention. Echoing the concerns raised by Mr. Agarwal she said that that the concern lies primarily in the usage of pesticides, PCBs, dioxins and furans in India and elaborated on the sound management of chemicals like DDT and PCBs.

She also threw light on NIPs strategy and action plan and said that the objective of NIP was to enable India comply with the obligation of the Convention and actively participate on an international platform. Talking about the priority areas of research of NIP, she explained that it seeks to strengthen and improve policies, legal institutions, and regulations and improve capacity building and public awareness for effective and efficient implementation. Further, she briefed on the action plan on the management of POPs stockpiles and wastes and outlined the need to control the stockpiles and its sound disposal.

In the end she also made several short and long-term recommendations. A few critical recommendations were as follows:

- Sound disposal plan of PCBs and medical waste – short term
- Capacity building of NIP implementing agencies and institutions – short term
- Technology upgrading - short term
- Inventories, alternatives - medium term
- Sharpen - Public awareness, collaboration between institutions and legal framework – long-term
Discussion Points on Session - I

- Inventorisation of active ingredients of molecules (Prof. KC Gupta): while the point was agreed, it was also suggested that the toxicity should also be measured in totality terms;

- Incineration of waste and stockpiles should be discouraged and if at all permitted, needs to be under good technology and proper monitoring - (Prof. KC Gupta);

- Use of nano tech for reducing the chemical burden such as DDT (Prof. KC Gupta) – the idea was broadly rebutted as once the chemical is proved POP and also other-wise ineffective – as in case of DDT – it should be desisted and done away with;

- Chemicals cocktail (Dr. Amarsing Azad, Kheti Virasat) – concern on the impact of cocktail of toxic chemicals was raised. It was agreed that there is a need for studying this aspect more in the coming days. However, this is a new science and will take some time to mature;

- Open burning as a big source of Dioxin and Furans – a problem that needs to be high on the agenda;

- The implementation plan should speed up as the time is running out as far as public health is concerned;

- Public awareness (Mr. Duncan, UK intern with Janhit Foundation) – how exactly this can be done. It was concluded that there are many levels of work that build public awareness. There are challenges but it’s a collective responsibilities. Scientific community must also be addressed for raising awareness at that level – not many are aware about this issue at that level;

- Pollution hotspots should be strictly monitored informed and should be high on agenda. Also monitoring of PCB hotspot;

- The informal sector (dominated by economically challenged section) needs to be integrated appropriately in the whole plan of action. For example the integration of waste collectors in recycling chain and benefit sharing;

- More of collaborative work among stakeholders is needed (sharing ideas, research inputs, experience and information, conference, workshops, seminar, meeting and even informal exchange of materials).
Session II – Persistent Organic Pollutants (POPs) – Regulatory issues

Mr. Piyush Mohapatra of Toxics Link made a presentation on “New POPs and New Challenges” where he elaborated on the chemicals newly listed under the Convention and also those under the scanner. He shared some critical information on new POPs such as production, use and their health and environmental impact.

Touching on the current status on new POPs he said that the country lacks even the basic information on most of the molecules and hence inventorization needs to be done first. Further, he pointed that although India has banned Chlordecone long back, the country is still the largest producer of Lindane. He also urged for an effective monitoring mechanism and regulatory structures and stressed on developing suitable alternatives wherever these new molecules are used. He further recommended appropriate disposal of stockpiles and need for more stakeholder consultations on the issue.

Throwing light on some of the positive initiatives taken by the government he said to the new E-waste Rules (India) would come into force from May 2012 and subsequently take care of EU’s WEEE directives and provision of RoHs from May 2014. These provisions will in-turn reduce the release of some hazardous POPs into the environment (like PFOS and Brominated Flame Retardants).

Dr. D. D. Basu, CPCB scientist, presented a case on “India’s Regulatory Framework on POPs and challenges in implementation”. He opined that India is a land of rules, which are not a problem but their proper implementation is. He briefly touched upon the regulatory framework that governs the management of toxicity, hazard and toxic substances in India. He listed down the various acts related to environmental management and chemical safety, like Air and Water act; Environmental Protection Act, The Chemical Weapon Act, Chemical Accidents, Gas cylinder rules, Manufacture and Storage Rules, Hazardous Waste Management Handling Rule, Insecticides Act and many others.

Dr. Basu was of the view that there is a huge problem in disposing off stockpiles. The main problem is of lack of equipment and proper infrastructure.

The doc and port also needs to be safeguarded as the toxic chemicals move through that root, he suggested.

Major portion of his talk was however on a comprehensive CPCB study on dioxins and furans and the health impact in humans (or in other words the societal risk) posed by the emission from common hazardous waste incinerator that en-route contaminate air, water, land and residues including certain liquid wastes, sludge, and solid residues. He concluded that his study suggest a very high correlation between health impacts (specifically the cancer) and the unintended POPs (D/F). The study outcome indicates more stringent enforcement of dioxins standards to reduce the societal health burden/ cost, he suggested.

Further, he gave a brief insight into the societal cost of various noxious emissions; the life span reduction and deaths caused due to these dioxins and furans in comparison to other life threatening factors such as road accidents.
Talking on the challenges he said that inventorization and prioritization; risk assessment technology upgradation and handling of date expired pesticides were some of the major challenges that require some concrete action plan.

Following were his recommendations:

- Organizing available data in a format
- Parallel running of research and implementation process
  - Invest in health studies, take advantage of LIC database
  - Disposing stockpiles of pesticides.
  - Taking action on illegal use of pesticides and chemicals
  - Regulating small scale manufacturing units of chemicals spread across the country
- CPCB and PCBs are hugely handicapped in terms of trained staff strength
  - Limitation of labs and technical staff to analyze certain complicated molecules such as dioxins (particularly from the stack)
  - Capacity building – particularly about POPs measurements

**Question and Answer on Dr. Basu’s presentation:**

How do we know that the incinerators and waste to energy plants are compliant? **Ravi Agarwal, Toxics Link** – CPCB assisting the PCBs and even private experts and people from NEERI are assisting. In future existing labs could be upgraded.

Why stockpiles management should be so difficult, as it is just a matter of import of technology or sending them to some the country of its origin to management? **Mr Satish Sinha, Toxics Link** - One of the bottlenecks, **Dr. Basu** said in dealing with the stockpiles and final disposal within the country is the “not in my backyard syndrome”. Government is also examining the offer from Germany for final disposal. However, the best way is to develop the capacity within the country; it can be done effectively, he said.

The next speaker was **Mr. Donkers**, Minister Counselor for Environment Delegation of the EU to India. **Mr. Donkers** traced the history of EU regulation on POPs, and how they proceeded from signing and rectifying the Stockholm Convention. He said that EU directives does not provide a possibility to any member state (27 as of now and Croatia to added next year) to do less or more and ensures that all the regulations are implemented throughout the states in the spirit of the law. This is binding even if the states are not a party to the Stockholm Convention, he informed. There may be divergence from other conventions such as the Basal where the provisions are not binding. He further briefed about the EU’s proactive actions on futuristic issues that the convention might take up - say POPs waste management, he said.
Mr. Donkers touched on some of the positive initiative undertaken by the EU and said that on the basis of certain risk assessments the EU has succeeded in imposing a temporary ban on many chemicals not listed under the convention. Also, there are good monitoring systems in place, for instance the furans and dioxins are being monitored very strictly. The member states have to report to European Commission and every three years there is reporting within the EU on the application of the regulation in the member states including the National Implementation Plan; stockpiles and release inventories of unintentional POPs. There are also penalties for non-compliance.

However, it does costs money, he said although quite worth it as toxic chemicals (especially POPs) have huge human health ramification through media and the food chain.

He also briefed on REACH- the legislation in EU which is in the process of implementation, the features of the legislation and said that the REACH regulations put the onus of proving the safety on the manufacturers/ industry. This encompasses even the bio substances.

He called for extensive public awareness on the issue and said that the public authorities and NGOs should concentrate on the graveness of the issue. He shared that in India the EU has been organizing information sessions on Stockholm Convention to generate awareness among the public. Through various discussions and deliberations EU has also been assisting MoEF and the industry on issues of stockpile management.

Mr. Donkers other suggestions were as follows:

- The technicality and the listing of POPs molecules under different annexure of the convention must be understood thoroughly;
- Public awareness is meaningless until there is information about safer, cost effective alternatives. We need to strike a balance;
- In certain cases the extension provided would depend upon the COP to the convention. This needs to be clearly understood by the parties;
- There is a shortcoming in the convention – the mechanism for compliance is not clear. It needs to be addressed at appropriately.

Further suggestions during the session:

- Exchange of regulatory experience from EU to CPCB
- Making some handy toolkit available for the grassroots NGOs for monitoring unintended POPs
- Need for CSR initiatives in dealing with toxics chemicals
- Need to have a clear roadmap from CPCB on POPs management in a time bound manner (further classifying NIP)
- There is a need for more exercise of pressure from the civil societies for the working governance. The coordination between agencies needs to be much more proactive.
Session III – POPs and Outstanding Issues – Managing Toxic Chemicals

Dr. AC Dhairwal, Director, NVBDCP (Ministry of Health and Family Welfare) made the first presentation of the session on ‘Phasing out DDT – what’s the roadmap’. He initiated his talk with the overview on the National Vector Borne Disease Control Programme; its work and strategy and said that it deals with six vector borne diseases like – malaria, dengue, Japanese encephalitis, Lymphatic Filariasis, Chikungunya and the Kala-Azar.

Talking about DDT’s use in vector control in India, he said the directorate is aware of the fact that they are using a POP and thus POP considerations override every other factor in the use of DDT in vector control, he stressed.

He however stressed on the fact that increasingly, NVBDCP is consciously using “Integrated Vector Management” approach to reduce the dependence of chemicals in general and DDT in particular. This involves environmental manipulations/modifications, biological controls, bed-nets etc. as well he said. There are IEC activities included too. Impact on societal susceptibilities is also monitored and researched along with sister institutions and experts like ICMR and NEERI and corrective measures are being taken.

However, he also mentioned the fact that the use of DDT for controlling Kala-Azar vector has increased in recent times as the disease is in the elimination mode in India.

Touching on the environment management plan, he said that it lays down measures needed to prevent, minimize and mitigate the adverse impacts on insecticides and focuses on proper storage, safe-handling and disposal of empty containers and insecticides remnants. The programme also takes help of consultants like SENES Consultants (World Bank supported) in monitoring the Environment Management Plan implementation across the country.

Talking about public health and implementation of environmental management plan he suggested measures for improving environmental condition (such as sanitation and municipal waste management).

Few other points made on Dr. Dhariwal's Presentation:

- Sanitation is the major cause of most vector borne diseases. There should be increase in the budget for sanitation management;
- DDT mandate committee has suggested phase-out plan for DDT.
- On impact on DDT on pesticide applicators and people - ICMR is studying the impact of DDT use on human being in the areas where it is being used. HIL representative (Dr. Basu) said that HIL is also providing all the protective gears to the pesticides applicators. He said that DDT IRS does not cause any adverse health impact quoting a WHO study of 2010.
The ground reality is the protective gears are mostly not used, one of the major cause of occupational hazards. The NVBDCP, HIL and other relevant agencies must take note of this fact and enforce stricter code of conduct.

Mr. Rajiv Betne of Toxics Link presented a brief overview on the status of Endosulfan and through this he raised certain very crucial issues on how decision on public health is being taken in India and how they should be. He said the banning of Endosulfan by a recent Supreme Court order (for production, use, and sale within India) should be seen as a victory of those who place public health on the highest order and must be celebrated in that spirit only.

However, he said that the permission given for export (of the earlier placed orders from foreign countries) is little surprising. Is the health of people of other countries is less important in our eyes, he asked? He wished the order was for complete disposal of the remnant.

He informed the gathering about “THE ENDOSULFAN PESTICIDE (PROHIBITION) BILL, 2011”, introduced in the parliament in August 2011, covering whole of India with blanketed ban on production, use and sale and also some good provisions for affected communities. He hoped this would initiate a new chapter in the domain of public health in India.

While there are some genuine concerns about food security and pest attack, said Mr. Rajeev, there are other better ways to address this issue, notably the non-chemicals or bio-chemical or integrated approaches which are shown to be successful in many parts of India and the globe, he argued. He briefly outlined the approach to toxic chemicals management as follows:

- Let’s not be obsessive with chemicals, especially toxic one, once they are proven danger;
- Develop own alternatives, support is elaborated under the convention. Gradually reduce the chemicals dependence in agriculture;
- Generate health data (quite weak at present), use the existing network on public health;
- Disposal framework and infrastructure needs to be developed (investment).

In the end he brought out some glaring gaps in the pesticides management in the country pointing towards negligible powers in the hands of environment and health ministries. He also suggested for better coordination among different agencies and ministries in matters related to toxic chemicals and public health.

Few other points on Mr. Rajeev’s Presentation:

- The HIL defended the use of endosulfan and said most epidemiological studies prove the molecule to be safer. This notion was rebutted strongly by stating the fact that the debate on toxicity of endosulfan is long over (Mr. Ravi Agarwal, Toxics Link) and now it is time to move ahead and not defend;
• **Mr. Agarwal** further stated that the public companies such as HIL must follow the decisions and not contend them as they are not for profit making. Public health interests should be the top priority for them. They should instead look for alternatives.

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**Mr. Satish Sinha**, Associate Director, Toxics Link made the next presentation on Trade and management issues related with Brominated Flame Retardants (BFR). Certain BFR, which are highly toxic POPs (used in electronic items and certain plastic materials) are not intended to be used in materials such as plastic food vessels. However, in India, due to multiple recycling (mostly in the informal sector) there has been cases (studied by Toxics Link recently) of cross contamination of BFRs into various kinds of plastics, which makes it an important issue to be discussed widely; **Mr. Sinha** Said. He elaborated the various kinds of BFR (around 75 and relatively cheaper than other flame retardants) and their application in various products.

Raising grave concern he said, that some BFR leech out in the environment. He also touched on the health afflictions caused by BFRs and said that it bio-accumulates in blood, breast milk and fat tissues and causes an array of adverse health effects like cancer; thyroid hormone disruption; impairment; delayed puberty and many other. Being a neuro-toxic it also impacts the nervous system as well as the reproductive system and thus, are likely to impact the next generation.

Briefing on the environmental and health concern emerging from BFR he said that Asia is the biggest consumer of BFR and those engaged in recycling of plastics with BFR are prone to exposure.

He also shared the studies undertaken by toxic link on the issue and said that recently a study was done to understand the quantum of BFR in WEEE and understand the cross contamination of material supply chain with BFR while recycling. **Ms. Priti Mahesh** of Toxics Link supplemented information saying there is a range of products that is made by these recyclers and thus cross-contamination is a matter of serious concern.

He however pointed out that India specific information is very thin, while the global research data suggest wide range of contamination - from different media to the fatty tissues of fish, birds and animals contaminating the food chain, and cause for bio-accumulation and bio-magnification.

**Mr. Sinha** also briefly touched upon the regulatory measures on different BFRs around the globe and India. He had following recommendations:

- Implement restrictions on the use of Halogen based flame-retardants / BFRs
- Providing an incentive to companies with BFR free products.
- Laying down specific standards for recycling of BFR contaminated plastics. Generate new data on environment and health due to BFR releases

Replying to certain queries **Mr. Sinha** stated that, the industry must come out with better alternatives and in future they have to when the law comes in force. Further he agreed that control mechanisms have to be placed in for better recycling practices in India.
**Dr. Anbu Munusamy**, Additional Director, NIIST/ CSIR next spoke on India’s action plan on Best available Tech/Best Environmental Practices for Dioxins and Furans (the unintended POPs) management. **Dr. Anbu's** said that although, India’s NIP has many gaps, there has been sincere efforts made by the scientific fraternity to bring out information as far as possible and also suggested many remedies for the future. We could upgrade, he said.

He elaborated on the difficulty in using the UNEP tool kit in analyzing D/F and how NIIST had to develop indigenous emission factor for the analysis. Ultimately some modification had to be done and finally the International TEQ was used for toxicity measurements. He elaborated on the work done on dioxins and furans for NIP in great detail (including awareness creation through IEC materials).

He threw light on the annual emission of dioxins and furans in the country and their release route. He also touched on the issue of emission from incinerators both hazardous waste incinerator and medical waste incinerator and also emissions from open burning sites including landfills.

He suggested steady burning and minimum smoldering and stated that open burning should be prohibited. Also pre sorting of scrap material, good operation conditions in furnaces where more than 850 degree Celsius should be maintained to destroy Dioxins and furans. Also the country needs to take up challenging research and a clear database needs to be developed.

In the end **Dr. Anbu’s** provided some of the new initiatives taken by NIIST. NIIST is developing catalyst (multi-oxide) for destroying the D/F at the stage of their production itself. Monolith liquid catalysts are also being developed by NIIST for destruction of D/F in the liquid medium, he said. Currently there is scope to cover PCBs, PeCB, PFOS and PBDE.

**Further points on Dr. Anbu’s presentation:**

- The existing incinerator / plant could be retrofitted with the new BAT and BEP. New plants need to comply with the new standards and BAT/BET;
- Design should also be integral part of BAT / BEP for minimizing D/F emission. We should not rely on the end-of-pipe solutions only;
- The information should be available / made available widely so that the new technology is not promoted by the manufacturers behind the curtain of ignorance.
Mr. Ravi Agarwal, chair of the plenary session invited various speakers for the panel discussion.

Dr. K.C Gupta was the first to speak. He made following points:

- The public information and awareness creation is very important which should be taken up on the priority;
- Implementation / enforcement must be followed strictly. This is a weak area in India.
- Use existing labs and upgrade them. Only few specialized labs should be there. Regional approach for lab analysis should be followed.
- Networking / coordination between different labs should improve. Component approach should be desisted with.

Mr. Prabhjot Singh Sodhi, (GEF/SGP, CEE – National Coordinator) made the next presentation on Small Grant Project (SGP) and opportunities on POPs. In the beginning he shared the SGP thematic and its work in detail.

He talked on sustainability and pointed the need to institutionalize the process of action. He said that public awareness should be given an institutionalized mode in partnership with the policy makers. Awareness generation, according to him is an important pillar but how do we educate and communicate is the most important. However, Mr. Sondhi strongly advocated building trust with the communities for any action plan to be successful.

He provided a few good examples of SGP sponsoring projects on plastic recycling and a few good models in small project financing. His other points were as follows:

- POPS and chemicals management is not an isolated and/or one institution’s job. There needs to be a collaborative / team effort. There must be a coordination committee;
- Assessment of responsibilities of participating entities is needed;
- CSO partnership is essential for creating small but effective projects;

Prof. T. Swaminatha of IIT Chennai, made a brief presentation on toxic chemical management. Elaborating first on one his experience on plastic recycling, he said the plastics need to be segregated before recycling keeping the end purpose of recycling in mind (say for making roads). But normally, what happens is that instead of recycling waste plastics, a huge amount of virgin plastic is introduced in the process (due to paucity of adequate waste plastics) and subsequently enhancing cumulative burden of toxic chemicals.

Since managing toxin is a new road and less travelled, thus caution needs to be exercised, he said.

In his view, he felt that ‘management’ has to be broad-based and should not only address the POPs but a range of toxic chemicals. POPs is a subset of the vast terrain of toxic chemicals and composition, he said. He
also talked on the two important perspectives the environmental perspective and technological perspective through which process efficiency can be increased to reduce waste.

However, most importantly he advocated that in the present context there is a need to change the way we produce things/products. By suitable changes in the production processes we could reduce the use and generation of toxic substances and also the waste. The true worth of the product also needs to be assessed in the overall term - we need to ask if we could do without that product.

Prof. Swaminathan proposed a paradigm to address the issue of toxic chemicals:

1. Human wants are the driving force for excessive consumption
2. Consumption >>>>Production >>>>Waste
3. Want Not >>>>Waste Not
4. Need of the hour - Not waste minimization but want minimization
5. Let’s live with what we really need

Sri V.V. Pattanshetti, Joint Director, Central Power Research Institute (CPRI) briefed the gathering on polychlorinated biphenyls (PCBs), which are dangerous even in Nano gram, and said that high life span of PCBs can adversely impact human life and species for generations, stressing on importance to urgently address their de-activation and final disposal.

He said that there is about 10,000 tons of this PCB / PCB contaminated material that needs to be eliminated in an environmentally sound manner. He said that CPRI is working to get a well accepted technology i.e. Sodium based de-chlorination technology (imported one) for elimination of PCBs.

He also talked on incineration where burning is not done in a controlled mechanism and large quantities of dioxins and furans are released while incinerating and seconded the idea of collaborative work among various interest groups to tackle the menace of toxic and waste management.

Discussion points in the session:

• More research needed for bio-degradation / enzymatic and photo catalytic degradation route for toxic chemicals/waste disposal – Dr. T Swaminathan
• Till the PCB contamination is not cleared, the State Electricity Boards should not auction the scrap as per new rule – Sri V. V. Pattanshetti
• Suggestions were made to take up issues of freeing local agriculture from natural chemical infestation / contamination such as the Chambal Command and Indira Gandhi Canal Command.
• Mr. Ramcharitra Sah, Director, CEPHED, Nepal shared his experience in dealing with POPs issues and NIP preparation in Nepal and shared some of the success stories on pesticides stockpile disposal, through collective endeavor of NGOs and the government. Mr. Ramcharitra has been part of NIP
preparation for Nepal. He informed the gathering about the decision of the country to send the obsolete 75 tonnes of pesticides located in 26 localities across the country, to Germany. He also shared some of the good initiatives undertaken (UNDP-GEF supported), where there was awareness generation and pilot models were developed for dealing with POPs issue. He said that a lot of work on PCBs and awareness generation was done extensively among the grill workers/metal fabricators. In many places dry welding machines are being promoted to reduce dioxin and furan emissions from this sector.

He also informed about the initiative taken in the country for the management of bio-medical waste for minimizing dioxin and furan release from this sector. Also the country is replacing incinerators with autoclave for dealing with infectious waste.

**Mr. Ravi Agarwal,** Director Toxics Link in his closing remark thanked all the speakers and participants and said that everyone has some responsibility (and constraints) and commitment is required among the stakeholders as well as the government to address issues of toxic management. He said that there are many challenges and though we have come up a long way there is a need to interact on a continual basis. It is not a one-day job, he said.
3. KEY CONCLUSIONS

- Urgent action on POPs / Toxic chemicals stockpiles disposal;
- India should proactively utilize all the avenues approved under international treaties – technical, advisory as well as financial;
- There is need to invest in data generation, data organization and inventory buildup. This is key for quantifying and qualifying of problems;
- The scientific fraternity should more proactively engage in disseminating their research outcome to the interest groups and public so that a mass awareness / movement can be created. They must take active part in setting agenda for toxic management and public health safeguard;
- In matter of public health, there is a need for systematic and systemic consultative process among interest groups and the public;
- Public awareness is the key for successful implementation of any plan. Need good amount of time and money budgeting for that.
- Assessing and fixing responsibilities, coordination and networking are key;
- Strengthening and upgrading of current scientific infrastructure rather than just going for of new labs should be pursued. The scientist must work in network rather than on a component basis;
- For government institutions and agencies, trade and profit making should not be the criteria in matters where public health is at stake. Public health is the primary responsibility of government organizations. They must follow the decisions instead of contending them;
- There is need to hugely invest in public health research which is a neglected area so far. New ideas must be thought of – for example utilization if LIC database;
- Exposure to a Cocktail of chemical and their collective impact is a new branch in toxic management. We need to have this on our research agenda;
- Implementation of regulation in India is weak. Need to address this issue effectively through enhancing numerical and technical capacity. Also trespassers must be strictly dealt with to observe credible compliance rate in future;
- It is vital to develop credible indigenous BAT/ BAP and alternatives in the long run;
- Looking at the galloping chemicals trade and increasing health impact of toxic chemicals in the region, the management has to have a holistic approach and just not concentrated on POPs management alone;
- There is a need for gradual shift towards biological and biochemical approach for development and green chemistry;
- In dealing with toxic substance and public health issues, there has to be effective empowerment of the Environment and Health Ministries;
- Need for thinking of alternative paradigm of development where life-cycle analysis of any product is important. This would mean critically analyzing the true worth of a product/ process and its utility for us. We need to ultimately move towards optimal consumption – satisfying needs and not the greed;
4. PRESENTATIONS

Session I – Stockholm Convention

Opportunities for India
By

Ravi Agarwal and Rajeev Betne

Toxics Link
UNIDO Evaluation of India’s National Implementation Plan for POPs

Betne, Rajeev
Senior Prog. Coordinator
Toxics Link, New Delhi

National Conference on Toxic Chemicals Management – “Availing Opportunities under the Stockholm Convention”
India Habitat Centre, New Delhi
28 February 2012
India’s “National Implementation Plan” for POPs

Project Start: July 2007
Project End: April 2011
GEF funds: $3,074,700
GOI funds: $6,880,000
UNIDO funds: $200,000
TOTAL funds: $10,154,700

Organisations funded:
1) Ministry of Environment and Forests (MoEF)
2) Central Pollution Control Board (CPCB)
3) Central Power Research Institute (CPRI)
4) Hindustani Insecticides Limited (HIL)
5) National Institute for Interdisciplinary Science & Technology (NIIST)
6) National Environmental Engineering Research Institute (NEERI)
National Implementation Plan Report (700 pages)
Goals of National Implementation Plan (1)

- Establish inventories on POPs production, use, trade, stockpiles, wastes and contaminated sites;
- Develop strategies and action plans to reduce and eliminate of POPs;
- Assess infrastructural capacity and propose institutional arrangements, regulatory frameworks and human resource needs;
- Raise stakeholder and public awareness to ensure the effective and sustainable implementation of newly proposed strategies and Action Plans
Goals of National Implementation Plan (2)

- Build sustainable capacity for reporting to the Stockholm Convention;
- Develop and demonstrate practical and feasible methodologies for priority actions that enable India to meet its Stockholm Convention obligations;
- Improve national, state and district capabilities to further define POPs inventories;
- Improve the containment and safe disposal of POPs through best-practice management
Results of UNIDO evaluation...

- The UNIDO Evaluation Report said the NIP Project in India needed:
  - Better project management and monitoring
  - Better consultation with stakeholders
  - Better awareness raising of POPs issues
  - Better contract development, reporting, monitoring and payment
  - Better legislative analysis, implementation and enforcement
  - Better capacity building
  - Better approach and methodology

- In particular, inventories of POPs contained insufficient information because:
  - Analysis was slow, expensive, leading to very few samples
  - Risk of human exposure increased, especially among women and children
## Project results: Limited POPs inventories

<table>
<thead>
<tr>
<th>POPs</th>
<th>Organisation</th>
<th>Number of samples analysed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Air</td>
</tr>
<tr>
<td>DDT</td>
<td>NEERI</td>
<td>51</td>
</tr>
<tr>
<td>PCB</td>
<td>NEERI</td>
<td>12</td>
</tr>
<tr>
<td>PCB</td>
<td>CPRI</td>
<td></td>
</tr>
<tr>
<td>Dioxins</td>
<td>NIIST/NEERI/CPCB</td>
<td>36</td>
</tr>
<tr>
<td>Pesticides</td>
<td>Agriculture Dept</td>
<td></td>
</tr>
</tbody>
</table>
## Project results: Limited POPs inventories (2)

<table>
<thead>
<tr>
<th>POP</th>
<th>Organisation</th>
<th>Obsolete stocks identified (tonnes)</th>
<th>DDT</th>
<th>PCB oil</th>
<th>PCB-solid waste</th>
<th>POP Pesticides</th>
</tr>
</thead>
<tbody>
<tr>
<td>DDT</td>
<td>NEERI/HIL</td>
<td>40.4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PCB</td>
<td>NEERI</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PCB</td>
<td>CPRI</td>
<td></td>
<td></td>
<td>3,000</td>
<td>6,717</td>
<td></td>
</tr>
<tr>
<td>Dioxins</td>
<td>NIIST, NEERI &amp; CPCB</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pesticides</td>
<td>Agriculture Dept</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>30</td>
</tr>
</tbody>
</table>
UNIDO Evaluation: Screening method for POPs

• Improved screening method needed to better define inventories of POPs produced, used, accidentally traded (in food) and stockpiled from waste and contaminated sites;

• Bio-detection screening methods may prove useful:
  – Good correlation ($r^2 = 0.96-0.99$) between Bio-Toxic Equivalents (TEQs) and WHO-TEQs for many matrices (such as emission gas, ashes, soils, sediments)
  – Regulatory acceptance in the US (EPA 4435), Europe (several countries) and Japan (JIS 463)
  – Available for 20 years and now installed in more than 50 laboratories in 30 countries .... but not in India
  – Equipment cost is ca. 80% cheaper than conventional HRGC/HRMS, analysis cost is ca. 70% cheaper than HRGC/HRMS
  – Can analyse as many samples in one week as the project analysed in 3 years (weekly capacity of 50 samples/person)
Further information

Evaluation Report:

http://www.unido.org/fileadmin/user_media/About_UNIDO/Evaluation/Project_reports/Final%20India%20NIP%20Evaluation%20November%202021_1.pdf
Persistent Organic Pollutants – India’s Research Agenda

National Conference -
Toxic Chemicals Management:
Availing Opportunities under Stockholm Convention
Organized by Toxics Link
New Delhi
February 28 – 2012

Dr. (Mrs.) Neeta Thacker
Chief Scientist & Head

CSIR-National Environmental Engineering Research Institute
Nagpur
Background

• A class of toxic chemical substances that can harm human health and the environment
• Long lasting toxic substances produced and released into the environment by human activity
• Use as industrial chemicals; and produced as unwanted by-products of certain chemical and/or combustion process
• Persist in the environment, bio-accumulate through the food chain and pose a risk of causing adverse effects to human health and the environment
• Due to long-range transport of POPs there is a consequent threats they pose to the environment of the whole globe
• The Stockholm Convention 2001 is a global treaty to protect human health and the environment from POPs which became legally binding on 17 May 2004
Stockholm Convention- Purpose

• Eliminate dangerous POPs
• Support the transition of safer alternatives
• Target additional POPs for action
• Cleanup old stockpiles and equipment containing POPs
• Work together for a POPs – free future
POP listed under Stockholm Convention

- In 1995 the United Nations Environmental Program (UNEP) decided to eliminate twelve chemicals, all organochlorines
- These twelve were classified as Persistent Organic Pollutants or POPs owing to their similar toxicity behavior
- Nine were pesticides and fungicides, one was polychlorinated biphenyl (PCB) and
- Last two were dioxins and furans – unintentionally produced as by-products of processes

**Initial POPs**
1. Aldrin
2. Chlordane
3. DDT
4. Dieldrin
5. Endrin
6. Heptachlor
7. Hexachlorobenzene (HCB)
8. Mirex
9. Toxaphene
10. Polychlorinated biphenyls (PCB)
11. Polychlorinated dibenzo-p-dioxins (PCDD)
12. Polychlorinated dibenzofurans (PCDF)

**New POPs**
1. Alpha hexachlorocyclohexane
2. Beta hexachlorocyclohexane
3. Chlordcone
4. Hexabromobiphenyl
5. Lindane
6. Pentachlorobenzene
7. Perfluorooctane sulphonic acid, its salts and perfluorooctane sulfonyl fluoride
8. Tetrabromodiphenyl ether & pentabromodiphenyl ether (commercial)
9. Octabromodiphenyl ether
10. Endosulfan
Country Situation on POPs- Pesticides

Production

- Most of the POPs pesticides are banned in India from use, production and import
- Out of nine POP pesticides only DDT is being manufactured in India, only for vector control
- DDT manufacturered only by the Hindusthan Insecticides Limited (HIL), a GOI enterprise
## Country Situation on POPs- Pesticides

**Stockpiles of Other POP Pesticides**
Wastes stocks of Aldrin and Dieldrin are mainly identified

<table>
<thead>
<tr>
<th>State</th>
<th>Location</th>
<th>Other POP Pesticides</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gujarat</td>
<td>Palanpur</td>
<td>Dieldrin (Technical)</td>
<td>276 Kg.</td>
</tr>
<tr>
<td>Manipur</td>
<td>Imphal</td>
<td>Aldrin 30% EC</td>
<td>45 Ltr.</td>
</tr>
<tr>
<td>Rajasthan</td>
<td>Sikar</td>
<td>Aldrin 30% EC</td>
<td>26 Ltr.</td>
</tr>
<tr>
<td></td>
<td>Kota</td>
<td>Aldrin 30% EC</td>
<td>30 Ltr.</td>
</tr>
<tr>
<td></td>
<td>Bikaner</td>
<td>Dieldrin 18% EC</td>
<td>4397.1 Ltr.</td>
</tr>
<tr>
<td></td>
<td>Barmer</td>
<td>Dieldrin (Technical)</td>
<td>31935 Kg.</td>
</tr>
<tr>
<td></td>
<td>Jaisalmer</td>
<td>Dieldrin 18% EC</td>
<td>7372 Ltr.</td>
</tr>
<tr>
<td>Maharashtra (RPQS)</td>
<td>Mumbai</td>
<td>Dieldrin 18% EC</td>
<td>3875 Ltr.</td>
</tr>
<tr>
<td></td>
<td>Palanpur</td>
<td>Dieldrin 18% EC</td>
<td>5100 Ltr.</td>
</tr>
</tbody>
</table>

Source: Hindustan Insecticides Limited (HIL), New Delhi
Country Situation on POPs - PCBs

Stocks of PCBs
• PCBs were never produced in India
• Use of PCBs began in 1950’s in India and requirements were met through imports
• Mainly PCBs oil used in power generation and transmission companies and heavy industries like cement, fertilizer and steel and pvt. mining, lubricant and ship-breaking industries etc.

Percentage weight of PCB containing oils region-wise

Source: Central Power Research Institute (CPRI), Bangalore
## Sector wise distribution of PCBs

<table>
<thead>
<tr>
<th>Sector</th>
<th>No. of Transformers</th>
<th>Percentage weight of PCB containing oils</th>
<th>Weight of PCB containing oils (tons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power</td>
<td>407</td>
<td>71.3</td>
<td>7016.034</td>
</tr>
<tr>
<td>Steel</td>
<td>913</td>
<td>18.0</td>
<td>1772.428</td>
</tr>
<tr>
<td>Cement</td>
<td>34</td>
<td>0.5</td>
<td>49.290</td>
</tr>
<tr>
<td>Fertilizers</td>
<td>16</td>
<td>0.3</td>
<td>28.680</td>
</tr>
<tr>
<td>Others</td>
<td>178</td>
<td>9.9</td>
<td>971.230</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1548</strong></td>
<td><strong>100</strong></td>
<td><strong>9837.662</strong></td>
</tr>
</tbody>
</table>

Source: Central Power Research Institute (CPRI), Bangalore
Country Situation on POPs - Dioxins

Annual emission of Dioxin and Furan Main source category (gTEQ/a)
ANNUAL EMISSION OF DIOXINS AND FURANS PERCENTAGE CONTRIBUTION - INDIAN SCENARIO

Release gTEQ/a
Total emission- 8656.55
Air- 2827.30
Water- 21.49
Land- 30.29
Product- 313.67
Residue- 5463.80
There are about 92 common medical waste incinerators available in the country.
Apart from that 60 small and medium scale waste incineration facilities owned by private and public hospitals spread across the country.
As per Bio Medical Waste (Management and Handling) Rules, 1998, the wastes are segregated at source and incinerable wastes are burnt.
There are 98 hazardous waste incinerators including common facilities available in the country among which
18 are in northern region
31 are in central region and
49 are in southern region.
There is no municipal solid waste incinerator operating in India.
Country Situation on POPs- Pesticide (DDT)

Year-wise DDT quantities exported  
- Hindustan Insecticides Limited (HIL), a Government of India enterprise, is the sole producer of DDT in the country
- DDT is formulated as 50% WP for in-country use
- Limited amount is formulated as 75% DDT WP for export
- HIL solely produces DDT for malaria and kala-azar vector control

DDT Production since 1990
- No sharp increase in DDT production in the last decade
- Graph shows decreasing trend
- In 2008-2009 highest amount of DDT - 50% WP was supplied to Assam to the tune of 1185 MT
- DDT was supplied to 22 states in India for malaria control
### Estimation of Release of Dioxins and Furans in Identified Source Categories as WHO-TEQ*

<table>
<thead>
<tr>
<th>No.</th>
<th>Main Source Category</th>
<th>Air (ng TEQ*/Nm³)</th>
<th>Water (pg TEQ*** /L)</th>
<th>Land (pg TEQ*/g)</th>
<th>Residue (Fly Ash/Bottom Ash) (pg TEQ*/g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Waste Incineration</td>
<td>-</td>
<td>0.007</td>
<td>-</td>
<td>385.8</td>
</tr>
<tr>
<td></td>
<td>Medical Waste Incineration 1, Maharashtra</td>
<td>-</td>
<td>0.007</td>
<td>-</td>
<td>12.06</td>
</tr>
<tr>
<td></td>
<td>Medical Waste Incinerator 2, Maharashtra</td>
<td>-</td>
<td>0.009</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hazardous Waste Incinerator 1, Maharashtra</td>
<td>0.3</td>
<td>-</td>
<td>-</td>
<td>17.01</td>
</tr>
<tr>
<td></td>
<td>Hazardous Waste Incinerator 2, Gujarat</td>
<td>2.84</td>
<td>-</td>
<td>-</td>
<td>7.12</td>
</tr>
<tr>
<td></td>
<td>Treatment, storage and Disposal Facility, Gujarat</td>
<td>-</td>
<td>-</td>
<td>9.74</td>
<td>-</td>
</tr>
</tbody>
</table>

Contd...
## Estimation of Release of Dioxins and Furans in Identified Source Categories as WHO-TEQ*

<table>
<thead>
<tr>
<th>Sr.No.</th>
<th>Main Source Category</th>
<th>Air (ng TEQ** /Nm³)</th>
<th>Water (pg TEQ*** /L)</th>
<th>Land (pg TEQ* /g)</th>
<th>Residue (Fly Ash) (pg TEQ* /g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Ferrous and Non Ferrous Metal Production</td>
<td></td>
<td>-</td>
<td>-</td>
<td>0.02</td>
</tr>
<tr>
<td></td>
<td>Steel Plant, (Chhatisgarh)</td>
<td>0.05</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Heat and Power Generation</td>
<td></td>
<td>-</td>
<td>-</td>
<td>0.01</td>
</tr>
<tr>
<td></td>
<td>Thermal Power Plant, Maharashtra</td>
<td>0.1</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Production and Use of Chemicals and Consumer Goods</td>
<td></td>
<td></td>
<td>-</td>
<td>0.0007</td>
</tr>
<tr>
<td></td>
<td>Pulp and Paper Industries Ltd., Maharashtra</td>
<td>-</td>
<td>336.33</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Miscellaneous</td>
<td></td>
<td>-</td>
<td>-</td>
<td>0.002</td>
</tr>
</tbody>
</table>

* Toxic equivalent quotient  
** TEQ as per WHO assigned toxic equivalent factor  
*** EU limit for ww: 0.03 ng TEQ/L  
# EU & CPCB limit in Air = 0.1 ngTEQ/m³N
Field sampling from potential sites for dioxins and furans

Fly ash sampling at Maharashtra Thermal Power plant

Data collection during stack monitoring at Hazardous Waste Incinerator facility, Maharashtra

Wastewater sampling at Thermal Power plant, Maharashtra

Stack monitoring at Hazardous Waste Incinerator facility, Gujarat
Distribution of PCDD/Fs in different matrices

- OCDD found highest in all the samples of fly ash, soil and wastewater samples
- 48 ng/g the highest OCDD found in soil sample collected from the hazardous waste dumping site
- Higher dioxins and furans levels in wastewater of the incinerator attached with scrubbers in APC devices
NIP- Strategies and Action Plans

- **Overall objective**
  to reduce, eliminate and prevent the health and environmental risks posed by POPs through effective implementation of the Stockholm Convention

- **NIP Implementation Objectives**
  to enable India to comply with the obligations of the Stockholm Convention to actively participate on the international platform

- **General outcomes of NIP Implementation**
  - Detailed information on the management of POPs viz. inventories, current stocks, environmental releases and fate of these chemicals;
  - Broad awareness on the effects of POPs on human health and the environment;
  - Enhanced institutional, organizational and legal capacity to respond to the obligations of the SC;
  - Appropriate technical capacities to control UpPOPs releases, to store, handle, transport and disposal of POPs;
  - Efficient cooperation of the stakeholders in the management of POPs.
NIP- Strategies and Action Plans

Priority Areas

- Strengthen and improve policies and regulations
- Undertake and strengthen capacity building on POPs
- Undertake replication projects
- Best available technologies or /Best available practices (BAT/BEP) for contaminated sites and waste disposal
- Explore effective alternatives to DDT
- Detail inventory of UpPOPs, PCDDs and PCDFs releases
- Update inventories of electrical equipment containing PCBs and wastes containing POPs
- Mechanism to ensure the implementation of various action plans
Action Plan- Research Priorities

The following has been identified by GoI under the NIP on POPs:

- Strengthening institutions and capacity building for effective and efficient implementation of the NIP in India
- Environmentally sound management of un-intentional release of PCDDs and PCDFs in the metallurgical industry in India
- Implementation of the BAT/ BEP strategies for elimination / reduction of UpPOPs emissions of the priority industry sectors identified in the NIP of India
- Management of PVC plastic waste to avoid incineration / dumping the landfill for preventing releases of Dioxins and Furans due to burning
- Capacity building, demonstration of production and promotion of bio-botanical neem derived bio-pesticides as viable, eco-friendly, bio-degradable alternatives to POPs pesticides
- Identification and remediation of sites contaminated by POPs chemicals
- Monitoring of POPs in the core media- Air, Sediment and human milk and blood
- POPs and pesticides management in India
- Environmentally Sound Management of Medical Wastes
- Environmentally sound management of hazardous waste
- Environmentally Sound Management and Final Disposal of PCBs
- Development and promotion of non POPs alternatives to DDT
- Inventorization of newly listed POPs
Action Plan- POP Pesticides

- Environmentally sound disposal method
  Elimination of aldrin and dieldrin waste stocks
- Environmentally sound alternatives to POPs pesticides
  Development and production of alternatives to POPs
  Development and production of biopesticide
Action Plan POPs -PCBs

• Environmentally sound management, phase-out and disposal of PCBs
  i. Strengthening PCB-owners including power sector and other industries
  ii. Updating of inventory of PCBs and PCBs containing equipment and wastes
  iii. Implementation of ESM through establishing treatment facilities
• Research and development in the field of PCBs
  i. Development of PCB alternatives for the electrical sector.
  ii. BAT for PCB disposal
• Public awareness on PCBs
  Public awareness and information programs
Action Plan on POPs  Pesticides- DDT

• Life-cycle management of DDT
  - Elimination of obsolete DDT stocks
  - Disposal of DDT packaging material in environmentally sound manner

• General public awareness on DDT use
  - Establishment and maintenance of an information management system (IMS)
  - Improving workers safety for IRS

• Environmentally sound alternatives to DDT
  - Development and production of botanical, chemical and Bt based alternatives to DDT
Action Plan – Releases from the unintentional production (PCDDs/PCDFs, HCB and PCBs)

• Strengthen legal and institutional framework for the management of POPs
• Reduction in unintentional release of PCDDs/PCDFs, HCB and PCBs formed in certain industrial processes
• Public awareness
• Evaluation system to ensure effectiveness of the POPs release reductions;
• Strengthen analytical capacity for research and development for monitoring of POPs
• Promote BAT/BEP application
Action Plan on UpPOPs – PCDDs and PCDFs

- Strengthen legal and institutional framework for the management
  - Strengthening existing policies and regulations
- General public awareness
  - To promote information, education and raise public awareness
- Strengthen analytical capacity for research & development for monitoring
  - Augmenting analytical infrastructure for monitoring Dioxin and Furans releases from source categories
  - Upgrading and continually updating the inventory of unintentional POPs using indigenously developed tools to measure UP-POPs
- Establishment of an evaluation system for the effectiveness of release reductions
  - Identify strategies to meet release reduction obligations of UP-POPs
  - Promote the application of available, feasible and practical measures for achieving release reduction or source elimination.
  - Review the strategies and report UP-POPs release reduction obligations every five years.
- Promote the use of BAT/BEP
  - Development and use of substitute or modified materials, products and prevent the release
  - BAT/BEP for new installations for industrial sources
  - BAT/BEP for existing installations for industrial sources
Action Plan on Management of POPs - Stocks and Wastes

- Capacity within the GOI for controlling the management of POPs stockpiles
  - Self reporting on POPs stockpiles/wastes
  - Updating national inventory on POPs stocks/wastes
  - Monitoring program for the management of POPs stockpiles/wastes
- Capacity for environmentally sound storage and disposal of POPs stocks/wastes
  - Upgrading interim storage facilities for POPs stocks/wastes
  - Creating national POPs disposal capacity
- POPs wastes disposal in an environmentally sound manner - - Disposal of the Aldrin and Dieldrin obsolete stocks
  - Disposal of 1700 tonnes of pure PCBs and 6000 Tonnes of PCBs contaminated equipment and wastes
Action Plan for Identification and Remediation of Contaminated Sites

• Capacity at GOI for POPs contaminated sites management
  - Develop policy and legal frameworks
  - Strengthen institutional capacities for mitigation of contaminated sites

• Contaminated sites management in environmentally sound manner
  - Identification and prioritization of potential contaminated sites
  - Selection of appropriate low-cost environmentally sound technologies for remediation
  - Remediation of selected contaminated sites
Action plan implementation

Ministry of Environment and Forest is the nodal ministry responsible for implementation.

- Establishment of Management Information System for regular reporting on DDT
- Continuous updating of national inventory of PCBs and PCBs containing equipment and wastes in power and other industrial sectors,
- Upgrading and continually updating the inventory of unintentional POPs
- Enhance and continuously update and upgrade national inventory for POPs stockpiles and wastes.
Priorities for long term capacity building for Convention Implementation

• Capacity building is an integral part of Convention implementation and as per the commitments in NIP the objectives are categorized as:

1. Short term priorities
   i. Environmentally Sound Management and Final Disposal of PCBs in India
   ii. Environmentally Sound Management of Medical Wastes in India
   iii. Strengthen capacities of Convention implementation bodies
   iv. Establish the National POPs Centre and the advisory board for the Chemical safety of POPs
   v. Implementation of BAT and BEP

2. Medium term priorities
   i. Development and promotion of non POPs alternatives to DDT
   ii. Inventorization of newly listed POPs
   iii. Implementation of the BAT/ BEP strategies for elimination / reduction of UpPOPs emissions of the priority industry sectors identified in the NIP of India
   iv. Management of PVC plastic waste to avoid incineration / dumping the landfill for preventing releases of Dioxins and Furans due to burning
   v. Capacity building, demonstration of production and promotion of bio-pesticides as viable, eco-friendly, bio-degradable alternatives to POPs pesticides
   vi. Identification of sites contaminated by POPs chemicals and its risk assessment to health and the environment and demonstration of remediation process
   vii. POPs and pesticides management in India
   viii. National POPs monitoring India program
   ix. Strengthening institutions and capacity building for effective and efficient implementation of the NIP in India
   x. Environmentally sound management of un-intentional release of PCDDs and PCDFs in the metallurgical industry
Priorities for long term capacity building for Convention Implementation

3. Long term priorities
   i. Create and improve public awareness
   ii. Create and Improve Public awareness through publicity, workshops, seminars etc. for the convention implementation activities.
   iii. Improvement in the policy and regulatory framework
   iv. Strengthening legal and regulatory enforcement capacity
   v. Capacity building by coordination between various departments, institutes etc.
Session II – Persistent Organic Pollutants (POPs)

Regulatory issues
New PoPs

New Challenges
## Nasty Nine

<table>
<thead>
<tr>
<th>Sl No</th>
<th>Chemicals</th>
<th>Listed in SC</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>13</td>
<td>Alpha Hexachlorocyclohexane (Alpha HCH)</td>
<td>A: Elimination</td>
<td>Pesticides</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(By-Product of Lindane)</td>
</tr>
<tr>
<td>14</td>
<td>Beta Hexachlorocyclohexane (Beta HCH)</td>
<td>A: Elimination</td>
<td>Pesticides</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(By-Product of Lindane)</td>
</tr>
<tr>
<td>15</td>
<td>Chlordecone</td>
<td>A: Elimination</td>
<td>As pesticides on banana root borer, fly larvicide, powder mildew and household ant</td>
</tr>
<tr>
<td>16</td>
<td>Hexabromobiphenyl (HBB)</td>
<td>A: Elimination</td>
<td>Industrial Chemicals (Flame Retardants) in construction business, electrical products, polyurethane foam</td>
</tr>
<tr>
<td>17</td>
<td>Lindane</td>
<td>A: Elimination with specific exemptions for pharmaceuticals use</td>
<td>Pesticides (Control of mites in sugarcane)</td>
</tr>
</tbody>
</table>
### Table: Classified Hazardous Chemicals and Their Uses

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Chemicals</th>
<th>listed in SC</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>18</td>
<td>Hexabromobiphenyl ether &amp; Heptabromo biphenyl ether (Octa BDE)</td>
<td>A: Elimination with specific exemptions</td>
<td>Industrial Chemicals (Flame Retardants) for ABS plastics for office equipments, business machines</td>
</tr>
<tr>
<td>19</td>
<td>Tetrafluorodiphenyl ether &amp; Pentabromodiphenyl ether (Penta BDE)</td>
<td>A: Elimination With specific exemptions</td>
<td>Industrial Chemicals (Flame Retardants) for polyurethanes use in casings and electronic equipment, textiles</td>
</tr>
<tr>
<td>20</td>
<td>Pentachlorobenzene (PeCB)</td>
<td>A: Elimination</td>
<td>Industrial Chemicals (Flame Retardants) in pcb products, dyestuff carriers, fungicides, Impurities in Pesticides, By-Products</td>
</tr>
<tr>
<td></td>
<td></td>
<td>C: Unintentional Production</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Perfluoroctane Sulphonic Acid (PFOS) Its Salts, and Perfluoroctane sulfonfyl fluoride (PFOS-F)</td>
<td>B: Restriction</td>
<td>Industrial Chemicals in electric and electronic parts, fire fighting foams, photo imaging, hydraulic fluids and textiles</td>
</tr>
</tbody>
</table>
## New PoPs: Environment & Health Concerns

<table>
<thead>
<tr>
<th>Chemicals</th>
<th>Environment &amp; Health Concerns</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alpha Hexachlorocyclohexane (Alpha HCH)</td>
<td>Neurotoxic, hepatotoxic, carcinogenic, effects kidney &amp; liver</td>
</tr>
<tr>
<td>Beta Hexachlorocyclohexane (Beta HCH)</td>
<td>Neurotoxic, cause oxidative source, linked to Parkinson's &amp; Alzheimer's disease</td>
</tr>
<tr>
<td>Chlordecone</td>
<td>Carcinogenic, effects reproductive systems, loss of weight, enlarged liver, affects nervous systems</td>
</tr>
<tr>
<td>Hexabromobiphenyl (HBB)</td>
<td>Endocrine disrupting substances, effects reproductive system, breast cancer in exposed women</td>
</tr>
<tr>
<td>Lindane</td>
<td>Immunotoxics, Carcinogenic (Group 2B), effects endocrine systems</td>
</tr>
<tr>
<td>Chemicals</td>
<td>Environment &amp; Health Concerns</td>
</tr>
<tr>
<td>----------------------------------------------</td>
<td>-------------------------------------------------------------------</td>
</tr>
<tr>
<td>Hexabromobiphenyl ether &amp;</td>
<td>Effects on the liver, thyroid and neurobehavioral development,</td>
</tr>
<tr>
<td>Heptabromobiphenyl ether (Octa BDE)</td>
<td></td>
</tr>
<tr>
<td>Tetrabromodiphenyl ether &amp;</td>
<td>Effects on the liver, thyroid and neurobehavioral development,</td>
</tr>
<tr>
<td>Pentabromodiphenyl ether (Penta BDE)</td>
<td></td>
</tr>
<tr>
<td>Pentachlorobenzene (PeCB)</td>
<td>Moderately toxic to human, very toxic to aquatic organisms</td>
</tr>
<tr>
<td>Perfluorooctane Sulfonic Acid</td>
<td>Effects on pregnant woman (Preclampsia),</td>
</tr>
<tr>
<td>Its salts, and perfluorooctane sulfonyl fluoride (PF30-F)</td>
<td></td>
</tr>
</tbody>
</table>
### Status of New PoPs

<table>
<thead>
<tr>
<th>Chemicals</th>
<th>EU</th>
<th>USA</th>
</tr>
</thead>
<tbody>
<tr>
<td>13 Alpha Hexachlorocyclohexane (Alpha HCH)</td>
<td>Most countries stop producing</td>
<td>Stop producing in 1970s</td>
</tr>
<tr>
<td>14 Beta Hexachlorocyclohexane (Beta HCH)</td>
<td>Banned in 1970</td>
<td>Stop Producing in 1970s</td>
</tr>
<tr>
<td>15 Chlordecone</td>
<td>Counties banned in 1980s</td>
<td>Banned in 1977</td>
</tr>
<tr>
<td>16 Hexabromobiphenyl (HBB)</td>
<td>Prohibited in 1980</td>
<td>Restricted in 1977</td>
</tr>
<tr>
<td>17 Lindane</td>
<td>Limited use till 2007</td>
<td>Banned agricultural/livestock use from 2006</td>
</tr>
</tbody>
</table>
## Contd……..

<table>
<thead>
<tr>
<th>Chemicals</th>
<th>EU</th>
<th>USA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hexabromobiphenyl ether &amp; Heptabromobiphenyl ether (Octa BDE)</td>
<td>Banned in electronic products in 2006</td>
<td>Restricted or banned in some states</td>
</tr>
<tr>
<td>Tetrabromodiphenyl ether &amp; Pentabromodiphenyl ether (Penta BDE)</td>
<td>Banned in electronic products in 2006</td>
<td>Restricted or banned in some states</td>
</tr>
<tr>
<td>Pentachlorobenzene (PeCB)</td>
<td>Banned in 1991 (2)</td>
<td>Voluntary restrictions 2005</td>
</tr>
<tr>
<td>Perfluorooctane Sulfonic Acid (PFOs) Its Salts, and perfluorooctane sulfonyle fluoride (TFSO-F)</td>
<td>Put restriction in 2006</td>
<td>Put restrictions in 2007</td>
</tr>
</tbody>
</table>
Where India stands?

- India is still one of the biggest producer of lindane (Alpha HCH & Beta HCH)
- Chlordecone has been banned in India
- India will comply with WEEE provisions from May 2012
- India will comply with RoHS from May 2013
- WEEE and RoHS provisions will reduce HBB, Octa BDE, Penta BDE, PFOS release into the environment
- PeCB has not been registered as the chemical in India
CHALLENGES

NIP INVENTORIES (2012-15)

- Overhauling legal, infrastructure, and institutional capabilities
- Assessment of import data, export, production, use, and stocks
- Estimation of HCB, PCBs & Pentachlorobenzene
Outstanding Issues

- Hotspots mapping
- Disposal of stockpiles
- Improve regulatory structure/standards
- Monitoring mechanism in place
- Health and Environment data generation
- Suitable alternatives (Adequate data)
- Research on new molecules
- Issue of trade and market
- More stakeholder consultations
INDIA’S REGULATORY FRAMEWORK ON POPS AND CHALLENGES IN IMPLEMENTATION

Dr. D. D. BASU
Addl. Director
Central Pollution Control Board
Parivesh Bhavan, Delhi
POP CHEMICALS AND REGULATORY FRAMEWORK IN INDIA
POP CHEMICALS WHAT ARE THEY

Persistent Organic Pollutants (POPs) are carbon based chemical compounds and mixtures that included industrial chemicals like PCB’s, pesticides like DDT and unwanted wastes like dioxins. POPs are primarily products and by-products of human industry that are to relatively recent origin.
THE STOCKHOLM CONVENTION ON POPS


➤ Objective of Convention

To protect human health and environment from POPs.

➤ Provision of convention

- Restrict, phase-out and ban the production and use of POPs pesticides and POPs industrial chemicals;

- Minimise release of POPs as unwanted by-products and where feasible, prevent or avoid their generation; and

- Clean-up and properly destroy obsolete stocks of POPs
IDENTIFIED TWELVE POPS – DIRTY DOZENS

- **Pesticides**
  - Aldrin
  - Chlordrin
  - Hexa Chloro Benzene
  - Endrin
  - Heptachlor
  - Dieldrin
  - Toxaphene
  - DDA
  - Mirex

- **Industrial Chemical**
  - Polychlorinated byphenyls

- **Unintended by Products**
  - Dioxins
  - Furans
CRITERIA FOR SELECTION OF CHEMICALS

- **Persistency**: Resist photolytic, chemical and biological degradation.
- **Low/Medium Volatile**: They evaporate slowly colder the climate, less is the volatility, accumulate at arctic.
- **High Dispersibility**: Travel long distance on air currents.
- **Lipophillic**: Accumulate in fats and oilds
- **Toxic**: Toxic at low concentration
- **Potential for Other human Injury**: Carcinogenic
  - Endocrine disruption
MEASUREMENT OF CRITERIA PARAMETER

- Persistency $T^{\frac{1}{2}}$ value
- Liophilicity Octanol–water partition coefficient $\log K_{ow}$
- Toxicity $LC_{50}$ value
- Air Dispersibility Air current/persistency
- Carcinogenicity AME’s test
### CRITERIA FOR SELECTING PERSISTENT ORGANIC POLLUTANTS

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Kow&lt;sup&gt;a&lt;/sup&gt;</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Bioaccumulation factor&lt;sup&gt;b&lt;/sup&gt;</td>
<td>5,000</td>
<td>5,000</td>
</tr>
<tr>
<td>Persistence</td>
<td>Persistence</td>
<td>Persistence</td>
</tr>
<tr>
<td>Air</td>
<td>2 days</td>
<td>2 days</td>
</tr>
<tr>
<td>Water</td>
<td>2 months</td>
<td>2 months</td>
</tr>
<tr>
<td>Soil</td>
<td>6 months</td>
<td>6 months</td>
</tr>
<tr>
<td>Sediment</td>
<td>6 months</td>
<td>6 months</td>
</tr>
</tbody>
</table>
CHEMICALS MOVEMENT CYCLE

IMPORTS → STORAGE → TRANSPORTATION

PRODUCTION

RECYCLING

DISPOSAL

EXPORTS

USER
PARLIAMENT HOUSE
## IMPORTANT LEGAL INSTRUMENT FOR CHEMICALS CONTROL IN INDIA

<table>
<thead>
<tr>
<th>ACTS AND RULES RELATED TO ENVIRONMENTAL MANAGEMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Air (Prevention and Control of Pollution) Act, 1981 amended 1987</td>
</tr>
<tr>
<td>The Air (Prevention and Control of Pollution) (Union Territories) Rules, 1983</td>
</tr>
<tr>
<td>The Water (Prevention and Control of Pollution) Act, 1974 amended 1988</td>
</tr>
<tr>
<td>The Water (Prevention and Control of Pollution) Rules, 1975</td>
</tr>
<tr>
<td>EIA Notification, 1994</td>
</tr>
<tr>
<td>Ozone Depleting Substances (Regulation and Control) Rules, 2000</td>
</tr>
<tr>
<td>Batteries (Management and Handling) Rules, 2001</td>
</tr>
</tbody>
</table>
# IMPORTANT LEGAL INSTRUMENT FOR CHEMICALS CONTROL

<table>
<thead>
<tr>
<th>ACTS AND RULES RELATED TO CHEMICAL SAFETY AND EMERGENCY MANAGEMENT</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>Chemical Accident (Emergency Planning, Preparedness and Response) Rules, 1996</td>
<td></td>
</tr>
</tbody>
</table>
## IMPORTANT LEGAL INSTRUMENT FOR CHEMICALS CONTROL IN INDIA

<table>
<thead>
<tr>
<th>ACTS AND RULES RELATED TO SPECIFIC CHEMICAL CATEGORY / CONTAINER</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>The Petroleum Act, 1934</td>
<td></td>
</tr>
<tr>
<td>The Petroleum Rules, 2002</td>
<td></td>
</tr>
<tr>
<td>The Calcium Carbide Rules, 1987</td>
<td></td>
</tr>
<tr>
<td>The Explosives Act, 1884</td>
<td></td>
</tr>
<tr>
<td>The Explosives Rules, 1983</td>
<td></td>
</tr>
<tr>
<td>The Gas Cylinder Rules, 2004</td>
<td></td>
</tr>
<tr>
<td>The Static and Mobile Pressure Vessels (Unfired) rules, 1981</td>
<td></td>
</tr>
<tr>
<td>The Insecticides Act, 1968</td>
<td></td>
</tr>
<tr>
<td>The Insecticides Rules, 1971</td>
<td></td>
</tr>
<tr>
<td>The Essential Commodities Act, 1955</td>
<td></td>
</tr>
<tr>
<td>The Fertiliser (Control) Order, 1985</td>
<td></td>
</tr>
</tbody>
</table>
# Important Legal Instrument for Chemicals Control in India

<table>
<thead>
<tr>
<th>Other Acts and Rules Relevant to Chemical Management</th>
<th>Factories Act, 1948</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>The Motor Vehicles Act, 1988</td>
</tr>
<tr>
<td></td>
<td>The Central Motor Vehicles Rules, 1989</td>
</tr>
<tr>
<td></td>
<td>The Mines Act, 1952</td>
</tr>
<tr>
<td></td>
<td>The Customs Act, 1962</td>
</tr>
<tr>
<td></td>
<td>The Merchant Shipping Act, 1958, amended in 2002 and 2003</td>
</tr>
<tr>
<td></td>
<td>Merchant Shipping (Carriage of Cargo) Rules, 1995</td>
</tr>
<tr>
<td></td>
<td>The Indian Ports Act, 1908</td>
</tr>
<tr>
<td></td>
<td>The Dock Workers (Safety, Health and Welfare) Act, 1986</td>
</tr>
<tr>
<td></td>
<td>The Dock Workers (Safety, Health and Welfare) Rules, 1990</td>
</tr>
<tr>
<td></td>
<td>Drugs and Cosmetics Act, 1940</td>
</tr>
<tr>
<td></td>
<td>The Prevention of Food Adulteration Act, 1954</td>
</tr>
<tr>
<td></td>
<td>The Prevention of Food Adulteration rules, 1955</td>
</tr>
<tr>
<td></td>
<td>The Prevention of Terrorism Act, 2002</td>
</tr>
</tbody>
</table>
IMPORTANT LEGAL INSTRUMENT FOR CHEMICALS CONTROL IN INDIA

THE ACTS AND RULES ASSOCIATED WITH CHEMICAL STORAGE

- MSIHC Rules, 1989, 2000
- Chemical Accidents (Emergency Planning Preparedness and Response) Rules, 1989
- Public Liability Insurance Act, 1991
- The Explosive Act, 1884
- The Insecticide Act, 1968
- The Gas Cylinder Rules, 2004
- The Petroleum Acts and Rules
- The Factories Acts and Rules
- The Static and Mobile Pressure Vehicle Rules, 1981
- The Ozone Depleting Substances (Regulation and Control) Rules, 2000
## AUTHORITIES WITH LEGAL DUTIES

<table>
<thead>
<tr>
<th>S. no</th>
<th>Authority (ies) with legal backing</th>
<th>Duties and corresponding Rule</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.</td>
<td>Chief Controller Imports &amp; Exports under Import &amp; Exports (Control) Act, 1947</td>
<td>Import and Export of Hazardous Chemicals</td>
</tr>
<tr>
<td>3.</td>
<td>Central Pollution Control Board or State Pollution Control Board under Environment (Protection) Act, 1986 as the case may be</td>
<td>Effluent, Emission, Hazardous Waste Management Handling Rules</td>
</tr>
<tr>
<td>4.</td>
<td>Chief Inspector of Factories appointed under the Factories Act, 1948</td>
<td>Enforcement of Directions and Procedure in respect of Industrial installation and isolated storage towards under the Factory Act, 1948</td>
</tr>
</tbody>
</table>
## AUTHORITIES WITH LEGAL DUTIES

<table>
<thead>
<tr>
<th>S. no.</th>
<th>Authority (ies) with legal backing</th>
<th>Duties and corresponding Rule</th>
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</thead>
<tbody>
<tr>
<td>5.</td>
<td>Chief Inspector of Dock Safety appointed under the Dock Workers (Safety, Health and Welfare) Act, 1986</td>
<td>Enforcement of directions and procedure in respect of industrial installation and isolated storage dealing with Hazardous chemical and pipelines inside the port</td>
</tr>
</tbody>
</table>
### AUTHORITIES WITH LEGAL DUTIES

<table>
<thead>
<tr>
<th></th>
<th>District Collector or District Emergency Authority designated by the State Government</th>
<th>Preparation of off-site emergency plans as per Rule 14</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>Centre for Environment and Explosive Safety, Defense Research and Development of Organisation (DRDO), Department of defence Research &amp; Development, Ministry of Defence</td>
<td>Enforcement of directions and procedures in respect of laboratories, industrial establishment and isolated storages dealing with hazardous chemicals in the Ministry of Defence</td>
</tr>
<tr>
<td>8</td>
<td>Central Insecticide Board</td>
<td>Restriction and banning of Pesticides, Disposal of dead expired pesticides</td>
</tr>
</tbody>
</table>
SOCIETAL RISK IN RELATION TO DIOXIN AND FURAN EMISSION STANDARDS FOR COMMON HAZARDOUS WASTE INCINERATOR
Direct release of PCDD/PCDF to the following five release vectors are mentioned as follows:

- **Air**
- **Water** (fresh, ocean and estuarine; then subsequently into sediments)
- **Land**
- **Residue** (including certain liquid wastes, sludge, and solid residues, which are handled and disposed of as waste or may be recycled)
- **Products** (such as chemical formulations or consumer goods such as paper, textiles, etc.)
<table>
<thead>
<tr>
<th>No.</th>
<th>Main Source Categories</th>
<th>Air</th>
<th>Water</th>
<th>Land</th>
<th>Product</th>
<th>Residue</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Waste Incineration</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>2</td>
<td>Ferrous and Non-Ferrous Metal Production</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>3</td>
<td>Power Generation and Heating</td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Production of Mineral Products</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>5</td>
<td>Transport</td>
<td>X</td>
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<tr>
<td>6</td>
<td>Uncontrolled Combustion Processes</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>7</td>
<td>Production and Use of Chemicals and Consumer Goods</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>8</td>
<td>Miscellaneous</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>9</td>
<td>Disposal</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
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<tr>
<td>10</td>
<td>Identification of Potential Hot-Spots</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Probably registration only to be followed by site-specific evaluation*
DEATHS AND LIFE SPAN REDUCTION DUE TO VARIOUS CAUSES
**APPROACH**

- Obtain the data on the deaths for various years due to a cause
- Find the average deaths for a period of 10 years
- Obtain the latest data on the total, male and female population
- Distribute the population by age group
- Obtain the data on average life span for the year for the total, male and female population
- Determine the life-years lost by each age group
- Determine the life-years lost by person per age group per year
- Find the total reduction in the life span of the whole population
DIARRHOEA INCLUDING GASTROENTERITIS
ININCIDENCE

Acute Diarrhoeal Cases

Number of Cases

Year

DEATHS

Deaths due to Diarrhoea

Number of Deaths

Year
Population in Lakhs in 2005

Total 1105535
Male 572073
Female 533462

Male % of total = 52
Female % of total = 48
DEATHS

Average deaths from 1996 to 2005 = 3603

Male = 52% = 1874
Female = 48% = 1729
SUMMARY
# TYPICAL CALCULATION FOR DIARRHOEA INCLUDING GASTRO-ENTERITIS

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Average Age</th>
<th>Total Population</th>
<th>% in Age Group</th>
<th>Multiplier</th>
<th>Death in the Age Group</th>
<th>Life Expectancy</th>
<th>Years Lost</th>
<th>Life Years Lost</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-4</td>
<td>2</td>
<td>3603</td>
<td>10.4</td>
<td>0.104</td>
<td>574.71</td>
<td>64.2</td>
<td>62.8</td>
<td>23531.9</td>
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<td>5-8</td>
<td>6.5</td>
<td>3603</td>
<td>10.7</td>
<td>0.107</td>
<td>365.62</td>
<td>64.2</td>
<td>58.3</td>
<td>22475.9</td>
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<td>9-14</td>
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<td>11.1</td>
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<td>396.83</td>
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<td>53.1</td>
<td>21124.4</td>
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<td>3603</td>
<td>10.7</td>
<td>0.107</td>
<td>365.62</td>
<td>64.2</td>
<td>47.8</td>
<td>10427.5</td>
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<td>20-24</td>
<td>22</td>
<td>3603</td>
<td>9.3</td>
<td>0.093</td>
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<td>0.081</td>
<td>291.84</td>
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<td>6.7</td>
<td>0.067</td>
<td>241.40</td>
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<td>6710.9</td>
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<td>42</td>
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<td>6</td>
<td>0.06</td>
<td>216.13</td>
<td>64.2</td>
<td>22.8</td>
<td>4928.8</td>
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<td>0.025</td>
<td>90.06</td>
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<td>72.06</td>
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<td>-2.2</td>
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<tr>
<td>70-74</td>
<td>72</td>
<td>3603</td>
<td>1.5</td>
<td>0.015</td>
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<td>-7.2</td>
<td>-7.2</td>
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<tr>
<td>75-79</td>
<td>77</td>
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<td>1.1</td>
<td>0.011</td>
<td>39.63</td>
<td>64.2</td>
<td>-12.2</td>
<td>-12.2</td>
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<td>80+</td>
<td>80</td>
<td>3603</td>
<td>0.4</td>
<td>0.004</td>
<td>14.41</td>
<td>64.2</td>
<td>-14.2</td>
<td>-14.2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
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<td></td>
<td></td>
<td></td>
<td><strong>4730.97</strong></td>
<td></td>
<td><strong>2649.7</strong></td>
<td><strong>137539.1</strong></td>
</tr>
</tbody>
</table>
## TYPICAL CALCULATION FOR TOTAL POPULATION

<table>
<thead>
<tr>
<th>Total Life Years Lost/year</th>
<th>Days in Year</th>
<th>minutes in a day</th>
<th>Life Minutes lost</th>
<th>population</th>
<th>Minutes lost per person/year</th>
</tr>
</thead>
<tbody>
<tr>
<td>137539.1</td>
<td>365</td>
<td>1440</td>
<td>72290550960</td>
<td>1185535000</td>
<td>65.38965384</td>
</tr>
</tbody>
</table>

Reduction in Life span = 65.4 minutes
## AVERAGE DEATHS

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Cause</th>
<th>Period</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cancer</td>
<td>2000</td>
<td>97968</td>
<td>59200</td>
<td>157168</td>
</tr>
<tr>
<td>2</td>
<td>Cholera</td>
<td>1996-2005</td>
<td>6.2</td>
<td>5.8</td>
<td>12</td>
</tr>
<tr>
<td>3</td>
<td>Diarrhoea</td>
<td>1996-2005</td>
<td>1874</td>
<td>1729</td>
<td>3603</td>
</tr>
<tr>
<td>4</td>
<td>Hepatitis</td>
<td>1996-2004</td>
<td>472</td>
<td>436</td>
<td>908</td>
</tr>
<tr>
<td></td>
<td>(Excluding 2003)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Kala Azar</td>
<td>1997-2006</td>
<td>105</td>
<td>97</td>
<td>202</td>
</tr>
<tr>
<td>6</td>
<td>Road Accidents</td>
<td>2005</td>
<td>49883</td>
<td>45585</td>
<td>94968</td>
</tr>
<tr>
<td>7</td>
<td>Train Accidents</td>
<td>1997-2007</td>
<td>79</td>
<td>72</td>
<td>151</td>
</tr>
</tbody>
</table>
LIFE SPAN REDUCTIONS

- Similar calculations for life span reductions were made for various other causes.

- Additional 40% deaths due to Cancer were attributed to Dioxin.

- The data is summarized in the following slides.
**REDUCTION IN LIFE SPAN**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Cause</th>
<th>Reduction in Life Span Minutes/person/year</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cholera</td>
<td>0.22</td>
</tr>
<tr>
<td>2</td>
<td>Train</td>
<td>2.7</td>
</tr>
<tr>
<td>3</td>
<td>Kala Azar</td>
<td>3.7</td>
</tr>
<tr>
<td>4</td>
<td>Hepatitis</td>
<td>16.5</td>
</tr>
<tr>
<td>5</td>
<td>Gastro</td>
<td>65.4</td>
</tr>
<tr>
<td>6</td>
<td>Dioxin</td>
<td>511</td>
</tr>
<tr>
<td>7</td>
<td>Cancer</td>
<td>1278</td>
</tr>
<tr>
<td>8</td>
<td>Road</td>
<td>1724</td>
</tr>
</tbody>
</table>
RELAND BETWEEN DIOXIN EMISSION AND COST OF INCINERATION, FOR
CAPTIVE HAZARDOUS WASTE INCINERATORS

\[ y = 11,133.49x^{-0.48} \]
\[ R^2 = 0.78 \]
RELATION BETWEEN DIOXIN EMISSION AND COST OF INCINERATION, FOR COMMON HAZARDOUS WASTE INCINERATORS

\[
y = 4.12786x^{-0.24}
\]

\[
R^2 = 0.23
\]

Dioxin and furan emission from stack (ng TEQ/Nm³)
RELATION BETWEEN DIOXIN AND FURAN EMISSION FROM STACK AND SOCIETAL COST OF THE AFFECTED POPULATION IN THE AFFECTED AREA
COMPARISON OF ANNUAL COST OF INCINERATION AND EMISSION CONTROL OF DIOXIN AND FURAN WITH CONSEQUENT SOCIETAL COSTS AT VARIOUS EMISSION LEVELS

\[ y = 1E+07x^{-0.61} \]
\[ R^2 = 0.564 \]
CHALLENGES

- Inventorization and Prioritization
- Risk Assessment with major sources
- Technology upgradation to major sources
- Handling of date expired pesticides
- Capacity Building of SPCBs and CPCBs
I have yet to see any problem, however, complicated, which when you looked as it in the right way, did not become still more complicated.

Paul Anderson
National Conference on Toxic Chemicals Management

The European Union’s implementation of the Stockholm Convention

New Delhi, 28 February 2012

Robert Donkers, Minister Counsellor Environment Delegation of the European Union to India
Globally recognized POPs

- **The original “dirty dozen”**
  - Aldrin, Chlordane, Dieldrin, Endrin, Heptachlor, Hexachlorobenzene, Mirex, Toxaphene, DDT, PCBs, Hexachlorobenzene, Dioxins, Furans

- **Added in 2009:**
  - C-pentaBDE, C-octaBDE, Chlordecone, Hexabromobiphenyl, alpha HCH, beta HCH, Lindane, PFOS and PeCB

- **Added in 2011:**
  - Endosulfan
Implementation in the EU

EU Regulation No 850/2004 (automatically law in all Member States):

- Enabled the EU to ratify Stockholm
- Gives effect to the main provisions of the Convention
- Enables elimination of POPs by measures which go partially beyond the provisions of the international Conventions (Stockholm, UN-ECE, Basel)
- The EU an “opt-out” Party
  - Expects the Endosulfan decision to be EU prohibition without exemptions by summer 2012
Key provisions in the Regulation

- Protection of human health and the Environment, based on the precautionary principle
- Prohibits or restricts production, importation and use of POPs
- Sets detailed limit values for waste containing POPs
- Strict measures on how to handle POPs waste
- Requires monitoring
Implementation Plans

- Important component in Convention is the National Implementation Plans
  - The EU’s first NIP adopted in 2007
- In function of the new substances
  - a revised EU-wide NIP including endosulfan is currently under preparation – expected adoption during 2012
Reporting – what happens on the ground

Every three years: Reporting within the EU on the application of the Regulation in the Member States including national NIPs

Every year: Reporting on the production and placing on the market of POP substances
  • Commission to compile a joint report

Every three years: summary reports on stockpiles and release inventories of unintentional POPs
Outlook

- **Five candidate substances being reviewed**
  - SCCPs, Hexabromocyclododecane, Chlorinated naphthalenes, Hexachlorobutadiene and Pentachlorophenol

- **The REACH Regulation review chemicals for PBT properties and may identify new POP candidates**

- **New POP candidates should also be nominated by all Parties**
  - **Not just the EU**

- **Balance between a dynamic Convention, implementation capacity and availability of financial resources**

- **Important that Stockholm gets a non-compliance mechanism**
Registration under REACH

- Chemical Safety Report documents Chemical Safety Assessment:
  - human health hazard assessment
  - phys-chem hazard assessment
  - environmental hazard assessment

- If the substance meets classification criteria or is assessed to be a PBT or vPvB:
  - exposure assessment and development of exposure scenarios
  - risk characterisation

- The CSA shall consider all identified uses (substance on its own, in a preparation and in an article) and all stages of the life-cycle.
Technical Assistance

- Commission provides voluntary support to the Secretariat of the Convention.
  - Effectiveness evaluation
  - Dioxin toolkit

- 17 Members States are donors of the Global Environmental Facility which is the Convention’s financial mechanism. The assistance included:
  - Support for participation at Conferences of Parties
  - Identification and elimination of stockpiles
  - Waste management
  - Development of implementation plans and legal frameworks
‘In our everyday deliberation, we must consider the impact of our decisions on the next seven generations.’

_from The Great Law of the Iroquois Confederacy_

* This is certainly true for chemicals and POPs in particular!! *
Further information

Regulation:
http://europa.eu.int/comm/environment/pops/index_en.htm

Stockholm Convention: www.pops.int

DANYAVAAD!!!
Session III – POPs and Outstanding Issues

Managing Toxic Chemicals
Endosulfan - The 22nd POP

$C_9H_6Cl_6O_3S$

Issues Before India

Betne, Rajeev

Sr. Programme Coordinator
Toxics Link
The Two SC’s stopped E’Sulfan’s Marathon in 2011

Hon. Supreme Court of India - May 2011

Not in India. Please;
You are in Annex A

ICMR

E’Sulfan

Happy Kasargod, Kerala

Stockholm Convention April 2011

Public Interest Groups
What the Two SC’s Said

Stockholm Convention - Approval

- April 2011 - Annex – A listing
- Phasing out – 5+5 years (+1 year notification)
- Exemption – 44 pests (Aphids, Tea mosquito etc.) ; 22 crops
- Parties adopted decision SC-5/4 to undertake programme to support the development / deployment of alternatives

However, final disposal of 2698.56kl could have been better

Clear Verdict

Supreme Court of India

- May 2011 – Temporary Blanket ban for 8 weeks (ICMR study commissioned)
- Dec 2011 - 2698.56 KL allowed to export by HIL
- Ban on production, sale and use still stays
And
THE ENDOSULFAN PESTICIDE (PROHIBITION) BILL, 2011

Bill No. XXIV of 2011
Introduced August 5, 2011

Features

• Covers whole of India – Ban production, use, import and export
• Pesticides with similar formula covered
• Tribunal to address related issues
• Financial compensation, medical treatment, special consideration for poor families
Let's be clear – E’Sulfan is caught

Whatever.....India wins for sure (and thus the world citizens)
India Facts Till Recent

3 Companies - Excel Crop Care, Hindustan Insecticides Ltd, and Coromandal Fertilizers

- Installed capacity – app. 10,000 tons
- India production - 8500 tons
- India consumption - 4500 tons
- India export - 4000 tons

Around 22 crops – Including food crops, cash crops and vegetables

Pest Control –
- Aphids
- Thrips
- Catterpillers
- Crop mosquitoes
- Bugs, Hoppers, worms

~ 80% of world demand produced in India
Some Genuine Concerns

• Pest loss in India could be 10-30%
• Stagnating food production (at app. 240mt)
• Food security / right to food
• Vulnerable cash crop – cotton, cashew, tea

Good Points

• E’sulfan use only <10% of total pesticides use in India
• Credible scientific fraternity
• Increasingly enabling environment for frontier research and development
• Known alternative – over 100 (ICMR/UNEP Documents)
What should be the Approach, now

- Why this obsession / possessiveness / acrimony - let's move on

- Stop – thinking that this is Rich country's ploy to dump alternative molecule .... develop our own credible alternative to ES

- Treating Kerala / Karnataka (affected part) as case of national Disaster (NHRC)

- Credible research needed –
  - Health data, environment impact of ES/ pesticides
  - On safer and sustainable alternative
  - Environment and health impact + Social costing
  - Balance of trade / commerce – crucial in coming years
  - Grassroots extension services / awareness

- Reduced dependence on chemicals in agriculture (IPM, Bio-P, NPM, SRI) – white paper on this

- Final disposal/ deactivation / End of life management

- Strengthen redressal mechanism and regulatory framework
UNIDO Suggestion on Screening method for POPs

- Improved screening method needed to better define inventories of POPs produced, used, accidentally traded (in food) and stockpiled from waste and contaminated sites;

- Bio-detection screening methods may prove useful:
  - Good correlation ($r^2 = 0.96-0.99$) between Bio-Toxic Equivalents (TEQs) and WHO-TEQs for many matrices (such as emission gas, ashes, soils, sediments)
  - Regulatory acceptance in the US (EPA 4435), Europe (several countries) and Japan (JIS 463)
  - Available for 20 years and now installed in more than 50 laboratories in 30 countries .... but not in India
  - Equipment cost is ca. 80% cheaper than conventional HRGC/HRMS, analysis cost is ca. 70% cheaper than HRGC/HRMS
  - Can analyse as many samples in one week as the project analysed in 3 years (weekly capacity of 50 samples/person)
Some issues in information sharing

The True Picture

Statement showing State-wise consumption of Endosulfan in the country during the year 2004-05

<table>
<thead>
<tr>
<th>S.No.</th>
<th>State</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Andhra Pradesh</td>
<td>240</td>
</tr>
<tr>
<td>2</td>
<td>Assam</td>
<td>105</td>
</tr>
<tr>
<td>3</td>
<td>Arunachal Pradesh</td>
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<td>4</td>
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<td>6</td>
<td>Goa</td>
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<td>7</td>
<td>Gujarat</td>
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<td>8</td>
<td>Haryana</td>
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<td>9</td>
<td>Himachal Pradesh</td>
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<td>10</td>
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<tr>
<td>34</td>
<td>Haryana</td>
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<tr>
<td>35</td>
<td>Pondicherry</td>
<td>0</td>
</tr>
</tbody>
</table>
And how we regulate pesticides is important

Food security

MoAg

CSOs / Citizens

Food Safety

MoEF and MoHFW: remains mere onlookers
Public Health Insecticides and Implementation of Environmental Management Plan

National Vector Borne Disease Control Programme
Directorate General of Health Services
Ministry of Health & Family Welfare
Magnitude of Vector Borne Diseases

• NVBDCP- nodal agency of Min. of Health & FW
• Deals six vector borne diseases

Malaria- About 6 million cases and 40,000 deaths (estimated figures)
Kala-azar- About 30,000 cases and 100 deaths
Dengue & Chikungunya
Japanese Encephalitis
Lymphatic filariasis

• Use CIB registered products
Vector Control Strategy
Institutional Frame Work

• DDT mandate committee under the Chairmanship of Secretary (HFW)

• Technical Advisory Committee under the Chairmanship of DGHS, GoI

• Operational Research
  – ICMR/ NIMR/VCRC/ RMRC
  – NEERI, Nagpur

• Stockholm Convention
  – WHO Global Alliance for alternatives to DDT
  – DDT Expert Group
Public Health Insecticides for vector borne disease control

- DDT- About 3200 MT DDT a.i. (80% of the Global use)
- OP Insecticides – Malathion 225 MT a.i.
- Synthetic Pyrethroids- 30 MT a.i

  Vector control  
  House hold pesticides  
  Professional Pest Management Personnel  
  (Pesticide used by Pest Control Officer)
## IRS - Insecticide Dosage, Dilution and Requirement

<table>
<thead>
<tr>
<th>INSECTICIDE</th>
<th>DOSAGE PER Sq. m. (a.i.)</th>
<th>DILUTION PER 10 LTR. OF WATER (covers 500 sq m area)</th>
<th>INSECTICIDE FORMULATION PER HOUSE (150 Sq. m) PER ROUND</th>
<th>AVERAGE PER 5000 POPU. (or 1000 houses) PER ROUND</th>
<th>TOTAL PER ANNUM</th>
</tr>
</thead>
<tbody>
<tr>
<td>DDT 50%*</td>
<td>1 gm</td>
<td>1 Kg</td>
<td>300 gm</td>
<td>375 Kg</td>
<td>750 Kg</td>
</tr>
<tr>
<td>Malathion 25% (2 coats and 3 rounds per annum)</td>
<td>2 gm</td>
<td>2 Kg</td>
<td>1200 gm</td>
<td>1500 Kg</td>
<td>4500 Kg</td>
</tr>
<tr>
<td>Deltamethrin 2.5%</td>
<td>20 mg</td>
<td>400 gm</td>
<td>120 gm</td>
<td>50 Kg</td>
<td>300 Kg</td>
</tr>
<tr>
<td>Cyfluthrin 10%</td>
<td>25 mg</td>
<td>125 gm</td>
<td>37.5 gm</td>
<td>46.87 Kg</td>
<td>93.75 Kg</td>
</tr>
<tr>
<td>Lambda cyhalothrin 10%</td>
<td>25 mg</td>
<td>125 gm</td>
<td>37.5 gm</td>
<td>46.87 Kg</td>
<td>93.75 Kg</td>
</tr>
</tbody>
</table>
| Alphacypermethrin 5%             | 25 mg                    | 250 gm                                               | 75 gm                                                    | 93.75 Kg                                             | 187.50 Kg
Supply of DDT 50% wdp from 2004-05 to 2011-12

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
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<tr>
<td>Mal.</td>
<td>6000</td>
<td>6000</td>
<td>6450</td>
<td>4800</td>
<td>5991</td>
<td>5694</td>
<td>4359</td>
<td>4089</td>
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<tr>
<td>K.A.</td>
<td>2500</td>
<td>2481</td>
<td>375</td>
<td>1200</td>
<td>830</td>
<td>1000</td>
<td>1516</td>
<td>2338</td>
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</tbody>
</table>
Environment Management Plan

Environment Management Plan (EMP) defines the measures needed to prevent, minimize and mitigate the adverse impacts of insecticide used under VBD program and to suggest the measures for improvement in environmental condition. The EMP is uploaded on Directorate NVBDCP website.

KEY THRUST AREAS

(A) PROPER STORAGE
   Ideal Insecticides Warehouse Location, Design and Structure of Warehouse & Stock Management:

(B) SAFE HANDLING
   Transportation of Insecticides, Personal Safety and Protection

(C) DISPOSAL OF EMPTY CONTAINERS AND INSECTICIDE REMANENTS

DTE. NVBDCP INITIATIVE – HIRING OF AGENCY

- An agency (SENES Consultants) is hired to monitor implementation of EMP activities under the WB supported project

OBJECTIVES OF THE CONSULTANCY SERVICES

- To assist NVBDCP in capacity building of the implementing agencies i.e. state, district and sub-district in environment management in the project states and districts
- To monitor the implementation of EMP activities as per the required regulatory and guidelines in states, districts and sub-district level
- To provide information on the status on the implementation of EMP in project districts
- The EMP is uploaded on Directorate NVBDCP website.
EMP initiatives by NVBDCP

- EMP Manual prepared and uploaded on Dte. NVBDCP website.

- Guidelines on “Proper Storage, Safe Handling and Disposal of Insecticides” are revised, communicated to states and uploaded on the Dte. Website.

- HIL to supply PPEs along with next DDT supply.

- States communicated about disposal of insecticide remnants and used insecticide containers and bags during and after IRS activity.

- Training organized on EMP concept to VBD Consultants.

- Field visits by Consultant (ES) to assess existing EMP activities.
Safety measures

Protective devices:
- Hats/Caps
- Overcoats
- Apron
- Rubber boots
- Goggles
- Gloves
- Mask
Safety measures

• Storage: Store insecticide in a well ventilated room

Disposal
  – Safe disposal of empty containers.
  – Washings of sprayers and the left over insecticides may be poured in to pits.
  – Never pour insecticides in to or near the drinking water source.
HUMAN AND ENVIRONMENT SAFETY

TRANSPORTATION: Insecticide -

1. Transported in well sealed and labeled containers, boxes or bags
2. Transported separately and not along any other item
3. Should NOT be transported in the vehicle carrying food items
Safety measures

Personal hygiene

- Hands and face should be washed after filling each pump charge.
- Eating, drinking and smoking should be forbidden, except after washing and before starting to spray.
- Spray men should not be exposed to insecticide for more than six hours each day.
- Overalls and hats should be washed daily, especially if they have been heavily contaminated.
- Spray men must take a shower at the end of each day’s work.
HUMAN AND ENVIRONMENT SAFETY
DOS AND DONTS DURING SPRAYING OPERATIONS

Dos:
• Do read the manufacturer’s label carefully and completely paying particular attention to precautions and antidotes.
• Do wear adequate clean protective clothing and equipment as specified on the label.
• Do wash immediately and thoroughly with soap and water if spray is spilled on the skin.
• Do remove clothes after using poisonous chemicals and bathe with plenty of soap and water. Wash work clothes before using again.
• Do wash hands and face before eating or smoking.
• Do confine insecticides to the property being treated.
• Do store insecticides in the original labeled containers away from food, feed or medicine; and out of reach of children, pets and livestock.
• Do dispose of empty containers properly and safely.
• Do call a doctor or get the patient to a hospital immediately if symptoms of poisoning occur during or shortly after spraying or dusting.

Donts:
• Don’t breathe sprays or dusts.
• Don’t direct spray or dust stream into the wind.
• Don’t use sprayers with leaking hoses or connections.
• Don’t allow drift onto neighboring fields, particularly pasture and forage crops, or fields containing produce ready to harvest.
• Don’t contaminate fish ponds, streams or lakes.
• Don’t use the mouth to siphon liquids from containers or to blow out clogged lines, nozzles, etc.
Antidotes for insecticide poisoning

**OP poisoning**
*(Organo-phosphorous compounds targets nervous system and is esterase inhibitor)*

- In case of OP poisoning, the patient should be transported as soon as possible to a doctor to receive an antidote.
- Organophosphate poisoning, 2-4 mg of atropine should be given intravenously (for children 0.5 to 2 mg according to weight).
- Depending on symptoms, further doses of 2 mg should be given every 15 minutes for 2-12 hours in severe cases.

**SP poisoning**
*(Affects nervous system- every part of the nervous system is affected)*

- In treating pyrethroid poisoning vitamin E oil preparations can be given for prolonged paraesthesia.
- Only in cases of definite allergic symptoms should corticosteroids be administered. On occurrence of convulsions after sever intoxication, intravenous injection of 5-10 mg Diazepam (or other benzodiazepine derivatives) should be given.
Brominated Flame Retardants

Satish Sinha
Toxics Link
What is BFR?

- Organobromide - a family of 75 chemical substances with different properties, characteristics, and performance.

- Only common point: all contain bromine

- BFRs are added to slow down or prevent the ignition of fire

- Other flame retardants: Chlorine, phosphorous and nitrogen based and inorganic based
Applications

Used in

- Housings of electric and electronic appliances and machines, printed circuit boards, wiring and electric power distribution equipment,
- Expanded and extruded polystyrene foams for insulation of buildings,
- Polymers for use in transportation,
- Components of textiles, carpets and furniture
BFRs

Polybrominated Biphenyls (PBBs)
- PBBs have been found to be persistent, bioaccumulative toxins
- PBBs are classified possible carcinogens
- Most production of PBBs ceased in the 1970s.
BFRs

Popularly used
• Polybrominated diphenyl ethers (PBDEs)
• pentaBDE (pentabromodiphenylether — “Penta”)
• octaBDE (octabromodiphenylether — “Octa”)
• decaBDE (decabromodiphenyl ether — “Deca”)

TetrabromobisphenolA (TBBPA)          Hexabromocyclododecane (HBCD)
### Major BFR volume (MT) estimates in 2001

<table>
<thead>
<tr>
<th>BFR</th>
<th>America</th>
<th>Europe</th>
<th>Asia</th>
<th>Rest of the world</th>
</tr>
</thead>
<tbody>
<tr>
<td>TBBPA</td>
<td>18,000</td>
<td>11,600</td>
<td>84,900</td>
<td>600</td>
</tr>
<tr>
<td>HBCD</td>
<td>2,800</td>
<td>9,500</td>
<td>3,900</td>
<td>500</td>
</tr>
<tr>
<td>DBDE</td>
<td>24,500</td>
<td>7,600</td>
<td>23,000</td>
<td>1,050</td>
</tr>
<tr>
<td>OBDE</td>
<td>1,500</td>
<td>610</td>
<td>1,500</td>
<td>180</td>
</tr>
<tr>
<td>PentaBDE</td>
<td>7,100</td>
<td>150</td>
<td>150</td>
<td>100</td>
</tr>
<tr>
<td>Total PBDE</td>
<td>33,100</td>
<td>8,360</td>
<td>24,650</td>
<td>1,330</td>
</tr>
<tr>
<td>Total BFRs</td>
<td>53,900</td>
<td>29,460</td>
<td>117,950</td>
<td>2,430</td>
</tr>
</tbody>
</table>

Data from BISEF (2001)
Concerns

- As additive flame retardants, PBDEs are not chemically bound to consumer products, but merely dissolved, so they can leach out and evaporate into the environment over time.

- Persistence, bioaccumulation, and potential for toxicity, both in animals and in humans
Health and Environment

- PBDEs have been found both in the environment and in humans.
- Levels of PBDEs in the human population have been rising steadily for the past thirty years and concentrations are doubling approximately every five years.
- PBDEs bioaccumulate in blood, breast milk, and fat tissues.
- Main sources of PBDE exposure for humans are likely to be indoor air, indoor dust and food, including human milk.
Health and Environment

- First identified in living organisms in 1981-found in fish samples from western Sweden
- Since then, they have been found in birds, fish, shellfish, amphibians, marine mammals, sewage sludge, sediments, air samples, meats, dairy products and even vegetables in numerous North American and European locations, as well as in Japan
- Most alarming, however, has been their discovery in human blood, fatty tissue, umbilical cord blood and breast milk in every region where scientists have conducted
Health and Environment

- A growing body of research in laboratory animals has linked PBDE exposure to an array of adverse health effects including thyroid hormone disruption, permanent learning and memory impairment, behavioral changes, hearing deficits, delayed puberty onset, decreased sperm count, fetal malformations and, possibly, cancer.

- A very low threshold for PBDEs to cause permanent impacts to the nervous system.

- Personnel associated with the manufacture and recycling of PBDE-containing products are exposed to highest levels of PBDEs.
Commercial Penta-BDE and commercial Octa-BDE are listed as POPs. HBCD is currently being considered as a potential candidate.
Toxics Link Studies

Two studies- BFR in WEEE

- Investigate and identify the possibility of cross contamination of the material supply chain with BFRs
- Identify health and environmental concerns
Key observations

- Release of dust during shredding of BFR contaminated plastic
- No occupational safety
- After preliminary processing, the recycling of plastics involves extrusion to make new products. The use of heat in the extrusion of plastics containing brominated flame retardants can cause the formation of brominated furans and dioxins.
- Contamination of the entire plastic flow
Key findings

- Out of 10 recycled plastic pellets tested under this study, 5 of them contained Brominated flame-retardants.
- All three plastic resins included in this test, namely HIPS, ABS and PC, were found to be contaminated with PBDEs.
- Different congeners of PBDE were detected in all of these five samples, namely Hepta, Octo, Nona and Deca.
- The concentrations of Deca-PBDE detected in 5 samples ranged from 140 mg/kg to 39602 mg/kg.
Key findings

- Among all 44 plastic samples 18 (41%) samples were found positive for BFR.
- The observed concentration of BFR was varied from 18.9 ppm to 126.3 ppm.
- 4 congeners (Hexa, Hepta, Nona and Deca) of PBDE detected - Hexa and Hepta congeners are more
Recommendations

- Restrictions to be placed on the use of Halogen based flame-retardants
- Providing an incentive to companies with BFR free products
- Laying down specific standards for recycling of BFR contaminated plastics
- Generate new data on environment and health due to BFR releases.
Formation of U-POPs and BAT/BEP to minimise the emissions

Dr. Anbu Munusamy, Dioxin Research Section
CSIR – NIIST, Thiruvananthapuram
FORMATION MECHANISMS
UPOPs
Dioxins, Furans, HCB & PCB

- Common name on one group of 17 chlorinated dioxins and dibenzofurans

- One of the most toxic compounds in the world
## Toxic congeners

**All 2,3,7,8 positons occupied with chlorine atoms**

<table>
<thead>
<tr>
<th>Dioxins</th>
<th>Dibenzofurans</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,3,7,8-TCDD (1)</td>
<td>2,3,7,8-TCDF (0.1)</td>
</tr>
<tr>
<td>1,2,3,7,8-PeCDD (0.5)</td>
<td>1,2,3,7,8-PeCDF (0.05)</td>
</tr>
<tr>
<td>1,2,3,4,7,8-HxCDD (0.1)</td>
<td>2,3,4,7,8-PeCDF (0.5)</td>
</tr>
<tr>
<td>1,2,3,6,7,8-HxCDD (0.1)</td>
<td>1,2,3,4,7,8-HxCDF (0.1)</td>
</tr>
<tr>
<td>1,2,3,7,8,9-HxCDD (0.1)</td>
<td>1,2,3,6,7,8-HxCDF (0.1)</td>
</tr>
<tr>
<td>1,2,3,4,6,7,8-HpCDD (0.01)</td>
<td>1,2,3,7,8,9-HxCDF (0.1)</td>
</tr>
<tr>
<td>1,2,3,4,6,7,8,9-OCDD (0.001)</td>
<td>2,3,4,6,7,8-HxCDF (0.1)</td>
</tr>
</tbody>
</table>

**Total: 17 isomers**
**TCDD-equivalents**

The total dioxin toxicity in the sample
- Concentration of a specific isomer multiplied with its TE-factor
- Add together all 17 isomers TE-value

I-TEQ = International TCDD equivalents

WHO-TEQ = I-TEQ + Toxic PCBs

Eadon equivalents
Nordic TCDD equivalents
Nato equivalents

Different TE-factors
INDIAN SCENARIO
source-by-source
SAMPLING

MEASURED AND/OR PRIMARY DATA

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DIOXIN – RELEASE ROUTE
POWER GEN – FOSSIL FUEL – FLUE GAS
HAZARD. WASTE INCIN. – FLUE GAS
WASTE DUMPING SITE - SOIL
LAND FILL FIRES – EMISSION
CREMATORIA – EMISSION SAMPLE

CSIR NIIST
MANGROVES – WATER SAMPLE
CONTAMINATED SITES - SOIL
BIOMONITORING – FOODS OF ANIMAL ORIGIN

A TOXICOLOGICAL SURVEY
COW & GOAT MILK
HEN & DUCK EGGS

[Image of three egg samples with labels: Egg Sample 1, Egg Sample 2, Egg Sample 3]
FISH & PRAWN
SAMPLING LOCATION
MANGROVES - SEDIMENT
PCDD/Fs IN SEDIMENTS (pg/g)
PUBLIC AWARENESS MATERIALS

CSIR  NIIST
POPs that are produced intentionally as well as unintentionally, such as dioxins.

Say No to Incineration

Incineration has been identified as a major source of dioxins and furans. While so-called state of the art incinerators can greatly reduce dioxin emissions, they still cannot stop the formation of dioxins and other POPs which may be present in the fly ash and bottom ash that would still require further treatment before disposal.

Alternative destruction and de-contamination methods and technologies, which do not generate POPs, should be used instead. In recognition of the dangers associated with incineration, countries should venture into non-incineration destruction technologies. Recently, the Philippines and Costa Rica both banned incineration as a disposal method for municipal waste and adopted composting and land filling methods.

Who are we?

NIIST is a constituent laboratory of CSIR, India, engaged in R&D programs in the area of Chemical and Engineering Sciences. The programmes of NIIST have a blend of basic research and technology development, have specific thrusts on frontier areas of research, National Mission Projects, regional resource-based activities and R&D to Industries. Dioxin research is a priority among the mission programmes of NIIST with the goal to protect human and environment from the impacts of Persistent Organic Pollutants through innovative research and consultancy to industries.

Dioxin research section, a state of the science facility, of NIIST is the first of its kind in India region dedicated to play crucial role in meeting these challenges. The programme undertakes research on assessment, control, destruction and phase out of dioxins and dioxin-like chemicals from industrial and non-industrial activities. At present, dioxin research section of NIIST has taken the responsibility of preparing finger print on industrial and non-industrial sources of dioxins in South India as first step towards the implementation of Stockholm Convention in India. The programme is funded by UNEP. As a whole, the dioxin research section of NIIST strives on its mission to protect public health and environment through quality research on dioxins.

Contact us

For & on behalf of Director, NIIST:
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Email: anbhaanuransamy@hotmail.com

Public Awareness Material on Deadly Chemicals

Dioxins

Committed to combat POPs pollution

Issued for Public Awareness by

Dioxin Research Unit
National Institute for Interdisciplinary Science and Technology, NIIST, CSIR
Thiruvananthapuram 695019, Kerala, India

CSIR  NIIST
हामी निर्माता एडाफासिन्ना (हिंदी) द्वारा विभिन्न अनुभव के लिए विशेष रूप से विश्वसनीय अनुभव उन्नत करता है। अनुभव उन्नत करने के लिए एडाफासिन्ना का विश्वास हेतु निर्माता एडाफासिन्ना (हिंदी) के द्वारा विश्वसनीय अनुभव उन्नत करता है। अनुभव उन्नत करने के लिए एडाफासिन्ना का विश्वास हेतु निर्माता एडाफासिन्ना (हिंदी) के द्वारा विश्वसनीय अनुभव उन्नत करता है।

निर्माता: एडाफासिन्ना (हिंदी)
## INFO ON SAMPLES

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</tr>
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</table>
PARTICIPANTS WORLDWIDE
Z SCORE - SEDIMENT

Total TEQ Sediment

19

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ANNUAL EMISSION OF DIOXINS AND FURANS PERCENTAGE CONTRIBUTION - INDIAN SCENARIO

- Residue: 63.12%
- Air: 32.66%
- Water: 0.25%
- Land: 0.35%
- Product: 3.62%
INCINERATION
INCINERATION

- **Hazardous waste incineration**
  - Low technol. combustion, no APCS
  - Controlled comb., minimal APCS
  - Controlled comb., good APCS
  - High tech. combustion, sophisticated APCS

- **Medical waste incineration**
  - Uncontrolled batch combustion, no APCS
  - Controlled, batch, no or minimal APCS
  - Controlled, batch comb., good APCS
  - High tech, continuous, sophisticated APCS

CSIR NIIST
WASTE DUMPING SITE
INCINERATION

ANNUAL PCDD/Fs EMISSION FROM WASTE INCINERATION (g-TEQ/a)

- Medical waste incineration: 272.37 g-TEQ/a
- Hazardous waste incineration: 5505.60 g-TEQ/a

ANNUAL PCDD/Fs EMISSION FROM WASTE INCINERATION (gTEQ/a)

- Air: 1812.14 gTEQ/a
- Residues: 3965.83 gTEQ/a
Open burning including landfill sites

- Open burning is an environmentally unacceptable process
- Best guidance is reduce open burn
- Avoid non combustible materials
- Avoid PVC and inorganic chlorides
- Avoid catalysts (copper, tron, chromium and aluminium)
BAT/BEP for Incineration

(1) Technique Optimization

- Materials
  - Avoid Non-combustible materials
  - Avoid Wastes containing high Cl or Br
  - Avoid Materials containing catalytic metals
  - Materials should be dry
BAT/BEP for Incineration

(1) Technique Optimization

- **Burning Process**
  - Supply sufficient air
  - Maintain steady burning
  - Minimize smouldering
  - Limit burning to small, actively turned, well-ventilated fires
BAT/BEP for Incineration

(2) Management

- To prohibit Open Burning
- To mitigate exposure routes
- To encourage alternatives
  - Economic Instrument
  - Public education
BAT/BEP for Incineration

(3) Alternative

i. Intentional biomass burning

ii. Open burning of mixed consumer wastes

iii. Open burning of specific materials and miscellaneous
BAT/BEP for Incineration

i. Intentional biomass burning

- timber
- composting
- raw materials for paper

Non-destructive use
BAT/BEP for Open burning

ii. Open burning of mixed consumer wastes

(i) Household waste, landfill/dump fires & industrial non-hazardous waste

- composting
- reuse
- recycling
- BAT incineration
- modern landfill
BAT/BEP for Open burning

ii. Open burning of mixed consumer wastes

(ii) Construction, demolition and post-disaster debris

- collected, sorted & reuse
- landfill
- BAT incineration
iii. Specific materials and miscellaneous

(i) Agricultural plastic
   • Life extension
   • Landfill
   • BAT Incineration

(ii) Tire
   • Life extension
   • To retread and reuse
iii. Specific materials and miscellaneous

(iii) Oil spill and gas flares

- better procedures for handling materials
SECONDARY METAL PRODUCTION
FERROUS & NON-FERROUS

ANNUAL PCDD/Fs EMISSION FROM FERROUS AND NON-FERROUS METAL PRODUCTION (gTEQ/a)

- Secondary zinc production: 40.20
- Secondary lead production: 7.93
- Aluminium production: 217.09
- Iron and steel production: 727.87
- Coke production: 24.99
- Iron ore sintering: 309.32
- Brass and bronze production: 0.338
- Thermal non-ferrous metal production: 16.06

ANNUAL DIOXIN EMISSIONS FROM FERROUS AND NON-FERROUS METAL PRODUCTION - INDIA (gTEQ/a)

- Residue: 1210.96
- Air: 505.88

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How are air emissions reduced?

- **Primary Measures**
  - **Presorting of scrap material**
    - Avoid presence of oils, plastics, and chlorine on scrap
    - Current Methods –
      - Thermal decoating and de-oiling followed by afterburning
      - Milling and grinding
      - Elimination of plastic by stripping copper wire or cryogenic stripping
      - Blending of material to create homogeneous feed
  - **Good operation conditions in furnaces**
    - Maintain furnace temperatures > 850°C to destroy dioxins/furans
    - Monitor emissions if possible, temperature, residence time, gas components, and fume damper controls
How are air emissions reduced?

- **Secondary Measures – Pollutant control measures**
  - **Fume and gas collection for all processes**
    - Sealed feeding systems and sealed furnaces
    - Control of fugitives by maintaining negative air pressure in furnace to prevent fugitive leaks
    - Gas collection – use of furnace enclosures
    - Use of hooding if sealed enclosures are not possible

- **High efficiency PM removal – dioxin/furan adsorb on PM**
  - Collected PM should be treated in high temperature furnaces to remove dioxins/furans
  - Methods – high-efficiency fabric filters, ceramic filters, wet and dry scrubbers

- **Afterburners and Quenching**
  - Afterburners with rapid quench are used to destroy organic materials that escape the combustion zone
  - Operate afterburners at temperatures > 950 C followed by rapid quenching to temperatures < 250C to prevent dioxin reformation. High temperature afterburners destroy dioxins/furans rapid quenching prevents reformation of dioxins/furans.
How are air emissions reduced?

- **Secondary Measures – Pollutant control measures**
  - **Adsorption on Activated Carbon**
    - Dioxin/furans adsorb onto activated carbon; Ideal due to large surface area for adsorption
    - Treatment with activated carbon using fixed or moving bed reactors
    - Injection materials such as lime, sodium bicarbonate and carbon into gas stream followed by high-efficiency PM removal measures such as fabric filters
  - **Catalytic oxidation – emerging research**
    - Transforms organic compounds into H2O, CO2, and HCl using a precious metal catalyst
    - Off-gases should have PM removal prior to this measure
    - 99% effective, shorter residence times, lower energy consumption
RESEARCH & CONCLUSION
CATALYTIC DESTRUCTION OF POPs

Pilot reactor

CSIR NIIST
The Laboratory-scale Reactor
Reducing Emissions

Different approaches:

- Addition of inhibitors (directly to the waste or into the flue gas stream)
- Control of waste composition and properties, development of materials
- Source sorting and/or pre-treatment of the waste (reducing the chlorine- and/or metal-content)
- Air pollution control devices
- Catalytic destruction
- Optimization of the combustion process (temperature, air flow, turbulence, residence time)
- New technology, development of combustion systems
- Reduction of HCl levels
WE NEED THREE THINGS TO PROTECT THE PUBLIC FROM TOXIC EMISSIONS.

STONG REGULATIONS

ADEQUATE MONITORING

TOUGH ENFORCEMENT

IF ANY LINK IS WEAK THE PUBLIC IS NOT PROTECTED

CSIR  NIIST
THANKS

TO MY
COLLEAGUES
WORLDWIDE
Session IV – POPs and Outstanding Issues

Grants and Financing
GEF SGP-INDIA

POPps – Opportunities

28.02.2012

Prabjhot Sodhi,
NC, GEF Small Grants Program, CEE India
GEF SGP Thematic Areas

- Climate Change Mitigation
- Biodiversity Conservation
- Prevention of Land Degradation & Desertification
- International Waters
- Prevention of Persistent Organic Pollutants (POPs)
Community level GEF SGP Principles

- Community need assessment – rapport and trust
- Local institution building and empowerment
- Skills and knowledge building of the locals
- raising public awareness of global environmental issues and changing public attitudes and practices;
- influencing government environmental policies and programs; and
- mobilizing in-kind and monetary resources to support project and program sustainability.
Results and Success Levels in GEF SGP

- Resource Mobilization; Visibility; Hand holding to other projects-donors; Measurability in Results; Links to GOI programs-conventions;
- Private sector CSR links to take forward the SGP lessons; Knowledge Management; Scaling up and Replication of Actions
- Sharing impacts in workshops and conferences; participation and sharing results; creating space and networking.
Prevention of Persistent Organic Pollutants (POPs)

- Community initiatives to eliminate the causes of land and marine-based sources of pollution, particularly Persistent Organic Pollutants (POPS), nutrients and certain metals
- Reduction/Elimination of agricultural run-off in the form of chemical fertilizers and pesticides
- Reduction of industrial waste dumping by promoting reuse and recycling
- Unintended Production of Dioxins and Furanes
--Many civil society organisations in India have undertaken monitoring programmes related to estimating levels of pesticides, and they have an interest in raising public awareness of environmental and health problems and potential solutions.

--Public ownership of schemes through active public participation is seen as vital by Parties to the Stockholm Convention, as such participation helps to reduce and phase out POPs chemicals and to develop safe alternatives.
--Stakeholder consultation is therefore an important aspect of the Convention compliance, particularly as India moves fully toward a market economy.

--UNIDO together with UNEP have implemented a global project to foster civil society involvement in Safe Chemicals implementation.

--The NGO Toxics Link acted as a hub for South Asia in this project.

--The intent therefore is to have consultation at all stages of the Project.
OUTCOMES

- 2 Districts, 5 Blocks and 520 Households (HHs).
- 20 Food/Crop Based Organic Products.
- Sale of Rs. 4 crores/year total over 2/3 years Rs. 14 crores.
- Sugarcane leaf burning reduced.
- Use of related Pops eg. Lindane reduced by 20-30% by farmers.

INSTITUTION MODEL FOR JANHIT

VILLAGES

SHG

SHG

SHG

NGO FACILITATION

STAKEHOLDERS
- Communities
- Academic and research institutions
- SHGs
- Government

LINKS TO MARKETS

NGO OWN SHOP
MOBILE VANS
COMMUNITY MELAS
UNIVERSITY OUTLETS
MEDICAL COLLEGE
SCHOOLS

*SHG: Self Help Group
Continued

- Public participation and ownership is seen as important for support of initiatives that reduce and phase out POPs chemicals.
- Stakeholder consultations - assessed as a cornerstone of the Stockholm Convention
- Sugar factories, institutions, government and Agricultural deptts.
- Improvement of public awareness and education
- Preparation of action plan for waste disposal & management
- Evaluation of adverse effect on human health
Green Bazaar
Stakeholders and Sharing Information with GEF SGP

- Details setting up the NIP coordination Unit
- Setting up task teams, project assistance, experts involvement on POPs management
- Setting up work plans, agendas
- Pesticide Inventory; PCBs and Poly Chlorinated Dibenzo Dioxins (PCDDs) and Poly Chlorinated Dibenzo Furans (PCDFs) Inventory
- Socio-Economic Analysis on POPs used
- Technical Report on POPs Management
- Possible strategic projects implemented
Examples on Partnerships in three areas/sectors

- Waste Incineration:
- Ferrous & Non-ferrous Metal Production:
- Heat & Power Generation:
  - Limited and low level of awareness amongst the stakeholders about PCDDs/PCDFs emissions.
  - Lack of capacity and technology for sampling and measuring PCDDs/PCDFs emissions.
  - Existing policies and regulations - mandatory measuring and reporting of PCDDs/DFs emissions in above sectors??
The principal sources, emissions and releases of POPs include the following:
1. Medical wastes.
2. Industrial wastes.
3. Municipal wastes.
4. Incinerators.
5. Chemical waste by-products.
...Contd

6. Pesticides.
7. Pulp and paper plants.
8. Automobiles.
10. Smelters.
11. Power transmission equipment (e.g. transformers, capacitors, etc.) which contain PCBs.
Article 10 of the POPs Convention deals with “Public Information, Awareness and Education”, which calls for each Party, within its capabilities, to promote and facilitate the following:

Please visit website…on POPs…
For more information, please contact
prabhjot.sodhi@ceeindia.org
Session V–Implications of Missing Opportunities

Plenary session with panel discussion
Toxic Chemicals Management

MILES TO GO........

ON A ROAD LESS TRAVELLED........

Prof. T. Swaminathan
Chemical Engineering Department
IIT Madras, Chennai
Email: tswami@iitm.ac.in
Wide variety of chemicals in use. Most are benign, many Toxic – but focus on POPs.

Concerns stem from Human health and Ecological impacts

wrt, POPs Agenda for Management and Action plan for implementation established through National and International Agencies. Several aspects discussed.
Environmental Perspective

- Generally addresses wastes and residues in manufacture and use of toxic chemicals

- Focus on End-of-pipe, i.e., Treatment and disposal strategies.

- Occasionally, alternatives- processes/products are proposed
Technological Perspective

Raw Materials (Natural Resources) → (Energy) → Products + Wastes

✓ Environmental perspective intrinsically assumes inevitability of wastes and looks for environmentally compatible disposal.

✓ This may not yield a sustainable solution as treatment & disposal is also similar to production.
➢ For a long-term sustainable solution it is necessary to address the process and the products.

➢ Increasing process efficiency reduces waste (Waste minimization)

➢ Process modifications to minimize or eliminate toxic materials is a better solution.

➢ The best solution, however, is to minimize / eliminate the need for toxic chemicals
Challenges

- Intentionally produced POPs
- What are the alternatives? Can Agricultural production be sustained and increased?
- Unintentionally produced POPs
- MSW & Biomedical waste incineration – dumpsites- no monitoring
- Industrial boilers, Kilns – Waste Oil
- Sound non-incineration technologies?
New Paradigm?

- Human wants are the driving force for excessive consumption
- Consumption >>>> Production >>>> Waste
- Want Not >>>> Waste Not
- Need of the hour - Not waste minimization but want minimization
• Que Sera Sera
• Whatever will be will be
• For the future generation, do a good deed
• Let’s live with what we really need
• Que Sera Sera
5. CONFERENCE IN VISUALS
Inaugural and first sessions:

Top Left: Prof Gautam, Ex-chair, CPCB giving his inaugural speech
Top Right: Prof Gautam, Ex-chair, CPCB giving his inaugural speech
Middle left: Mr. Robert Donkers and Mr Ravi Agarwal on the inaugural panel
Middle right: Mr. Robert Donkers, EU minister’s counselor for Env. In India giving his inaugural speech
Bottom Left: Mr. Ravi Agarwal, Director, Toxics Link giving an overview on the Stockholm Convention and opportunities
Bottom right: Dr. Neeta Thacker, Chief Scientist, NEERI replying to a query
Glimpses from different sessions:

Top left: Dr. AC Dhariwal, Director, NVBDCP making his presentation on the roadmap for DDT phase-out in India
Top Right: Dr. Anbu Munsamy, Joint Director at NIIST replying to a query
Middle left: Mr. Satish Sinha, Associate Director, Toxics Link making his presentation on BFR
Middle right: Dr. DD Basu, Scientist, CPCB making his presentation on POPs and regulatory challenges
Bottom Left: Dr. DD Basu, Scientist, CPCB replying to a query
Bottom right: Sri VV Pattanshetty, Joint Director, CPRI making a point on PCBs
Dr. Swaminathan, Mr. Sondhi and Mr. Ravi on panel

Dr. Basu, HIL representative

Dr. Amarsingh Azad, Kheti Virasat making a point

Attentive Dr. Neeta Thacker, NEERI

Indian Ngo participation

Prof. K C Gupta, IITR making a point
Dignitaries’ and participants from Across India

Interest groups from South Asia (Nepal, Bangladesh, Sri Lanka, Bhutan)
6. CONFERENCE AGENDA

**Tea** - 09:15am – 09:30am

**Inaugural session** – 09:30am – 10:30am (Host: Priti Mahesh, Toxics Link)
Welcome address and agenda – Ravi Agarwal, Director, Toxics Link, New Delhi
Dr. Chhanda Chowdhury, Director, (HSMD), MoEF
Prof. K. C Gupta, Director, IITR, Lucknow
Robert Donkers, Minister Counsellor for Env, Delegation of the EU to India
Special Invitee – Prof. S. P. Gautam, Ex-Chairperson, Central Pollution Control Board

**Session I – Stockholm Convention – Opportunities for India** 10:30am – 12:00pm

*Chair:* Prof. T. Swaminathan, IIT Chennai  
*Co-Chair:* Mr. Prabhjot Singh Sodhi, National Coordinator GEF-SGP, CEE

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
<th>Speaker</th>
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<tbody>
<tr>
<td>10:30am – 10:45am</td>
<td>Stockholm Convention – is India availing the opportunities</td>
<td>Ravi Agarwal, Director Toxics Link</td>
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<tr>
<td>10:45am – 11:10am</td>
<td>National Implementation Plan (NIP) – gaps and roadmap</td>
<td>Dr. Chhanda Chowdhury, Director, (HSMD), MoEF</td>
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<tr>
<td>11:10am – 11:35am</td>
<td>Persistent Organic Pollutants – India’s Research Agenda</td>
<td>Dr. (Ms) Neeta P. Thacker, Chief Scientist and Head - AI Div., (Stockholm Convention Regional Centre on POPs NEERI</td>
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<tr>
<td>11:35am – 12:00pm</td>
<td>Discussion and question / answer</td>
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**Session II – Persistent Organic Pollutants (POPs) – Regulatory issues** 12:00pm – 01:15pm

*Chair:* Prof. K. C Gupta, Director, IITR, Lucknow  
*Co-Chair:* Dr. Chhanda Chowdhury, Director, (HSMD), MoEF

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<tr>
<td>12:00pm – 12:10pm</td>
<td>New POPs, new challenges</td>
<td>Piyush M, Senior Prog. Officer, Toxics Link, New Delhi</td>
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<td>12.10pm – 12:30pm</td>
<td>India’s Regulatory framework on POPs and Challenges in implementation</td>
<td>Dr. D.D Basu, Pollution, Assessment, Monitoring &amp; Survey, CPCB</td>
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<tr>
<td>12.30 pm- 12.50pm</td>
<td>A case of European Union Regulation</td>
<td>Robert Donkers, Minister Counsellor for Env, Delegation of the EU to India</td>
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<td>12:50pm – 01.15 pm</td>
<td>Discussion and question / answer</td>
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**Lunch** - 01:15pm – 02:00pm

**Session III – POPs and Outstanding Issues – Managing Toxic Chemicals** 02:00pm – 03:15pm

*Chair:* Robert Donkers, Minister Counsellor for Env, Delegation of the EU to India  
*Co-Chair:* Prof. T. Swaminatha, IIT, Chennai

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<tr>
<td>02:00pm – 02:10pm</td>
<td>Endosulfan Ban – issues before India</td>
<td>Betne, Rajeev, Senior Prog. Coordinator, Toxics Link, New Delhi</td>
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</table>
02:10pm – 02:25 pm Phasing out DDT – what’s the roadmap  
Dr. A.C. Dhariwal Director, NVBDCP

02:25pm – 02:40 pm Brominated Flame retardants (BFR) - management and business issues for India  
Satish Sinha, Associate Director, Toxics Link

02:40pm – 02:55pm Dioxin / Furans – action plan on BAT/BEP  
Dr. Anbu Munswamy, Addl. Director, NIST, Trivandrum

02:55pm – 03:15pm Discussion and question / answer

Session IV – POPs and Outstanding Issues – Grants and Financing 03:10pm – 04:10pm

Chair: Dr. S.P Dhua, Regional Coordinator, UNIDO
Co-Chair: Sri Ravi Agarwal, Director, Toxics Link

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<tr>
<td>03:15pm – 03:30pm</td>
<td>Small Grant Project (SGP) on POPs – Opportunities</td>
<td>Mr. Prabhjot Singh Sodhi, GEF-SGP, CEE – National Coordinator</td>
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<tr>
<td>03:30pm – 03:50pm</td>
<td>Financing NIP implementation</td>
<td>Dr. (Ms.) Indrani Chandrasekran, Adviser (E&amp;F), Planning commission</td>
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<tr>
<td>03:50pm – 04:10pm</td>
<td>Discussion and question / answer</td>
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Tea - 04:10pm – 04:20pm

Session V – Implications of Missing Opportunities (Plenary session with panel discussion) 04:20pm – 05:20pm

Moderator - Ravi Agarwal, Director, Toxics Link

Panelist
- Prof. K. C Gupta, Director, IITR, Lucknow
- Robert Donkers, Minister Counsellor for Env, Delegation of the EU to India (to confirm for this session)
- Prof. T. Swaminatan, IIT Chennai
- V.V. Pattanshetti, Joint Director, CPRI
- Dr. A.C. Dhariwal, Director, NVBDCP
- Dr. (Ms.) Indrani Chandrasekran, Adviser (E&F), Planning commission
- Sri J S Kamdyotra, Member Secretary, CPCB
- Sri Keshav Chandra, IAS and Chairperson, DPCC
- Dr. SP Dhua, Regional Coordinator, UNIDO

Focal issues for discussion
- Opportunities under the POP convention
- Research priorities
- Health and environment concerns
- Challenges - Implementation plan of action
- Role of civil societies
- Learning from global experience
- Financing and regulatory issues
- Awareness creation

05:20pm -05:30pm – Synthesis and concluding remarks – Satish Sinha, Associate Director, Toxics Link

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About Toxics Link

Mission Statement - “Working together for environmental justice and freedom from toxics. We have taken upon ourselves to collect and share both information about the sources and the dangers of poisons in our environment and bodies, and information about clean and sustainable alternatives for India and the rest of the world”

Toxics Link, New Delhi, India, is a public interest organization of fifteen years, emerging from the need to establish a mechanism for researching and disseminating information about environmental toxics and health. Over the years we have evolved as a very credible group in the region working on issues of chemicals and waste management, toxics free health care, clean energy alternatives and electronic and electrical waste management. Our mission is to working together with various stakeholders for environmental justice and freedom from toxics.

For more information can be found on our website – www.toxicslink.org

For Further Inquiries

Betne, Rajeev, Sr. Programme Coordinator, Toxics Link - rajeev@toxicslink.org - 09810943835
Piyush Mohapatra, Sr. Programme Officers, Toxics Link – piyush@toxicslink.org - 09873453242
Prashant Rajankar, Sr. Programme Officers, Toxics Link – prashantrajankar@toxicslink.org - 09650745900