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12/1/93

**PAINTS AND COATINGS INDUSTRY  
FACTORY ASSESSMENT REPORT**

**Sri Lanka  
November 7-11, 1993**

**Prepared for:**

**U.S. ASIA ENVIRONMENTAL PARTNERSHIP**



**WORLD ENVIRONMENT CENTER (WEC)**

## DISCLAIMER

This project was sponsored by the U.S. Agency for International Development through WEC's Cooperative Agreement in support of the U.S.-Asia Environmental Partnership (US-AEP). The opinions expressed herein are the professional opinions of the author and do not represent the official position of the Government of the United States of America or the World Environment Center.

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## I. EXECUTIVE SUMMARY

In a major effort to support the industrialization of under-developed countries in South and Southeast Asia, while at the same time, minimizing industrial pollution and protecting existing environmental resources, the United States-Asian Environmental Partnership (US-AEP), through a Cooperative Agreement with the World Environment Center (WEC), has initiated and is coordinating project missions to several countries, including Sri Lanka. As part of the Sri Lankan project, six industry groups were selected as having a potential critical need for waste minimization and pollution control measures. One of the selected industries manufactures paints and coatings. The objective of this trip was to evaluate opportunities for waste minimization and pollution prevention within the industry as a whole. This was accomplished via visits to selected paint and coatings companies in Sri Lanka to perform factory assessments and meet with their executives.

A number of major findings came out of these meetings and assessments. In general, the paint and coatings industry does not appear to be one of the largest sources of pollution in the country. Nevertheless, significant releases of hazardous wastes to the environment do occur in an unregulated manner and, in particular, large quantities of untreated wastewater are routinely discharged to the surface water ecosystem. However, on a positive note, the paint and coatings industry appears to be relatively up-to-date from an equipment and technology standpoint, technically capable, and most importantly, highly receptive to the concept of waste minimization and its dual benefits of cost reduction and environmental protection.

Broadly speaking, there are two main areas needing follow up and attention to achieve the goal of continuous waste reduction and pollution prevention in the paint and coatings industry. First, the industry needs better access to proven technology and techniques for waste minimization which already exist in other parts of the world. A local center of credible, reliable expertise must be established which the industry can turn to for technical and engineering aid. Second, a program of government regulation which creates financial incentives and positive public recognition for improvement in pollution reduction should be created. Such a program will foster continuing attention to the issues of waste minimization and pollution prevention. A system of education and regulation modeled on the Minnesota Technical Assistance Program (MnTAP), Office of Waste Management (OWM), Minnesota Pollution Control Agency (MPCA) combination in place in Minnesota would likely be highly effective in Sri Lanka.

## II. INTRODUCTION

The purpose of this mission was to evaluate the potential for waste minimization and pollution prevention within the paint and coatings manufacturing industry in Sri Lanka. The mission was conducted under the auspices of the US-AEP through a Cooperative Agreement with WEC. It was further supported by the U.S. Agency for International Development and the World Bank through its Metropolitan Environmental Improvement Project.

The mission was led by Calvin C. Henning, President of Frost Paint & Oil Corporation of Minneapolis, Minnesota. Mr. Henning and company were active on site in Sri Lanka (primarily within the greater Colombo metropolitan area) from November 7, 1993 through November 19, 1993. Key elements of the mission included environmental audits of four manufacturing plants, two owned and operated by Paints and General Industries, Ltd. (Nawala and Ratmalana facilities), one owned and operated by Chemical Industries Ltd. (CIC), and one Delmage Forsyth and Company (Paints) Ltd. in Moratuwa. On November 15, Mr. Henning also conducted a half-day workshop in Colombo on waste minimization and pollution prevention in the paint and coatings industry for attendees from the industrial sector, related consultants, and academia. While in Sri Lanka, Mr. Henning also held discussions with the managing directors of two paint manufacturers not visited, Mason's Mixture Ltd. and Silicone Coatings Ltd. In addition, he wrote an article for the University of Moratuwa's Chemical Engineering Department Journal on the necessity of close ties between industry and academia to achieving environmental protection goals. Finally, Mr. Henning gave the keynote address and led a panel discussion on waste minimization and pollution control at a day long symposium cosponsored by the Sri Lankan Ministry of Environment and Parliamentary Affairs and the U.S. Embassy.

The factory audits and the industry workshop were conducted with the participation of a local audit team which included two members from the University of Moratuwa, one representative from a respected independent testing laboratory, and one member from the paint and coatings industry in Sri Lanka (names and affiliations in Appendix B).

### III. FINDINGS

#### A. Introduction

The primary method of assessing the potential for waste minimization and pollution control in the Sri Lankan paint and coatings industry was through factory audits, and interviews with the managing directors of six manufacturing facilities. Prior to the factory visits, the audit team met to establish goals and procedures, and to review the basic operations of the industry.

Subsequent to the factory audits, an industry workshop was held that served two purposes:

- 1) To present the concept and techniques of waste minimization to a broad segment of the industry
- 2) To serve as a forum for the audit team to gain additional insight into Sri Lanka's current industry practices and its general willingness and ability to voluntarily adopt waste minimization and pollution prevention practices.

Through the factory audits and the industry workshop, a number of environmental issues were determined. The audit team was encouraged by the fact that many manufacturing plants had already adopted some elements of pollution prevention within their operations, and all appeared to be highly aware of the need to reduce both waste and environmental emissions. Further, there appear to be sufficient technical underpinnings to support comprehensive waste minimization and pollution control techniques. On the other hand, numerous opportunities for significant waste reduction and pollution prevention still exist.

#### B. Waste Minimization Opportunities

Most of the companies studied manufacture both water based and solvent based paints. Therefore, wastestreams are generally of two types and present different concerns with different solutions as discussed below.

##### 1. Solvent Based Paint Wastestreams

Waste resulting from the clean-up of equipment used to manufacture and package the solvent based products contains a mixture of solvents and residues of resins and pigments. It may or may not contain toxic chemicals, and varies greatly in composition. The good news is that the absolute quantity of this type of waste is relatively low. However, the bad news is that frequently it is not receive proper disposal. The most

common disposal technique in Sri Lanka apparently is to sell or give the solvent based waste to other firms or individuals who, it is believed, use it in low cost paint products. However, it was not clear to the audit team that the waste was, in fact, being reused. It may simply be disposed of, and no records of how this waste is transferred, transported, reused, or disposed of seem to exist. At a minimum, clear documentation of the quantities of this type of waste, and a record of its use or disposal must be established. The minimization or elimination of solvent based paint wastestreams is even more desirable.

## **2. Water Based Paint Wastestreams**

The second type of waste is a consequence of the cleaning of equipment used to manufacture and package water based paint products. This waste is typically a low concentration of non-toxic latex and pigment residue in a water stream. However it does contain an unacceptable level of total suspended solids and is usually quite high in Biochemical Oxygen Demand (BOD) and Chemical Oxygen Demand (COD). It may also be outside the desirable pH range, and may contain low levels of toxic metals. Most often, these water wastestreams are being directly discharged to surface water systems or to the city sewer system. In some cases, they are allowed to permeate into the ground from holding wells without any type of pretreatment. At times, very primitive settling techniques, such as open, excavated pits, are used to recover the most obvious solid content of the wastestream. The recovered residue is reused in lower quality latex paint. However, the remaining effluent may not meet existing Sri Lankan wastewater discharge standards.

While the technology to properly treat these water wastestreams is well known and proven in other countries, it does not appear to be easily accessible for practical adoption by this industry in Sri Lanka. Prior to considering and installing pretreatment, every effort should be made to minimize the quantity and harmfulness of the water wastestreams.

#### IV. CONCLUSIONS AND RECOMMENDATIONS

Certain conclusions can be drawn, and recommendations made based on the findings presented above. The first conclusion is that while the paint and coatings industry is not one of the greatest sources of pollution in Sri Lanka, clearly a significant quantity waste is discharged into the environment. A process must be started to eliminate this source of pollution. Second, from a technical standpoint, the knowledge and equipment to effectively eliminate pollution from the paint and coatings industry in Sri Lanka already exists in other countries and is applicable to the situation in Sri Lanka. Finally, the paint and coatings industry in Sri Lanka possesses sufficient technical ability to receive and implement appropriate waste minimization and pollution control technology. Coupled with this technical ability is an apparent readiness and willingness to adopt the basic philosophy of waste minimization and pollution control versus end-of-the-pipe treatment technologies. These conclusions lead to the following recommendations.

**Recommendation 1: Establish a technology information center.**

A technology information center should be established that can effectively identify proven and appropriate waste minimization and pollution control technology in use in other countries. This information should be readily available to Sri Lankan paint companies. The center must be "hands-on" and engineering oriented rather than highly theoretical in style. Its services must be available to industry at low or no cost to encourage voluntary use of its resources.

**Recommendation 2: Institute regulations that establish penalties for waste/pollution generation. Encourage recognition of companies that minimize or eliminate waste.**

A regulatory system should be established that creates cost penalties for waste or pollution generation. This should be coupled with recognition and positive public response for companies that demonstrate substantial environmental improvement. The regulatory system should be fee-based, with appropriate charges for all environmental emissions. Individual companies could be required to file annual reports or inventories of all environmental discharges, subject to government audit. Companies would qualify for lower fees, or avoid them altogether, by reducing or eliminating their discharges to the environment.

**Recommendation 3: Develop a public awareness program highlighting the dangers of waste discharges to the environment.**

A high public awareness of the dangers of waste discharge into the environment must be established and maintained. This serves a dual purpose: it educates the general populace as to the hazards of pollution, and it adds value to environmental awards that can be given to those companies which clearly demonstrate a commitment to protecting and improving the country's environmental resources.

**APPENDIX A**  
**ITINERARY**

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## ITINERARY

<u>Date</u>	<u>Location</u>	<u>Activity</u>
11/8/93 am	Colombo	Audit Team Meeting
11/8/93 pm	Nawala	Audit Paint & General Industries, Ltd.
11/9/93 am	Ratmalana	Audit Paint & General Industries, Ltd.
11/9/93 pm	Ratmalana	Audit Chemical Industries, Ltd.
11/10/93	Colombo	Audit Team Meeting
11/11/93	Moratuwa	Audit Delmage Forsyth (Paints), Ltd.
11/15/93	Colombo	Industry Workshop
11/17/93	Colombo	Interview S. Fernando of Mason's Mixture, Ltd.
11/18/93	Colombo	Interview R. Hewabowala of Silicone Coatings, Ltd.
11/19/93	Colombo	Pollution Prevention & Control Symposium - Keynote Address Panel and Discussion

**APPENDIX B**  
**PERSONS AND ORGANIZATIONS VISITED**

## PERSONS AND ORGANIZATIONS VISITED

<u>Organization</u>	<u>Contact</u>
Paints & General Industries, Ltd.	R. Ganemulla, Technical Director
Chemical Industries, Ltd.	J. Perera, SHE & Quality Assurance Mg
Delmage Forsyth & Company, Ltd.	N. Bastian, Managing Director and A. Mubarek, Factory Director
Mason's Mixture, Ltd.	S. Fernando, Managing Director
Silicone Coatings, Ltd.	R. Hewabowala, Managing Director

## AUDIT TEAM

Ceylon Institute of Scientific and Industrial Research (CISIR)	A. Mubarek, Head, Instrument Centre
University of Moratuwa	Dr. a. de Alwis and Dr. S. Bhuvendralingam
Paints & General Industries, Ltd.	R. Ganemulla

**APPENDIX C**  
**BUSINESS CARDS**

## Appendix C Business Cards



Nihal

**PERMOGLAZE**

**N.H.S. BASTIAN** F.B.I.M. (ENG), F.E.D.I. (WB)  
Managing Director

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TEL: 331031, 331032.  
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FAX: 000413, 000149, 000139  
CABLE: 'FORSYTH'  
Residence: 5, Kivrose Avenue, Colombo 4. Tel: 500130



**S.C.A. FERNANDO** F.B.I.M. F. Inst. D.  
MANAGING DIRECTOR

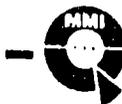
**Mason's Mixture Limited**

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Pittugala, Malabe.

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Tlx: 21111 'METAL' CE

Fax: 698489



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**PERMOGLAZE**

**DELMEGE FORSYTH  
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## Appendix C Business Cards



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MISSION TO SRI LANKA**

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International Resources Group

A Project of the United States Agency for International Development  
and the Ministry of Environment and Parliamentary Affairs

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**APPENDIX D**  
**CURRICULUM VITAE**

## CURRICULUM VITAE

Calvin C. Henning holds a B.S. Degree in Chemistry from the South Dakota School of Mines and Technology. He has been active in the paint and coatings industry for over 20 years, holding positions in product development, research, international project management, and international sales at one of the top five multi-national suppliers of coatings in the world. In 1990 he became President and majority owner of Frost Paint and Oil Corporation in Minneapolis, Minnesota. The company recently received the 1993 Governor's Award for Excellence in Pollution Prevention, one of only six given to Minnesota manufacturers. Under Henning's leadership, Frost has refocused its direction and become the leading regional supplier of low polluting industrial coatings. Henning is an active member of the Northwestern Society for Coatings Technology, and a founding member of the Minnesota Paint Council. He is a director of the Northeast Business Association and a member of the Minnesota Chamber of Commerce.

**APPENDIX E**  
**LIST OF ATTACHMENTS**

## LIST OF ATTACHMENTS

- 1) Paints and Coatings Industry, Recommendations and Practices for Waste Reduction
- 2) Making the Future Happen - Without Pollution  
(Article for Chem. Eng. Journal- Univ. of Moratuwa)
- 3) (Symposium Agenda) Pollution Prevention and Control:  
The Greening of Sri Lanka's Industrialization  
19 November 1993
- 4) Current developments as a direct result of this exchange.

PAINTS AND COATINGS INDUSTRY

RECOMMENDATIONS AND PRACTICES

FOR

WASTE REDUCTION

Calvin C Henning, President  
Frost Oil and Paint Company  
Minneapolis, MN USA

15 November 1993

NAREPP/IRG Workshop

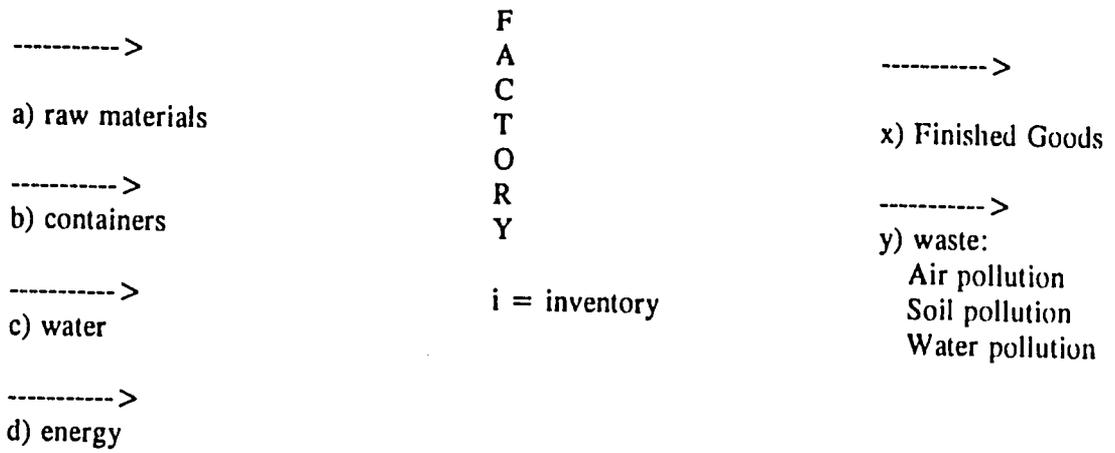
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**BASIC PRINCIPLE:**

WASTE REDUCTION  
NOT  
WASTE TREATMENT

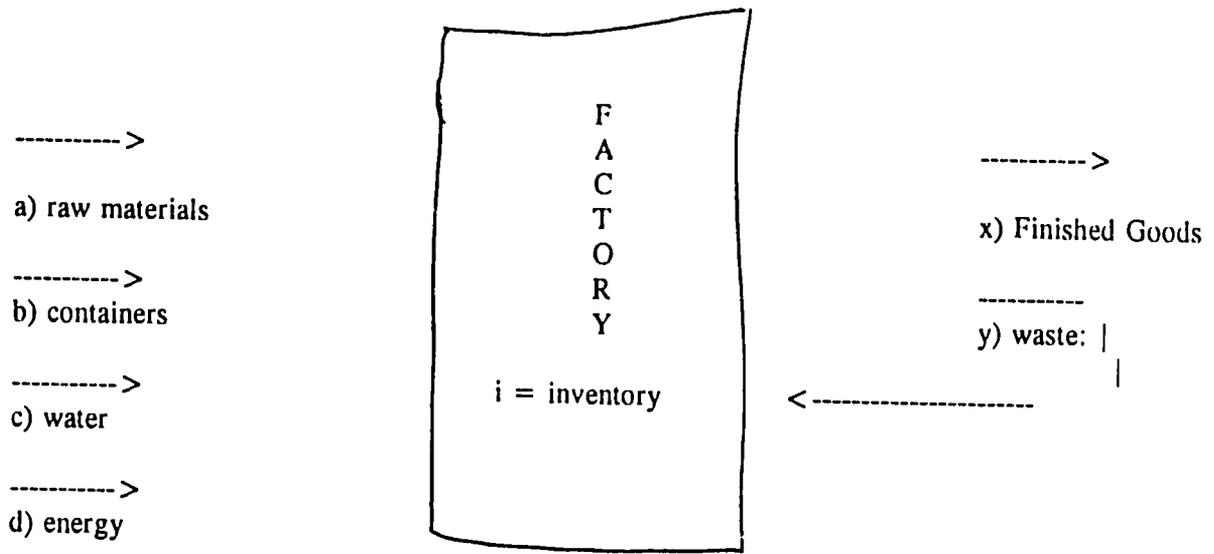
A factory must consider itself to be a total environment - a closed loop - a world in itself.

Each factory should set up a basic mass/balance system -----  
all inputs are to be balanced against all outputs.



$$i_b + a + b + c = x + y + i_e$$

## BASIC FACTORY MODEL



If  $i_b = i_e$

then,  $a + b + c = x$

and  $y = \text{WASTE} = 0$

## IDEAL FACTORY MODEL

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## RECOMMENDED PRACTICES FOR WASTE REDUCTION

### I. MANAGEMENT PRACTICES

- A. Establish waste elimination and concern for the environment as a basic philosophy of the company.
- B. Obtain suitable training for all employees in appropriate waste reduction techniques.
- C. Measure all wastestreams out of the factory and communicate the size and cost of waste disposal to all employees.
- D. Participate in industry-wide technology sharing in waste reduction.
- E. Insist on waste reduction techniques as a basic job requirement for each employee.
- F. Establish a reward or bonus system for all employees based on waste reduction.



## RECOMMENDED PRACTICES FOR WASTE REDUCTION

### II. SALES/MARKETING/PLANNING PRACTICES

- A. Only produce Finished Goods for which there is a market or customer.  
Avoid excess stocks and obsolete product.
- B. Thoroughly understand your customer's specifications.  
Manufacture the correct product.  
Unusable or returned product is a potential waste.
- C. For testing purposes, produce only enough material for a good test.  
Any excess is waste material.
- D. When possible, limit and consolidate your product line. Then there will be less chance of obsolete or excess stock.
- E. Market products which reduce the hazard or amount of your waste during production:  
e.g.
  1. less toxic raw materials
  2. lower solvent content
  3. waste which is more suitable for re-use.

## RECOMMENDED PRACTICES FOR WASTE REDUCTION

### III. LABORATORY AND FORMULATION PRACTICES

- A. Formulate using existing raw materials.  
Minimize the number of raw materials.
- B. Formulate for a minimum of manufacturing steps.  
Less clean-up equals less waste.
- C. Formulate for best possible color match on come-off.  
Fewer tint additions.
- D. Categorize formulas by waste type.
- E. Systematize waste re-use in formulas. (e.g. wash solvent, paint sludge, wash water)
- F. Re-use lab samples, quality control retains, and lab raw material samples.
- G. Regard each waste stream as a free raw material.
- H. Re-use test panels when possible.
- I. Do not use disposable lab containers.
- J. Use lab wash solvents in production.

## RECOMMENDED PRACTICES FOR WASTE REDUCTION

### IV. RAW MATERIAL PRACTICES - Buying, Storing, and Handling

- A. Purchase only quantities of raw materials which will definitely be needed.
- B. Use First-in, First-out (FIFO) inventory control.
- C. Store raw materials under roof.  
Store on an impermeable surface with protective diking/bunds.
- D. Buy only first quality raw materials.
- E. Insist that raw materials suppliers pack and ship in appropriate containers.
- F. Train employees in proper raw material handling.  
Provide proper tools and equipment to minimize the dust and vapor loss.
- G. Maintain a clean raw material storage area.  
Remove and seal broken bags or leaking containers.  
Do not allow pigment dust accumulation.
- H. Provide employees with proper protective equipment from vapors, dust, and noise.  
Minimize distractions to employees.
- I. Provide training and tools to accurately weigh and measure materials.
- J. Empty raw material containers completely.

## RECOMMENDED PRACTICES FOR WASTE REDUCTION

### V. MANUFACTURING PRACTICES - Blending, Dispersion, and Mixing

- A. Keep tanks covered.
- B. Use pumping instead of open pouring.
- C. Use batch ingredients (resins, solvent) to clean equipment, then add to batch.
- D. Sequence batches to minimize equipment cleaning.
- E. Properly disperse pigments -- less need for filtration, less residue waste.
- F. Choose one solvent for all cleaning, such as MIBK or xylene.  
Formulate selected products to use this wash solvent.
- G. Segregate waste stream by product type or category (not color).  
For example, A = alkyd, B = latex, C = acrylic.  
Use for clean-up waste, lab waste, excess raw materials.

## RECOMMENDED PRACTICES FOR WASTE REDUCTION

### VI. QUALITY CONTROL PRACTICES

- A. Pre-tint lab samples for color match - one shot program.
- B. Use as a control point for use of excess raw materials, over-runs, defective product, etc. (maintain an up-to-date inventory of these potential wastes).
- C. When batch retains are no longer needed, add to current production.
- D. Insist that correct standards and test specifications are available for all finished goods. Insist that each batch meets all specifications.

## RECOMMENDED PRACTICES FOR WASTE REDUCTION

### VII. FILLING AND PACKAGING PRACTICES

- A. Fill accurately - by weight if possible.
- B. Whenever possible, use filtration equipment that does not cause disposable waste. Use stainless steel sieves and screens instead of cartridges or bags. Bags cause less waste than cartridges.
- C. Segregate filling waste for re-use.
- D. Segregate cleaning solvent for re-use.
- E. Use high quality containers - avoid leaks, spills, returned stock.
- F. Be sure that the shipper or transporter understands how to handle your product.
- G. When filling, scrape material from the sides and bottoms of tanks to minimize cleaning necessary.

## RECOMMENDED PRACTICES FOR WASTE REDUCTION

### VIII. GENERAL CLEANING PRACTICES

- A. For solvent-based products, select one solvent for cleaning which can be formulated into products for re-use.
- B. Sequence equipment (dispersers, mills, blenders, tanks, straining equipment) to avoid the need for cleaning between batches.
- C. Maintain a generally clean work environment. Dust, spills, poorly cleaned equipment are a safety and health hazard, but also lead to contamination and defective products.
- D. When using water for cleaning, use high pressure spray. Add surfactant or use heated water if appropriate.
- E. Use dirty or partially treated and reusable water for first stage cleaning. Follow with clean water rinse.

## RECOMMENDED PRACTICES FOR WASTE REDUCTION

### IX. WATER USAGE PRACTICES

- A. Recycle non-contact (uncontaminated) process water.
- B. Use partially treated water for first-step washing.
- C. Use treated water (flocculated and settled) as a raw material.
- D. Use residue from treated water as a raw material.
- E. Do not allow rain water to increase the volume of waste water.
- F. Treat and properly dispose of water only as a last resort - it is a wasted resource.

THE LESS WATER USED, THE LESS NEED FOR WATER TREATMENT, THE LESS COST OF WATER.

## RECOMMENDED PRACTICES FOR WASTE REDUCTION

### X. MISCELLANEOUS PRACTICES

- A. Segregate non-hazardous waste to facilitate recycling (yard waste, glass, wood, paper, etc.)
- B. Can raw material containers be re-used for Finished Goods?
- C. If you cannot re-use or recycle a segregated waste stream, can it be a raw material for another company?
- D. Can an industry-wide waste listing and exchange program be organized?
- E. Never lose control of your waste. If you give it away, or sell or exchange it, be certain that you know it is being properly used. Insist on documentation.

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# SUMMARY

WASTE IS NOT GARBAGE -- IT IS A RESOURCE

WASTE DISPOSAL OR WASTE TREATMENT COSTS  
MONEY.

WASTE MINIMIZATION SAVES MONEY.

IT IS OUR DUTY, AS CITIZENS OF THE WORLD, TO  
MINIMIZE WASTE,  
THEREBY PREVENTING POLLUTION, AND  
THEREBY IMPROVING OUR ENVIRONMENT.

## MAKING THE FUTURE HAPPEN - WITHOUT POLLUTION

Calvin C. Henning  
President  
Frost Paint and Oil Co.  
Minneapolis, Mn  
USA

One of the most widely publicized descriptions of Sri Lanka (Ceylon at the time) has come to us from Marco Polo. In his writings he describes it as "undoubtedly the finest Island of its size in all the world." Residents of and visitors to Sri Lanka can still confirm the accuracy of Marco Polo's observations. Indeed, that the Island is one of great beauty and resources, is an incontrovertible fact.

A second fact which is widely known, is that Sri Lanka is well on its way in a program to achieve the status of a newly industrialized country (NIC) within the next several years. As part of the strategy to achieve NIC status, rapid industrial growth is being strongly encouraged. New factories and plants are being built and the output of industry is rapidly growing. Along with this growth in output of goods comes the potential for an unwanted by-product: industrial pollution of water, air, and soil. If not managed correctly, the path to NIC status will be on a collision course with Sri Lanka's inherent beauty and quality of life.

There are numerous examples around the world of unmanaged industrial growth leading to environmental nightmares. My own country, the United States of America, experienced a stellar increase in the standard of living from the late 1800's to the mid 1900's. This increase in standard of living was primarily driven by the engine of industrial growth. But by the 1960's and 1970's the undesirable outgrowths of this rapid industrialization became apparent. Air quality rapidly decreasing - in some cities street lights were turned on in the middle of the day to aid visibility; in many cities, people were warned not to go outside on days of especially heavy smog. In a blatant example of water pollution, the Cuyahoga River within the city of Cleveland, Ohio, actually caught on fire due to its high content of organic pollutants. And in recent years, over 1200 heavily contaminated landfill sites have been identified, which now must be cleaned up at tremendous public and private expense. This clean-up is necessary to prevent recurrences of situations like Love Canal in New York, where many families were found to be living on the site of a former hazardous chemical waste dump, which resulted in substantial harm to their long-term health.

Early recognition of the dangers of un-managed industrial growth should allow Sri Lanka to avoid its pitfalls. Industrial growth and a clean environment are not mutually exclusive. But environmentally responsible growth will require the co-operation of the best and brightest talents in Sri Lanka.

In particular, manufacturing industry and the technical universities must join forces to insure that environmentally responsible growth occurs.

In Sri Lanka today the manufacturing industry has two key needs related to pollution prevention and waste minimization :

1. the need for access to Technology which can be used to reduce waste and prevent pollution.
2. the need for university graduates who have an understanding of the real-life problems faced by industry.

Likewise, it appears that the university system has two key needs which prevent it from being of maximum service to industry :

1. a lack of understanding of the actual conditions and constraints which affect the ability of a factory to change the way in which it operates.
2. a lack of up-to-date equipment necessary to do the development and laboratory work to support industry needs.

On the positive side of the ledger, it appears that a respectful and co-operative atmosphere already exists between industry and academia. What should be strongly considered is a program to strengthen and formalize the ties between industry and the universities.

A key element of such a program could be the establishment of a formal business internship requirement for graduates of the science and engineering curricula. Each graduate should spend a minimum of six months in the employ of an appropriate business. The graduate would be accountable for the results of a specific project at that business. The cost of the internships would be borne by industry; a portion of the costs would provide a stipend for the student, and the remaining portion could be used to provide funds for the acquisition of needed laboratory equipment.

An internship program modelled along these lines would substantially resolve the needs listed earlier of industry and the universities. The university intern would provide an excellent channel for technical information from worldwide sources to his specific industry. In early internships, waste minimization and pollution control projects would be obvious targets.

In addition, the "real-life" work experience gained by the intern would make him a great deal more valuable and employable in industry upon his graduation.

On the other hand, as the interns completed their six month projects and returned to academic studies, they would have a far superior understanding of the various constraints under which an industry must operate, and would be able to inject this understanding into the university environment.

And finally, a source of funds would become available for needed university laboratory equipment, which could also be selected based on a sounder understanding of future industry needs.

In summary, the challenge of industrial growth on an environmentally sound basis is not insurmountable. By taking advantage of the best talents available in academia and industry, Sri Lanka will be able to avoid the environmental consequences suffered by other industrializing countries. An industry internship program should strongly be considered as a tool to create synergism of the talent pools available. By working together academia and industry will insure that Sri Lanka remains "the finest Island of its size in all the world."

The Ministry of Environment and Parliamentary Affairs and the Embassy of the United States of America are pleased to present a symposium on the subject:

Pollution Prevention and Control:  
The Greening of Sri Lanka's Industrialization

19 November 1993  
Colombo Renaissance Hotel

- 9:00 Registration/Viewing of Exhibition in Queen's Court
- 9:50 Invitees take their seats
- 9:55 Arrival of Hon. Minister and H.E. the Ambassador and lighting of traditional oil lamp
- 10:00 Introduction and Welcome: Secretary, Ministry of Environment and Parliamentary Affairs, Dr. D. Nesiah
- 10:10 Address: H.E. the Ambassador of the United States, Teresita C. Schaffer
- 10:20 Address: Honourable Minister of Environment and Parliamentary Affairs and State Minister for Policy Planning and Implementation, Dr. Wimal Wickramasinghe
- 10:40 Video on Pollution Prevention and Control: 3M and the Environment
- 11:00 Keynote Address: Calvin C. Henning, President, Frost Oil and Paint Company, Minneapolis, Minnesota and U.S. Waste Minimization Expert
- Topic: Pollution Prevention and Control Strategies for Sri Lanka: Lessons from U.S. Experience
- 12:00 Lunch
- 1:30 Address: Ranjit Fernando, Director and General Manager of the National Development Bank
- Topic: Financing Pollution Prevention and Control
- 2:00 - 3:15 Panel Discussion and Audience Questions and Answers
- Topic: Pollution Prevention and Control in Sri Lanka's Industrial Growth
- Panel Members:
- \* Padmini Batuwitage, Director Pollution Control Management, Ministry of Environment and Parliamentary Affairs
  - \* Lal De Mel, Director, Chemical Industries (Colombo) Ltd.
  - \* Calvin C. Henning, President, Frost Oil and Paint Company, USA
  - \* David McCauley, Chief of Party, Natural Resources and Environmental Policy Project, (Moderator)
  - \* Sumith Pilapitiya, National Programme Coordinator, Metropolitan Environmental Improvement Project
  - \* Representative of Central Environmental Authority
- 3:15 - 3:30 Closing Remarks by Dr. D. Nesiah, Secretary, Ministry of Environment and Parliamentary Affairs

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**Frost Paint and Oil Corporation**

1209 Tyler Street Northeast  
Minneapolis, Minnesota 55413-1586  
FAX: (612) 789-0308  
Phone: (612) 789-8871

To: Nihal Bastian  
Delmege Forsyth & Co. (Paints) Ltd.

December 22, 1993

Dear Nihal:

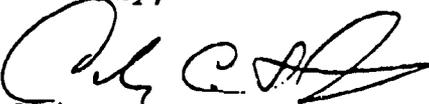
I have some additional information regarding water treatment. Rochester Midland does not have a distributor near Sri Lanka. However, they do have an international office, which can answer your technical questions directly, and ship chemicals for water treatment to you if desired.

Perhaps of more interest to you, Rochester Midland may want to discuss the possibility of a business venture with you in Sri Lanka. I have told them that Delmege Forsyth has many other businesses besides paints; they may be interested in your help in setting up a distribution office in Sri Lanka, to supply water treatment chemicals and equipment to all industries which may need them (paints, pesticides, textiles, leather tanning, food processing, etc..) They could provide initial training and information.

For more information regarding water treatment questions or a possible business venture, please contact:

Glenn Stoudt  
Rochester Midland International  
2800 Veterans Blvd. - Suite 256  
Metairie, La 70002  
Phone: (504) 831-5342  
FAX: (504) 831-1782

Sincerely,



Calvin C. Henning

CCH:ys



CREATIVE CHEMISTRY

Manufacturers of specialty chemicals for institutional • industrial • commercial • food processing • water treatment • personal hygiene

International Division

2800 Veterans Blvd.  
Suite 256  
Metairie, LA 70002Tel. (504) 831-5342  
Fax. (504) 831-1782

December 29, 1993

**VIA FACSIMILE: (612) 789-0308**Mr. Calvin C. Henning - President  
FROST PAINT AND OIL CORPORATION  
1209 Tyler Street Northeast  
Minneapolis, Minnesota 55413-1586

Dear Mr. Henning:

Thanks very much for the correspondence which I received today regarding your Sri Lankan mission.

The project and opportunity look interesting and I will be pursuing.

We look forward to hearing from your friend, Mr. Nihal Bastian.

Based on what I have been hearing about your weather lately, I suppose I could enlist you and anyone else residing in Minnesota for your return trip to Sri Lanka soon.

Thanks again for your assistance.

I will be sure to let you know what may be our results on this project.

Sincerely,

Glenn Stoudt  
Vice President  
International Division

Enclosure

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**CREATIVE CHEMISTRY**  
SINCE 1988

manufacturers of specialty chemicals for institutional • industrial • commercial • food processing • water treatment • personal hygiene

**International Division**

2800 Veterans Blvd.  
Suite 256  
Metairie, LA 70002

January 6, 1994

Tel. (504) 831-5342  
Fax. (504) 831-1782

**VIA FACSIMILE: 699-413**

Mr. N.H.S. Bastian  
DELMEGE FORSYTH & CO LTD.  
297 Union Place  
Colombo 2, Sri Lanka

Dear Mr. Bastian:

Thank you for your fax letter of January 5. We appreciate your interest in our company.

We will send by separate cover the enclosures you require and information on the products related to the business opportunity you described.

Also as you mentioned, the necessary legislation being in place is critical to the demand for a number of products. This would be the case in Waste Water Treatment Chemicals. The marketing of balance of the line in boiler and cooling products, however is not directed by this effluent treatment legislation.

We have enclosed also a floppy disc with the glossary of our products and prices for our distributors.

We discussed briefly with Mr. Henning the possibility of RMC doing a technical and educational seminar regarding the use of the products in various effluent treatment applications for your industry and others. If this is an appropriate venue from your understanding and experience of the local needs, then we would be interested in hearing from you on how we might organize such a program.

We will appreciate hearing from you once you have had the opportunity to evaluate our product line and the opportunity presented.

Thanks again for your interest in our company. We look forward to hearing from you soon.

Sincerely,

Glenn Stoudt  
Vice President  
International Division

cc: Mr Calvin Henning

Enclosures- WE dec, WE dx, S43C, RMI, C17 & 18, WWT 8m

/cn/delmege.001

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