

PN-ABX-404

1995-03-11

**STRATEGIES FOR THE PROMOTION AND SUSTAINABILITY OF THE  
U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT'S  
WASTE MINIMIZATION PROGRAM IN SRI LANKA**

**Colombo, Sri Lanka  
February 25 - March 11, 1995**

**Prepared for:**

**US - ASIA ENVIRONMENTAL PARTNERSHIP**



**WORLD ENVIRONMENT CENTER**

## **DISCLAIMER**

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## I. EXECUTIVE SUMMARY

The United States Agency for International Development (USAID) Mission to Sri Lanka seeks to promote waste minimization (WM) as a strategy for environmentally sustainable economic development. As part of the Mission's program, the World Environment Center (WEC) organized a mission of two WM experts to Sri Lanka in the first quarter of 1995. Donald Brosky, Pollution Prevention Specialist for the 3M Corporation, was the WM industry expert, and assessed WM technical opportunities in Sri Lanka industries, from February 20 to March 4. Burton Hamner, Pollution Prevention Manager for Shapiro and Associates, Inc. was the WM institutional expert and developed a WM outreach strategy, and an approach to increase the sustainability of the WM program. The WEC experts' assignments overlapped by a week, from February 27 to March 10, 1995. Funding and program direction was provided by the U.S.-Asia Environmental Partnership (US-AEP). Another USAID WM mission was conducted the same time in Sri Lanka by USAID's Environmental Pollution Prevention Project (EP3), which is helping the National Development Bank (NDB) of Sri Lanka with implementation of a Pollution Control and Abatement Fund (PCAF). This report is by the WEC Institutional Expert, and includes information and conclusions relevant to the WEC Industry Expert and EP3.

Nine major meetings were held with business and government organizations, and two factory visits were conducted. A major finding was that, although environmental capacities in Sri Lanka are not well developed, there are many industrial and business management organizations with a strong interest in environmentally sustainable development and with the basic business productivity skills needed to conduct WM training, consultancy, and promotion. The business consultants and trainers all saw WM as a logical extension of their current skills and as a new opportunity to market their skills as a service to help industry reduce environmental costs and risks. The editor of Sri Lanka's only all-business magazine saw WM as a relevant topic for his magazine and an opportunity to build circulation through education about this subject.

Based on the meetings held and other observations, it was concluded that the best opportunity for USAID to both promote WM and ensure a sustainable WM program is for USAID to establish a partnership with the National Institute of Business Management (NIBM), a local business training and consultancy organization. NIBM is Sri Lanka's oldest and most active management training organization, whose mission is to improve industrial productivity. NIBM has major training facilities, provides consulting services for productivity improvement, markets its services using a variety of means, and is the manager of the Sri Lanka National Productivity Campaign. It is recommended that USAID work with NIBM to implement a WM program and to support that program with various resources. A draft Request for Proposals and Terms of Reference for a WM institutional partner and an outline of subjects for WM training courses are included as attachments to this report. The Terms of Reference can be

used as a series of action items for USAID to implement in cooperation with a local partner, even if a contractual relationship is not established.

Local officials have expressed concern that environmental business exchanges (EBEs) that provide technical assistance directly to industry have had limited success. Therefore, it is recommended that future EBEs should focus on building institutional capacity through training of consultants and local institutions. Particular emphasis should be placed on training management and industrial consulting companies, of which there are many in Sri Lanka, in methods of marketing and implementing WM in industry.

EP3 is planning to conduct training for banks involved in the PCAF in April 1995. EP3 should ensure that management and industrial consulting companies and the NIBM are included in the training as they are the ones most able to provide WM consulting services as specified by PCAF requirements. To help the Sri Lanka banking community connect to its international peers who are also promoting environmentally sustainable development, EP3 also should include information about international banking programs for sustainable development in the training,

Other specific recommendations included in this report:

- Conduct a local survey on appropriate terminology alternatives to "Waste Minimization",
- Integrate WM into other USAID programs,
- Conduct WM Exchange Program with India,
- Position USAID as the national resource for information on international environmental management standards and organizations,
- Promote WM to U.S. companies sourcing from Sri Lankan industry,
- Promote the concept of eco-industrial parks, and
- Promote community Green Star programs.

Funding for this project was provided through a Cooperative Agreement between the World Environment Center (WEC) and the United States-Asia Environmental Partnership (US-AEP), United States Agency for International Development (USAID).

## II. INTRODUCTION

### A. Project Background

The United States Agency for International Development (USAID) Mission to Sri Lanka is implementing the Natural Resources and Environmental Policy Project (NAREPP), a six-year project to assist the Government of Sri Lanka (GOSL) achieve its environmental goals. NAREPP is implemented with contracted assistance from the International Resources Group Ltd. (IRG). One component of NAREPP is urban and industrial environmental management. NAREPP's activities in this component focus on development of policies and programs for pollution prevention and control with assistance provided through IRG and the U.S.-Asia Environmental Partnership (US-AEP).

NAREPP had initiated an industrial environmental audit program in March 1993 with USAID's Technology Initiative for the Private Sector (TIPS) project. Subcontractors to IRG conducted factory assessments and provided training to Sri Lankan professionals, introducing concepts of waste minimization (WM).

Around the same time, the World Bank's Metropolitan Environmental Improvement Project (MEIP) introduced the concept of a national waste minimization program (NWMP) for Sri Lanka. MEIP also used a team of consultants to conduct environmental audits, which focused specifically on water pollution, at twenty companies in the Ratmalana and Moratuwa suburbs south of Colombo. The consultants prepared reports regarding environmental conditions and WM opportunities at the companies.

A key proposed element of the NWMP is a financing system for "green" investments, including WM, pollution control, relocation of highly polluting businesses to industrial estates with pollution control systems, and pollution monitoring equipment. This proposal was adopted by the National Development Bank (NDB) of Sri Lanka which has initiated the Pollution Control and Abatement Fund (PCAF). Funding for the PCAF has been provided by a German donor agency, KfW, for the amount of U.S.\$5.5 million, including \$1.5 million for technical assistance (based on current exchange rates for deutschemarks (DM)). To manage the program, NDB has established an internal Environment Unit. Several commercial banks are participating in the program, along with NDB.

The PCAF will provide financing assistance for technical consultation and for equipment purchases. A company can receive a grant to cover 75% of the costs, up to DM20,000 (about U.S.\$12,000), to hire consultants to identify and design systems for pollution reduction. The grants explicitly require that WM options be considered before pollution control options are explored. NDB's Environment Unit must approve consulting contracts and terms of reference before grants are authorized. Once a technical design

has been developed, the company can apply for a loan of up to DM200,000 to purchase and install the needed equipment. Interest rate for the loan will be at the annual rate of inflation (currently about 8.4%), which is equivalent to zero real interest. In comparison, regular commercial loans in Sri Lanka currently cost about 20% interest. Loan periods are up to seven years and include a one-year grace period. NDB's Environment Unit also will review and approve loan applications. If grant and loan applications are made through participating banks other than NDB, they must obtain clearance from the Environment Unit. NDB has developed a draft grant and loan application form.

A key feature of the PCAF is that preference will be given in technical design and equipment for WM options. Applicants and their consultants will have to demonstrate that WM options have been thoroughly evaluated before financing for pollution control or "end-of-pipe" solutions can be considered.

In March 1994, a team of WM experts from Minnesota, U.S.A., visited Sri Lanka under the sponsorship of the World Environment Center (WEC) and US-AEP. The "Minnesota Mission" visited factories and various officials and organizations, with assistance from NAREPP/IRG and MEIP staff, and produced a report recommending mechanisms to help institutionalize WM in Sri Lanka. These recommendations included establishing an advisory board, a demonstration and applications testing center, and a National Waste Minimization Institute.

The Minnesota Mission provided advice to NDB regarding implementation of the PCAF. To continue assistance to NDB, in early 1995 the USAID mission entered into agreement with USAID's Environmental Pollution Prevention Project (EP3). EP3 is a U.S.-based program to provide pollution prevention and WM assistance in countries around the world. At the time of this writing, EP3 is conducting a mission in Sri Lanka to help NDB evaluate proposals from companies seeking PCAF financial assistance and to improve the proposal application documentation. Twelve inquiries from industry have been received to date by NDB.

Other international aid agencies also are promoting WM and environmental management in Sri Lanka. The World Bank's MEIP mission has already been mentioned. The United Nations Industrial Development Organisation (UNIDO) is conducting factory environmental assessments around Colombo using foreign consultants. To minimize overlap of effort, USAID and UNIDO have agreed to divide up the priority industry sectors for assistance. USAID is concentrating on food processing, paint formulation, and chemical formulation. UNIDO is covering metal finishing and plating, textiles, and distilleries.

## **B. Background of This Report**

USAID seeks to provide additional technical assistance to NDB and to promote the PCAF to industry. USAID, through the US-AEP, provided funding to send two experts to Sri Lanka for this purpose. The experts were identified and trip arrangements were made by the WEC.

The WEC Industry Expert was Donald O. Brosky, Pollution Prevention Specialist for the 3M Corporation's Environmental Services and Technology division. His assignment was to review the reports on the twenty companies audited by MEIP, visit the factories as needed, and recommend candidate industrial facilities for WM projects. Recommended facilities could apply for PCAF financing of their projects. Upon his arrival in Sri Lanka, the number of companies to review was reduced to five, because many of the original twenty were textile companies and the USAID mission had agreed that UNIDO would be covering that industry sector.

The WEC Institutional Expert was Burton Hamner, Pollution Prevention Manager for Shapiro and Associates, Inc., of Seattle, Washington. His assignment was to develop an institutional mechanism for a pollution prevention outreach program in coordination with the EP3 team assisting the NDB with the PCAF loan process and review of applications. The WEC Institutional Expert was expected to conduct facility visits to assess the management's capability and willingness to be involved in an outreach program, and to develop recommendations on a general structure for an outreach program. It was also expected that the WEC Institutional Expert would make a follow-up visit to Sri Lanka to help the EP3 team assist industries with implementation of WM programs being funded by the PCAF.

USAID mission staff members indicated to the WEC Institutional Expert that they were concerned about sustainability of the EBE program being used to promote WM; they seek a local organization to organize and host future exchanges and to provide continuity in between the visits. The WEC Institutional Expert was asked to review the plan for future exchanges and make recommendations to improve the sustainability of this particular area of the mission program.



### **III. MEETINGS HELD AND FACILITIES VISITED**

#### **A. Natural Resources and Environmental Policy Project/Environmental Pollution Prevention Project - February 27, 1995**

A coordination meeting was held by David S. McCauley (NAREPP/IRG Chief of Party), Jim Gallup and Raghu Raghavan (EP3), M. Thiruchelvam and Burton Hamner. Objectives and procedures of the PCAF were discussed. Mr. Gallup stated his concern that the PCAF application does not emphasize the technical assistance grant component strongly enough. Lack of capability among local environmental consultants to provide WM assistance was discussed. Mr. McCauley expressed interest in receiving information on the design of "eco-industrial parks".

#### **B. Ceylon Institute for Scientific and Industrial Research - February 27, 1995**

The Ceylon Institute for Scientific and Industrial Research (CISIR) is a quasi-governmental organization that conducts applied research for industry. CISIR includes the Chemical and Environmental Technology division, which was stated to be the leading environmental testing facility in Sri Lanka. The division conducts studies for industry on a fee basis, including design of pollution control systems. It also participates in WM audits and assessments of local industries with foreign experts. The division fields 20 to 30 calls a month from industries seeking pollution control advice and can respond to 3 to 4 calls in detail. The division has a business development approach, and will waive fees for preliminary assessments if the staff is confident that major work for the division will result. The division has done two major pollution control systems projects and a number of consultations.

CISIR also has started and is now a partner in the Industrial Technology and Information Market Network (ITMIN). ITMIN is a private organization whose shareholders include several government agencies, the National Development Bank, and CISIR. It plans to provide information on technology and market opportunities to industry on a fee basis, and to develop on-line linkages to a wide range of industrial and market information databases, including Internet and CD-ROM sources. ITMIN will market its services using direct mail, advertising, and other means. The implementing organization for ITMIN is INFOMART, a Colombo company providing consumer information on products and services. ITMIN definitely plans to provide information on pollution control and WM technology and services.

The CISIR staff participates in WM audits and visits with foreign aid agencies including USAID. CISIR appears to have potential as a partner for further technical assistance but it faces constraints on expansion of staff and new business development because

of required government hiring and budgeting procedures. It cannot be as responsive as a private business or consultant.

### **C. National Development Bank - March 1, 1995**

A meeting was held with the chairman of the National Development Bank (NDB) to provide some background information on the EP3 assistance to the PCAF design and implementation and to obtain information about industrial financing conditions and outreach opportunities. According to the chairman, industry and other investors commonly expect a return of 20% to 25% on investments. High interest rates discourage investment in new equipment. Industry prefers to buy used equipment whenever possible; a discussion ensued regarding importation of inefficient and pollution-creating used equipment and how such importations might be modified. Outreach programs were discussed. Industry executives belong to a wide range of organizations, the choice being often influenced by cultural factors.

NDB has decided that there is a market opportunity in environmental consulting and has entered into a joint venture with ERM Ltd., an international environmental consulting company. NDB's intention is to participate for several years until the venture is self-sustaining and then withdraw from the venture.

A subsequent meeting was immediately held with representatives of commercial banks participating in the PCAF. They were advised of the pending EP3 training on the PCAF. Many of the bankers had engineering or other technical backgrounds, which was somewhat of a surprise at first, but explained by the fact that banks provide among the best-paid jobs for technically trained people. They expressed interest in having an orientation session for their CEOs and general managers included in the upcoming training. The bank representatives also indicated that they receive regular professional training in banking practices from international organizations, including the World Bank and USAID. A USAID banker training event is held annually in Sri Lanka and is considered an important opportunity.

### **D. Ceylon National Chamber of Industries - March 1, 1995**

EP3 representatives and Burton Hamner met with the managers of the Chamber. It has about 350 members, all from manufacturing companies. Its board of directors includes representatives from several government agencies such as the Board of Investment. The Chamber acts as a spokesperson for industry and has been promoting concepts such as quality management. It recently retained a consultant to visit member companies and promote quality management and ISO 9000. The Chamber also has a new environmental committee.

Chamber managers said that industry in Sri Lanka is under great pressure to modernize and become more efficient because import tariffs are being eliminated, exposing them to intense competition, especially from India. They said that there are numerous industry consultants available, in contrast to the low number of qualified environmental consultants. They indicated that the National Institute of Business Management was a coordinating and general body for the industrial consulting community.

The Chamber is participating in a UNIDO program to help ten companies restructure, which will include a wide range of business practices such as accounting, quality control, and purchasing. We indicated that WM would be a logical addition and the Chamber managers agreed. They also said that it would be helpful if industries could post information about their ongoing environmental improvements, demonstrating that they are indeed gradually improving. They were very interested in receiving information about Green Star programs, in which regulatory or other agencies award a certificate of accomplishment for environmental achievements and which can help their public image. They are also interested in receiving information about ISO 14000, which they had not heard about.

#### **E. United Nations Industrial Development Organisation Pollution Reduction Programme - March 1, 1995**

EP3 representatives and the EBE team met with Andrew Milsted, Chief Technical Advisor for the United Nations Industrial Development Organisation (UNIDO) Industrial Pollution Reduction programme. UNIDO's approach to technical assistance is different from that of USAID; UNIDO experts work intensively and repeatedly with a few companies, rather than visiting many companies only once. Milsted described the extensive WM outreach and technical assistance programs already in place in India and showed a publication using a cartoon format to demonstrate WM examples and approaches that was developed by the National Productivity Council of India, which is UNIDO's main institutional partner for WM promotion.

#### **F. ALUCOP Cables, Ltd. - March 2, 1995**

Donald Brosky and Burton Hamner visited the ALUCOP Cables, Ltd. facility. The company manufactures a variety of electrical and tension cable, ranging from household electrical wire to heavy aluminum power cable. ALUCOP has been in business for 16 years and has 150 employees. The company disposes of very little waste to the environment because almost all of its metal, plastic, paper and oil wastes are purchased by others for recycling. ALUCOP has a partner company next door that purchases waste plastic bags and scrap for 15 rupees per kilo, and melts and extrudes the waste material into plastic pellets for recycling.

The company is very quality conscious and meets technical standards established by the National Standards Institute. It is planning to achieve ISO 9000 certification for its quality system. Management and technical training is regularly purchased from several organizations, including the Institute of Management and the Employees Federation. Training seminars cost them around 2,000 rupees per day for events held at hotels. Seminars have between 70 and 100 participants, thereby generating around 200,000 rupees per day for the promoters. Marketing of seminars is done by direct mail; ALUCOP managers showed us a number of flyers and brochures for training recently received. ALUCOP is a member of the National Chamber of Industries.

ALUCOP has received assistance in the past from the International Executive Service Corps, which it held in the highest regard. The company is visited several times a year by its insurance company, which provides some advice on risk reduction. The company president is an active member of the Rotary Club of Colombo West.

WM opportunities at ALUCOP include reduction in the wastage at the beginning of cable runs, where plastic sheathing is not uniform, and possibly in the recycling of drawing oils used for aluminum cable extrusion. However, none of these is an immediate environmental improvement opportunity because most waste is sold to recyclers. Mr. Brosky will look into opportunities for reducing drawing oil use. The company has a full-time quality manager who is always working on reducing waste cable, even though waste is sold for recycling.

#### **G. Mona Plastics Ltd. - March 3, 1995**

Don Brosky and Burton Hamner visited the Mona Plastics factory in Ratmalana. Mona Plastics does injection molding of high-density polyethylene items such as toys and trinkets, which are painted by hand and by spray. It also does some aluminum sheet forming of household goods. A meeting was held with Rohan Karanuratne, Chief Engineer, who provided a tour of the facility. One of the company's major customers is the Hallmark Company, which purchases large quantities of small plastic gift items. Because of environmental concerns of American consumers, Hallmark has imposed a requirement for the use of lead-free paint on its products and the use of bubble-wrap in packaging instead of styrofoam.

Several years ago, the company was the subject of complaints from neighbors about paint fumes. This led to a threat from the Central Environmental Authority (CEA) of Sri Lanka to shut down the company for air pollution violations. In response, the company installed a vapor collection system at the spray-painting benches and purchased a vapor scrubber, which uses water spray to capture particulates and solvent vapors. The water is recirculated, and sludge is disposed of along with other company wastes. Mona Plastics spends about 1,200 rupees a week for waste disposal by a private company; Mr. Karanuratne indicated that he did not know what was done with the waste once it was removed.

The other main environmental discharge at the company is water from the aluminum cleaning process. Aluminum is cleaned with sodium hydroxide, which is flushed with water. The water is recycled until it becomes too caustic, at which time it is neutralized with small quantities of nitric acid and disposed of to the sewer. Wastewater discharge was not considered a problem or a significant expense by the company. Solid wastes mostly consisted of packaging from supplies, such as bags that contained polyethylene pellets, and empty paint cans.

The following opportunity for source reduction of hazardous chemicals at the company was observed. Many of the plastic parts are spray-painted by young women who hold parts in a mask or with tongs while they spray them. They sit at long benches that house a vapor collection system along its middle. Each seat has an air intake, in front of which the part is held while it is painted. Very few of the women wore protective masks over their faces, and clearly they were inhaling some quantities of paint fumes and particles throughout their painting shifts. No one was observed to be wearing gloves. Plant representatives indicated that training is done by assigning a new worker to a senior one who provides on-the-job training. A set number of parts and a set amount of paint is provided to each worker each day. Apparently, there is no system in place to measure painting efficiency other than completing the painting of all parts using the amount of paint provided. There were at least one hundred women doing spray painting, and there must be some range of variability in skills and efficiency. It was observed that in painting small pieces most of the sprayed paint went onto the mask holding the piece. It was not possible to inspect the paint guns, but it appeared that they were all of the same type. Paint guns, tools, and hands are cleaned using an inexpensive paint thinner. The company has a distillation unit to recycle the paint thinner.

The amount of paint being used by the company could be measurably reduced by careful study of the spray painting process. Airless spray guns could be used that would increase transfer efficiency. Spray patterns from the guns could be adjusted to fit the size of the parts being painted, thereby reducing overspray onto the masks. Spray pressure could be reduced so that less "bounce-back" occurred. The actual amount of paint used by each worker could be recorded and posted daily so that they could see who was the most efficient painter. That person's technique could then be studied and emulated by the others. The solids content of the paints could be increased so that less solvent is used. Health risks could be reduced by providing air masks to the workers, and perhaps by increasing the draw pressure of the vapor collection system. The latter method could reduce exposure to the vapors, which undoubtedly reduces productivity toward the end of painting shifts. Another concern was the paint formulation. The solvents used could be modified to reduce health risks. Although plant representatives indicated that the paint was lead-free, it is highly likely that some colors contain other toxic metals such as cadmium or chromium. The paint content specification sheets were unavailable for our inspection.

The key point for program development illustrated by this company is that the main area for environmental improvement appears to be in reducing chemical use, rather than reducing environmental discharges. Later, it was learned that this company would be ineligible for the Pollution Control and Abatement Fund because its discharges to the environment were not significant. However, resource efficiency and worker health might be significantly improved through application of WM techniques. Discharge of solvent vapors to the air could also be reduced. Such opportunities should not be overlooked because of an institutional program bias toward wastewater and solid hazardous waste discharges.

Mr. Karunaratne was asked about participation in training and outreach programs. He said they sent managers to training at the Rubber and Plastics Institute, and had paid 40,000 rupees per person for classes held on Saturdays over several months. He expressed a low opinion of the management training provided by institutions in Sri Lanka because, in his opinion, it was not practical for his company's needs. He said that training opportunities should be communicated to his board of directors or the general manager, since they had to approve such activities. They have used an energy consultant in the past, paid him around 30,000 rupees for his services (not including equipment) and had achieved significant savings in energy costs through their equipment upgrades. Mr. Karunaratne recommended the Board of Investments and its list of consultants as the place he would go if he needed a consultant.

#### **H. National Institute of Business Management - March 6, 1995**

A meeting was held with Mr. S.M.J. Neangoda, Director of Consultancy for the NIBM, at his office. NIBM was established in 1968 with support from UNIDO and the International Labor Organization. It was incorporated in 1977 and is now a self-sufficient institution. Its governing council is composed of senior business executives from banking, accountancy, and industry. The mission of NIBM is to improve the competitiveness of Sri Lanka enterprises by enhancing productivity through development of management skills and systems. It is an independent organization and, according to Mr. Neangoda, can undertake any projects that it considers worthwhile and sufficiently remunerative. There are no civil service or other constraints on hiring staff or consultants or in new business ventures.

NIBM provides a wide range of training courses that covers business skills such as computers, accountancy, and productivity techniques. Certificates and diplomas are offered. Participants are generally lower- and mid-level managers, but there are a number of courses targeted at senior executives as well. Courses cost around 2,000 rupees (around U.S.\$40) per day. In 1994, NIBM offered a short course (three half-days) in Waste Control, "to create initial awareness of waste control among owners and managers of small and medium scale industries and business." The fee was 1,800 rupees per person. The instructor was an NIBM faculty member with a background in chemical engineering and industrial project management.

During the visit, the three-story facility was very busy, with hundreds of people participating in classes. NIBM also provides consulting services. Mr. Neangoda said that there is a full-time consulting staff of about 30 people. They provide preliminary assessments at no charge and then negotiate contracts with clients. Projects cover a wide range of management systems development, such as strategic planning, recruiting, information systems, and productivity analysis.

NIBM has been designated the National Productivity Organization and is spearheading a national productivity campaign. Mr. Neangoda said that 1996 is to be the "Year of Productivity" for Sri Lanka, and that NIBM will manage its national promotion. NIBM, in partnership with the Ceylon Chamber of Manufacturers, is sending a proposal to UNIDO to provide consultancy services for the restructuring of ten companies, which will include a wide range of business improvements. NIBM has done consultancies in cooperation with CISIR, which provides technical and industrial laboratory resources.

Mr. Neangoda and the WEC Institutional Expert discussed WM and its applications to productivity at some length. Mr. Neangoda expressed interest in having training on the subject made available to the faculty and consultants of NIBM. He also claimed that NIBM was Sri Lanka's premier business skills training organization, with more flexibility and applications orientation than other business education institutions, such as the Post-Graduate Institute of Management, that tend to have academic orientations. Thus, according to Mr. Neangoda, NIBM is the institution that would be most appropriate for a partnership with USAID to promote environmental management skills to the business and consulting community. He said that the first requirement for establishing a linkage is to develop a concept paper and submit it to the governing council for approval. Then details could be worked out with USAID. He emphasized the entrepreneurial capacities of NIBM, which enables NIBM to set up any kind of partnership or program. For example, USAID could establish an office in NIBM to manage a WM training, promotion and consultancy program.

#### **I. USAID Private Enterprise Program - March 6, 1995**

The WEC Institutional Expert met with William S. Foerderer, a Private Enterprise Officer for the USAID Sri Lanka mission. He identified three areas where WM would be helpful to his office. First, the Technology Initiative for the Private Sector (TIPS) program provides grants to companies for business development, and technical assistance volunteers through the International Executive Service Corps (IESC). Funding may be available to companies to purchase, install, and demonstrate clean technology alternatives to current polluting processes. IESC volunteers could help companies with WM projects.

Second, the Promotion of Private Infrastructure (PPI) project seeks to help the private sector develop infrastructure in areas such as ports, telecommunications, transportation

and housing. About \$1 million is available for technical assistance. Mr. Foerderer stated that there is a major need for competent environmental analysis of private sector projects and that the environmental impact assessment process in Sri Lanka is not very adequate. The WEC Institutional Expert advised him that two U.S. organizations, the American Planning Association and the American Public Works Association, have extensive environmental analysis and education capabilities and that they may be good choices for institutional partnerships with the PPI project. A discussion was held regarding opportunities for WM in certain infrastructure projects, particularly sewer systems. Technical and financial assistance on water conservation can significantly reduce discharges to sewer systems, thereby reducing required capacities. In energy projects, energy conservation assistance may also reduce required capacities.

Third, Mr. Foerderer is responsible for recruiting a local engineer as a technical representative for US-AEP. He expressed concern that the "tech rep" would be perceived only as a salesman of U.S. environmental equipment and services. A discussion was held regarding the possibilities for recruiting an experienced industrial engineer who understands WM techniques and who could advise local businesses on WM methods, as well as provide leads to equipment and services. Mr. Foerderer expressed interest in obtaining a copy of the *Directory of Industry Environmental Information Resources*, recently published by the ASEAN Environmental Improvement Program and US-AEP, and in receiving information about the Business Charter for Sustainable Development and the ISO 14000 Environmental Management Standards. I agreed to supply some information via WEC.

#### **J. Lanka Business Week Magazine - March 7, 1995**

The WEC Institutional met with M.S.S. Fernandopulle, Editor of *Lanka Business Week* magazine. It is about six months old (founded in the fall of 1994), with a circulation of around 5,000, 75% via subscription. The readers are largely businessmen and business school students and faculty. The publisher, Island Press, also publishes a line of Sinhala-language textbooks for middle school children. It entered the business publishing field because it saw demand for a national magazine focused only on business. The only other similar magazine identified was *Lanka Monthly Digest* - "Sri Lanka's Business and Leisure Magazine," which contains a mix of business, travel and leisure material.

Mr. Fernandopulle says he gets material from free-lance writers, who get about 300 rupees per article, and from articles contributed by businesses. A full-page ad (black-and-white only except for covers) costs 15,000 rupees; a color cover ad is 25,000 rupees. The WEC Institutional Expert gave him background information about the USAID WM project, the PCAF, WM in general, and contact information for local representatives of USAID, UNIDO, MEIP, and ITMIN. He took copious notes and said that he was very interested in the topics. He is interested in running contributed articles on WM and would attend press briefings and read press releases on the subject. He also



picked up on the idea of industry-specific WM stories, perhaps run as a series that could be advertised to build circulation. He also wanted information about WM case studies from India, which he recognized was most relevant to Sri Lanka. He said he would assign story responsibility to some of his free-lance writers.

This meeting clearly demonstrated the need for a briefing package on WM that outlines the concepts, examples, programs, and contacts for Sri Lanka. If such a package had been available for the editor, there is little doubt that an article would appear in the magazine within a month or two. As it is, a reporter now must go around and get the information from the programs if a story is to appear.

#### **K. Metropolitan Environmental Improvement Programme - March 9, 1995**

The WEC Institutional Expert met with Dr. Ravi Pereira, National Program Coordinator for the MEIP. MEIP is focusing on several urban environmental issues. Two of them which have significant interest for WM are community involvement and empowerment for environmental improvement, and development of industrial estates with common waste treatment systems. A discussion was held about community "Green Star" programs to acknowledge businesses that are making environmental improvements, and eco-industrial parks, which are designed from the beginning to reduce waste by promoting waste exchange, energy recovery, water reuse, and cooperative technical assistance.

## IV. FINDINGS

### A. Industrial Environmental Awareness in Sri Lanka

Industry in Sri Lanka is rapidly becoming aware of environmental concerns and appears to be very interested in cost-effective strategies for managing them. Every person contacted by the WEC Institutional Expert was interested in WM and agreed that it was an important concept to promote. At NIBM, the WEC Institutional Expert was asked to explain why WM was any different from basic productivity improvement (the answer was that WM has explicit environmental goals and is prioritized based on environmental risks and costs). NIBM management and others also agreed that it is hard to motivate industry to WM, or to productivity enhancement for that matter, because industry doesn't clearly see the financial advantages, only the implementation difficulties. However, the possibility of using WM to avoid the need for environmental licensing and regulation was clearly seen as a new and marketable benefit for industry, particularly by NIBM. Industry appears to readily understand the purpose of WM, but not how it would necessarily apply to its situation. There is evidence of a market for WM education in that NIBM offered a course on waste control in the previous year.

Nearly everyone who the WEC Institutional Expert spoke with was aware of ISO 9000 Quality Management Standards and that the Sri Lanka Standards Institute is vigorously promoting them. The businesses visited had quality control programs. No one other than international agency representatives had heard of ISO 14000 Environmental Management Standards. No one had heard of the International Chamber of Commerce's Business Charter for Sustainable Development either. There appears to be an opportunity to increase industry environmental awareness through promotion of ISO 14000 and the Business Charter as business standards important to Sri Lanka, an export-oriented country.

### B. Waste Minimization Promotional Opportunities

#### 1. Sri Lanka Business Media

WM appears to be an interesting subject to the editor of Sri Lanka's only all-business magazine. It is likely that other editors and business commentators would be very interested as well, especially if case studies are provided. However, using these channels effectively requires preparation and provision of articles or briefing packages that have all the information that the editors need immediately. Otherwise they have to assign reporters to get the story. They could benefit from press briefings, but less so from press releases (which usually require follow-up by reporters in order for them to write good feature articles).

## 2. Commercial Industrial Consultants

There are a large number of industrial and management consultants in Sri Lanka; the business phone directory has 48 entries under "Management Consultants", and there are more consultants listed under most industrial headings, such as "Textiles". In contrast, there are no listings for environment or pollution-related organizations. Industrial and management consultants are an obvious target for WM outreach, since they have the general skills needed to market and implement WM as a productivity improvement concept. They also would benefit by the new marketing angle presented by WM, in that it helps clients avoid regulatory problems and pollution control costs.

## 3. Management training organizations

There are an increasing number of business training organizations. Seminars are given in hotels and in various institutes on management methods, including productivity improvement and total quality management. It appears that a business that wants training in common business subjects has no trouble finding a good match for cost, location, etc. A total of 11 organizations are listed under "Schools" in the telephone directory that clearly focus on business management training; the universities also have business programs. WM could logically be incorporated into these programs through a "train-the-trainer" approach, and they would benefit from a multiplier effect.

One opportunity of special interest to USAID is the management training being provided to Sri Lanka under various USAID private sector development programs. We were informed by local bankers that they receive annual training in banking practices from a USAID program. Additionally, USAID advisers have played a major role in establishing the country's stock exchange. If training in WM concepts and benefits was provided to these USAID advisers and trainers, it would reach high-level players in the Sri Lankan economy, who in turn could promote the idea that WM is good business to the clients they advise. Such training should not be technical, but instead should focus on the competitive advantages to business of avoiding environmental regulation and pollution control costs, and improving public image and stakeholder relations. Participants could be taught where to go for more extensive training and technical assistance so that they could recommend these opportunities to their clients.

## 4. Examples from India WM programs

In India, there are now a fair number (more than 50) of companies that have participated in WM assistance programs, saved money through WM implementation, and been documented as case studies. These are clearly the most relevant possible examples for Sri Lankan industry. The case studies could be collected and published, and exchange programs established with Indian WM promotional organizations.

## 5. Insurance Companies

One of the companies visited indicated that it is audited semi-annually by its insurance company. Insurers have a major vested interest in WM and reduced environmental risk, and it may be that they regularly visit all their industrial clients in Sri Lanka. If so, insurers would be a major resource for WM promotion, especially if they give discounts on premiums for vigorous WM programs that reduce potential environmental liabilities.

## 6. Recognition Programs

At the Ceylon National Chamber of Manufacturers, the directors were emphatic that there should be a positive reinforcement theme to WM promotion. The WEC Institutional Expert informed them about the various Green Star programs in U.S. communities, which give a green star or similar certificate of recognition to companies that have achieved various, relatively simple WM goals, such as recycling 50% of their solid wastes. The directors thought this was an excellent idea and one that would be very well received in Sri Lanka because of its relatively small society and the importance placed upon status and public image. WM could be promoted through such a program if a respected local institution established appropriate criteria, awarded certificates or green stars, and publicized those who received the awards. Information about U.S. programs of this type should be studied and discussed with appropriate groups.

## 7. Incorporate WM into Other USAID Programs

The opportunity to incorporate WM into the banker training being provided by USAID in Sri Lanka was discussed above. There are ten environmental projects other than WM identified in the US-AEP program matrix document for Sri Lanka. There also are environmental projects and impact assessment requirements, and business development projects, under the Private Sector program. These projects could be reviewed by a creative WM expert, applications for WM identified, and procedures and methods for integration developed. Since these projects are all expected go forward or already are under way, incorporating WM into them would provide extended promotion of WM and potentially some direct technical assistance.

In summary, the major opportunities for a WM outreach program lie in education of the organizations that make a business out of educating business: schools, consultants, and business publications. WM can be promoted as a logical extension of well-known business practices, with the environmental advantages of reduced pollution control costs, reduced environmental risks, and increased market share. Another major opportunity lies in establishment of public recognition programs. Businesses may not really believe that WM is good for them at first, but they want the green star because others have it. This helps overcome the initial obstacle of businesses saying, "But what's in it for me?" Once they implement WM practices, the savings and good morale usually lead to sustained efforts.

## **C. Opportunities for Increasing Sustainability of USAID Waste Minimization Program**

### **1. Issues for Sustainable Implementation**

USAID staff members commented during this assignment that providing occasional WM experts to visit factories may not be very effective because the visits are intermittent and no overall strategy is apparent to the local participants, who are fully aware of the large expenditures for these short visits. In addition, the recommendations of U.S. experts are often not implemented because the causes of the observed problems lie in management practices that can be changed only through top-level motivation and sustained involvement.

At the same time, USAID is providing training with high participant self-interest, such as banking and privatization financing. In these programs the participants leave with a burning desire to implement their own activities. Yet the sponsors apparently are unaware of the efforts elsewhere within USAID to promote WM and do not include WM in their training. Business management training also is being provided by other international aid agencies, such as the World Bank. USAID could survey the agencies to identify upcoming training that the agencies will offer, and then coordinate with them to ensure that some promotion of WM takes place.

## **D. Analysis of WM Program Alternatives**

There are several alternatives to increase the sustainability of the USAID WM program in Sri Lanka. Each is discussed here with pros and cons, and the recommended approach is presented in the Conclusions section.

### **1. "Business as Usual"**

The USAID-US-AEP coordinator, Mr. Thiruchelvam, could continue managing all aspects of the program, including identification of projects, coordination of visits by EBE experts, and promotion to local institutions. Increased coordination with other USAID programs, such as the private infrastructure investment program and the banker training program, would be appropriate.

**PROS:** USAID would retain full control over the WM program and would have the most direct access to U.S. WM expertise through organizations such as WEC and EP3. Internal coordination with other USAID programs could be ensured.

**CONS:** USAID staff do not have the resources to manage all the logistics of a WM program and cannot expect to create a program that is "owned" by local industry by managing the program without help.

2. Stimulate Environmental Consultant Development

The members of the fledgling environmental consulting community could be assisted with training and resource materials to include and incorporate WM into their services.

**PROS:** There is increasing demand for environmental services, particularly in the area of pollution control and environmental impact assessment. Environmental consultants are eager to receive support and could be considered to be entrepreneurial in spirit.

**CONS:** There are very few environmental consultants available. Most importantly, environmental consultants seldom have industrial production or management backgrounds and usually do not know how to market services based on return on investment for the client. Instead, they market least-cost engineering solutions to compliance problems. They would require extensive training with outside experts in the basic strategies for WM, as well as in marketing of value-added services.

3. Establish a New Waste Minimization Institute

USAID could provide funding and training to create a new organization that would implement outreach, training, and consultancy activities. This WM Institute could be modeled on several U.S. organizations that conduct similar activities.

**PROS:** The new organization would be solely dedicated to WM and would be highly responsive to USAID and other national and international WM assistance efforts. It would not be distracted by other activities and could catalyze efforts nationally through coordination and task implementation.

**CONS:** Setting up a new organization is very difficult and requires extensive background research on potential managers and advisors, locations and facilities, funding requirements, etc. The organization could be perceived locally and internationally as a "creature of USAID," not an objective organization with truly patriotic intentions. It would have to compete with numerous other local organizations for the attention of business and would experience a long awareness-building period, which would create many opportunities for political and financial conflict.

#### 4. Establish a WM Program in an Existing Local Institution

USAID could help a local institution with interests similar to WM, such as a business improvement training and efficiency consulting service, to incorporate a WM element into its programs.

**PROS:** A new organization would not have to be established. Name recognition for the existing institution would (hopefully) already exist, and mechanisms for training, marketing, and consultancy would already be in place. Political and funding issues could be readily identified and incorporated into planning. USAID could implement the WM program under a standard contractual relationship. The best possible partner institution could be obtained through a competitive request for qualifications.

**CONS:** An existing institution would already have a mission and program, and WM could be neglected despite good intentions. Effectiveness could be compromised if the institution has existing funding or political problems or if it is perceived negatively among the business community. It would almost certainly be perceived as not neutral by one or more stakeholder groups, since the institution would have a previous charter that was not focused on WM.

## **V. CONCLUSIONS**

To achieve its dual goals of promoting WM through outreach and to increase the sustainability of the WM program, USAID is advised to establish a partnership with a local organization that can assist with both goals. USAID is also advised to conduct a number of other activities on its own that would complement the work of the local partner.

### **A. Focus Future Environmental Business Exchanges on Capacity-Building for Local Business Organizations and Consultants**

USAID should consider alternatives to EBEs that provide WM technical assistance directly to industries. Future EBEs should focus on training local management training and consulting organizations on WM methods and marketing strategies. Technical and marketing WM workshops should be held for industrial and management consultants, with an emphasis on the relationships among WM, productivity, efficiency and quality. "Green" marketing strategies should also be taught. "Train-the-trainer" WM workshops should be held for business training organizations and faculty.

### **B. Conduct Survey on Terminology**

There is a need to determine the best terminology to use in Sri Lanka. Several individuals said that "waste minimization" is a negative term to business because it lacks a positive, return-on-investment connotation. In the U.S. and elsewhere, many business people think of waste minimization as equivalent to pollution control. However, one Sri Lankan industry leader said he thought the term was fine. At CISIR, which has extensive consultation experience with industry, the term "clean production" was strongly recommended. It should be noted here that CISIR has a long association with UNIDO, which uses "clean production" as its term of preference. At NIBM, the directory of consultancy asked why WM was any different from "productivity" and said that the definition of productivity could simply be expanded to include resource efficiency for environmental improvement.

Since a mixed message on terminology was received, the WEC Institutional Expert recommended that a formal survey of business managers be conducted. They should be given a written questionnaire that presents a range of terms, including WM, clean production, clean technology, pollution prevention, resource efficiency, green business, sustainable production, and productivity for environment. Respondents should be asked to choose the term that they think best exemplifies the idea of protecting the environment by improvements in production processes and in business management practices. The results of the survey should indicate which term is most likely to have a



positive response from industry. Responses should be received from at least ten business managers in each of the following categories: small business, medium business, large business, and exporting business. Responses should also be obtained from businesses outside of Colombo.

### **C. Create Local Partnership for the WM Program**

Based on the analysis of alternatives outlined in the Findings section and the extensive discussions with Sri Lankans during this mission, it is recommended that USAID identify a local institution and contract with it to implement a WM program for Sri Lanka. The NIBM would make a good partner. The recommended elements of the relationship are outlined below.

#### **1. Define the Desired Elements of a National Waste Minimization Plan**

The 1994 report on WM potential and opportunities provided to USAID by the Minnesota Mission outlines a number of valuable goals and actions for implementing a national WM program. However, the Minnesota Mission report also recommends establishing a National Waste Minimization Institute, which is not recommended for the reasons outlined above in the alternatives analysis. Nonetheless, the tasks of the institute recommended by the Minnesota Mission would serve as a good basis for further refining the desired elements of a national strategy. These elements should be considered further by USAID based on the increasing knowledge of local opportunities and situations. USAID could consider holding a roundtable or a series of them, with representatives from interested organizations, to fully flesh out the desired elements of the program. This is politically very important, since it creates a sense of ownership among local leaders. The recommendations of the Minnesota Mission only suffer from the fact that its members were in the country for only a week, and evidently no Sri Lankans had an active role in defining the elements recommended in their report. A roundtable series organized by USAID could effectively remedy this weakness.

#### **2. Establish a Partnership with a Local Institution**

Based on the expanded, locally defined vision for the WM program, USAID should prepare a Terms of Reference and submit it to potentially interested institutions for discussion. A draft Request for Proposals and Terms of Reference are included in this report as Attachment 1. The draft is written using contracting language on the assumption that, if USAID is to provide financial assistance to the local partner, a competitive bid process would be followed to obtain the best prices for services. If USAID chooses to select a partner based on existing information, the Terms of Reference can be used as the starting point for a work plan. In my opinion, USAID could establish a partnership with the NIBM that would have high probability of successfully implementing the work tasks in the Terms of Reference.

### 3. Provide Intensive Capacity-Building to the Local Partner

Once a partner is selected, USAID will need to help start up its program. The following actions are recommended. See Attachment 1, Work Tasks, for a broader but less detailed outline of recommended work tasks.

#### Prepare briefing package

USAID should develop a WM briefing package that covers the concepts, methods, benefits, and resources for WM. It should also describe the role and plans of the partner. The briefing package should be about 10 pages in length. The briefing package can be used by the partner and USAID to promote the program locally.

#### Prepare and deliver a train-the-trainer course in WM

USAID should conduct a WM train-the-trainer program for the partner so that it can begin implementing its own training. This should be done using experienced WM experts from the U.S., who themselves have received formal training in adult instruction techniques.

#### Help partner design its WM strategy

The initial strategy and terms of reference for the WM program can only be considered a start. As the partner learns more about WM and starts allocating resources to the program, it will inevitably recognize new opportunities and requirements for modification to the program. USAID should be prepared to assist the partner on an ongoing basis via experienced WM institutional experts who have knowledge of the various strategies tried by WM programs in the U.S. Ideally, the same WM expert(s) would continue to assist the partner as this provides continuity and an improved learning curve.

#### Help partner develop multilevel training programs

USAID should help the partner develop and implement training programs covering at least four levels of management: Chief executives and senior managers; middle managers (such as facility managers); technical managers such as production supervisors; and providers of management advice and services, such as accountants, bankers, and insurers. An outline of the subjects to be covered under each level training is included with this report as Attachment 2.

#### Provide experts to assist in training

When training is initially implemented, USAID should be prepared to provide consultants to help in the first sessions. They should be there to help, not to run the show, since they would have previously conducted train-the-trainer programs for the partner's teaching faculty. After the first few classes are done, the visiting consultants will not

have to provide support for general WM instruction. However, there will almost certainly be an interest in providing training on industry-specific WM techniques. For these sessions, USAID can provide industry experts from the U.S. who can complement the skills of local industry experts brought in to help with training.

#### Provide core library of reference materials

The partner will need a basic core library of WM reference materials covering general management and technical issues, and also industry-specific materials. USAID could prepare a core library in the U.S., using resources such as EP3 and the U.S. Environmental Protection Agency, and transfer it to the partner in Sri Lanka. The core library should contain information on WM organizations in the U.S. and elsewhere so that the partner can establish program linkages on its own.

#### **D. Integrate WM into Other USAID Programs**

Interviews with USAID staff in Sri Lanka and in the U.S. have identified a number of areas where WM outreach and sustainability can be enhanced by incorporating WM training and reference materials into the activities of other programs. The USAID mission director should authorize a review of all development assistance activities being undertaken by the mission, in cooperation with a WM institutional or marketing expert, to identify where WM can be fit into other programs. For example, the mission sponsors training to Sri Lankan bankers on banking practices. A short WM component could be included in the training they provide. In sewer system development, WM technical assistance to reduce industrial and household water consumption and discharge could be included. To assist the Sri Lankan stock exchange, training could be provided to local stockbrokers and investment managers on the benefits of WM as a risk reduction and market-share-increasing strategy for listed companies.

#### **E. Conduct WM Exchange Program with India**

A vigorous WM program is being managed by USAID in India, and another is being managed by UNIDO. These programs have produced a number of successful WM examples in industry. Since seeing is believing, USAID Sri Lanka should conduct a regional professional exchange to show its local partner and Sri Lankan managers how WM has been successfully implemented in Indian companies and institutions.

#### **F. Position USAID as the National Resource for Information on International Environmental Management Standards and Organizations**

In discussions with Sri Lanka industry leaders, the WEC Institutional Expert found that none of them had heard of either the Business Charter for Sustainable Development

promoted by the International Chamber of Commerce or the developing ISO 14000 Environmental Management Standards. These international guidelines are being produced by industry for industry, and they reflect the state of the art in industrial environmental management practices. USAID should promote awareness and knowledge of these guidelines, in addition to WM techniques from the U.S., because it would enhance confidence in USAID's objectivity and position it as a truly international resource. Business executives from the U.S. are participating in these international guidelines programs and could present seminars on them in Sri Lanka under the sponsorship of the USAID mission.

### **G. Promote WM to U.S. Companies Sourcing from Sri Lankan Industry**

Several major U.S. companies are purchasing products from Sri Lankan sources. A smaller number are actually producing products here. For example, Mona Plastics' major customer is the Hallmark cards and gifts company. USAID could research which major U.S. companies are sourcing from Sri Lanka and promote WM to them. They could be advised about the efforts of USAID to promote WM to Sri Lankan industry and asked to contribute information about their own environmental programs and standards, and to promote WM to their suppliers. A smart business listens to its customers, and if the customer wants its supplier to get involved in a local WM program, the supplier probably will.

### **H. Promote the Concept of Eco-Industrial Parks**

Eco-industrial parks are industrial estates designed to minimize the impact of their resident companies on the environment. The concept covers common waste treatment systems, generation of power through incineration of solid wastes, exchange and re-use of effluents and other wastes by companies, provision of central environmental technical assistance services, design of energy- and water-efficient facilities, composting of organic wastes, and several other novel ideas. Key to the success of the concept is the incorporation of the ideas into construction of basic park infrastructure and the recruitment of businesses that can profitably exchange their wastes with each other. There are several eco-industrial park projects under way in the U.S. and there is a growing literature on the subject. Recognizing that the concept is still in its infancy even in developed countries, USAID could at least inform Sri Lankan development authorities of the vision and concepts and provide literature to them.

Apparently, USAID is participating with MEIP in a project to locate a group of industrial estates that would have common waste treatment systems. Five of these estate areas are scheduled for Environmental Impact Assessments (EIAs). USAID could use the EIA process to consider eco-industrial park concepts and promote awareness of the literature on the subject, and linkages to the U.S. organizations conducting projects in this area.

## **I. Promote Community "Green Star" Programs**

In the U.S., there are several "Green Star" programs which are community projects to promote WM to businesses using voluntary recognition schemes. Businesses are asked to endorse certain environmental principles, mostly focused on WM and toxics use reduction, and to implement WM practices. Businesses that volunteer for the program and which self-report that they are reducing their wastes, are recognized with a green star which they can use in promotions, and their names are publicized in community papers and during community events. In Seattle, Washington, the Green Star program now has hundreds of business members and participation is rapidly growing as businesses see their competitors getting community recognition and saving money through WM. USAID could stimulate the development of similar programs in Sri Lanka by providing information to local communities about the U.S. programs and working in cooperation with MEIP's community empowerment project.

## **J. Help EP3 Include Management Consulting Companies in the PCAF Training**

The PCAF process includes a grant for technical consulting services, which are explicitly required to include WM analysis. However, there are no known environmental consulting companies in Sri Lanka with expertise in WM; they all focus on waste treatment. But there are many management and industrial consulting companies with expertise in process re-engineering, productivity improvement, quality programs, full cost accounting, and other major methods used for WM. There are also several organizations that provide business training on these subjects. The NIBM provides both consultancies and training. Accordingly, EP3 should ensure that a range of management and industrial consulting and training organizations, specifically including NIBM, participate in the PCAF training that EP3 is going to provide. A special effort should be made to survey the consultants and training organizations several weeks after the workshop, to learn what they thought of it and whether they are going to go after the business opportunity created by the PCAF.

## **K. EP3 Should Promote International Banking Environmental Charters in Sri Lanka**

The United Nations Environmental Program and a group of leading international banks have established a Banking Charter for Sustainable Development, which outlines a number of policies and actions to be taken by banks in their long-term environmental self-interest. The U.S. headquarters of the charter organization is located in Washington, D.C. EP3 should obtain information about the charter, prepare briefing packages on the charter, and include the briefing package in the training they are going to deliver to banks in Sri Lanka.

**APPENDIX A**

**TERMS OF REFERENCE FOR A LOCAL PARTNER FOR THE WM PROGRAM**

## APPENDIX A

### TERMS OF REFERENCE FOR A LOCAL PARTNER FOR THE WM PROGRAM

#### **Request for Proposals and Terms of Reference**

#### **Institutional Partner for Implementation of an Industrial Waste Minimization Program**

The United States Agency for International Development (USAID) Mission to Sri Lanka seeks a Sri Lankan business or institutional partner (hereafter referred to as "partner") to implement a program in waste minimization (WM) for Industry. The objective of the program is to promote WM to Sri Lankan business and industry as a preferred approach for the reduction of industrial pollution and as a complementary strategy to pollution control and waste management. It is USAID's intention to help the Partner establish the program and achieve self-sufficiency, at which time USAID will terminate its direct financial support of the Partner. USAID may continue to provide technical assistance and information resources to support the program, as appropriate.

USAID will select and contract with partner based on the submitted qualifications and bids submitted in response to this Request for Proposals. The contract may include financial support for professional staff, training, outreach and marketing, consulting partnerships, international professional exchanges, and other activities. It is USAID's intention that the program implemented by the Partner become financially self-supporting within a maximum of four years, through training and consulting fees, sale of publications or memberships, fund-raising from other international organizations, or other strategies.

Interested parties are invited to submit a proposal to USAID that meets the Terms of Reference outlined below. For each item in the Desired Qualifications, please provide up to 100 words of explanation. Before selecting partner for final negotiations, USAID will review all submittals and conduct interviews with up to three applicants.

#### **Scope of Work**

Bids are requested for implementation of the tasks outlined in this scope of work. Competing bids and qualifications will be evaluated to select partner. USAID reserves the right to modify the scope of work in negotiation with the Partner after the Partner has been selected.

Duration of all tasks is for a period of one year, unless otherwise specified. USAID will review performance of the Partner after one year and either renegotiate the contract or assign it to another partner through a competitive selection process.

## Work Tasks

1. Retain or assign a Chief of Party and provide necessary staff, office space, and office equipment needed for implementation of the WM program.
2. Participate in one week of core training to be conducted by USAID in WM, Industrial Environmental Management, WM Promotional Strategies, and Training Methods, .
3. Establish a ten-person advisory council for the WM program, which is to be composed of Sri Lankan leaders from industry, government and the community. Conduct council meetings every two months.
4. Prepare and conduct a market research survey of industry whose results can be used in program design. The survey should identify current awareness of environmental and business productivity strategies, preferred terminology for WM, and information channels used by industry. The survey should reflect preferences of managers from small, medium, and large businesses; exporters and local businesses; and urban and rural businesses. At least 100 responses to the survey must be received.
5. Prepare four basic WM courses for senior managers, middle managers, technical staff, and business advisers according to the attached training outline and the results of the market research survey. The courses should reflect the particular needs and concerns of Sri Lankan industry and society. USAID will provide example training materials and strategies for delivery of the materials. Participants in the courses will receive a certificate of accomplishment which will be endorsed by the advisory council.
6. Conduct a one-week study tour to India to visit WM programs operating there, including meetings with Indian WM program managers and visits to factories that are participating in the WM programs. USAID will assist in coordination of the study tour.
7. Participate with USAID experts in two-day WM assessments (as on-the-job training) of four industrial companies, and prepare action plans to help the companies implement recommendations from the assessments. Consulting assistance for 100 hours over six months per company is required. USAID will identify the companies to receive assessments.
8. Develop and conduct a marketing campaign for the WM training courses.
9. Organize and conduct six WM training sessions for each of the four training levels. Each training session should include approximately 50 participants, for a total of approximately 1,000 persons trained in one year.



10. Publish a directory of training participants, including brief descriptions and contact information, at the end of the year and distribute a copy to each participant.
11. Conduct surveys of participants at intervals of three and six months after training to learn how the training is being implemented. Written, telephone, and personal surveys may be used. Survey responses must be obtained from at least 80% of training participants.
12. Market and provide WM consulting services to industry at no cost for preliminary assessments and at negotiated rates for intensive assistance. At least four consulting projects will be conducted.
13. Operate a clearinghouse for WM technical information and publications, which is to include a full-time information officer and reproduction facilities. The proposal should include photocopying costs for reproducing 10,000 pages.
14. Design, print, and distribute a six-page quarterly newsletter about the WM program. Distribution of 5,000 copies is required.
15. Organize and conduct six two-week international professional exchanges, which is to include sending Sri Lankan managers to the United States and other countries, and hosting U.S. experts on technical and training missions to Sri Lanka.
16. Organize and lead up to 40 visits to Sri Lanka industries by USAID Mission to Sri Lanka staff and visiting experts.
17. Either develop a national WM promotion campaign or incorporate WM as a highly visible component into other national campaigns focused on industrial and/or environmental improvement.
18. Provide information on WM to communications media such as magazines, newspapers, television, and radio, and assist them in producing stories about the benefits of WM. Twenty press briefings are required.
19. Assist Sri Lankan organizations to develop linkages for the purpose of mutual education and information transfer with other national and international organizations interested in WM.
20. Document and publish ten case studies of WM in Sri Lankan industry.
21. Prepare a plan for operating the WM program in the second year, including strategies for financing the program on a self-sustaining basis.

### **Measurement of Success**

At end of the contract year, USAID will evaluate the performance of the Partner based upon the following criteria:

1. People trained in certification classes
2. Consulting projects initiated or completed, including revenues earned
3. Quantitative reductions in pollution generated by factories receiving consulting projects, and by participants in training programs
4. Coverage of the WM program in local communications media, including television, newspapers, magazines, newsletters, and conferences
5. Information assistance requests processed by the clearinghouse
6. International exchanges managed
7. Either development of a national WM promotion strategy, or the clearly visible incorporation of WM into other national campaigns for business improvement
8. Preparation of a second-year operating plan demonstrating progress toward financial self-sufficiency of the training and consultancy elements

### **Desired Qualifications**

The areas of expertise outlined below may be met by a single organization or a team of contractors. Please limit explanations of expertise to 100 words per item.

Industrial Management Expertise: Formal education, and at least five years of full-time work experience, in the management of industrial organizations, including financial analysis, operations management, productivity and efficiency improvement methods, recruiting and training. These qualifications may be spread among the managers of a team.

Training: Proven experience in developing and delivering training courses, covering both technical and management subjects, to various audiences, including senior managers, middle managers, and technical staff. Access to training facilities other than hotels or other high-cost venues.

Consulting: Experience in providing consulting services to industry, including assessment of opportunities, negotiation of contracts, and successful completion of work. Client references are required.



Access to Industry: Ability to identify and contact key industry targets, using a variety of means such as direct mail, advertising, promotional speeches and seminars, and personal relationships. Possession of a database, preferably computerized, of industrial companies in Sri Lanka.

Entrepreneurial Skills: Ability to identify, assess, and pursue new opportunities that may arise in the future

Institutional Linkages: Formal connections to government organizations and international industrial organizations and associations, including professional memberships of staff, memoranda of agreement, and/or project partnerships.

Governorship: Supervision of the organization by a board of directors or similar advisory group, whose members are recognized leaders in business, government, and the community, and have visible authority and capability to direct the organization's mission, strategy, and recruitment of senior managers.

**APPENDIX B**  
**TRAINING OUTLINES BY MANAGEMENT LEVEL**

## APPENDIX B

### TRAINING OUTLINES BY MANAGEMENT LEVEL

#### Note on Training Approaches

There are some basic facts about training:

- If it's boring, they won't learn.
- If they are lectured to continuously, it will be boring.
- People would rather teach themselves than have others teach them.
- Proof of the training concepts is hidden among the audience, and it takes a "detective" to find it.
- Trainers need to be very adaptable, especially when training experienced business people.
- Experienced business people believe in real-world examples, not in trainers.

These few points illustrate the successful approach for training: it should be conducted by trainers who have lots of real-world experience with the subject and who can discuss examples at length; trainers should involve the participants as much as possible in exercises to draw out the answers, which are often known subconsciously; trainers should work with participants one-on-one to find those who have already successfully implemented the techniques being trained, but who are too shy to say so publicly; training, especially in long sessions, should be considered a form of theater, where the objective is to involve, entertain, and educate the audience.

The training outlines below were developed under short notice and are beyond the formal scope of work of this assignment. However, they reflect the author's extensive experience in training hundreds of factory managers and executives in dozens of workshops and seminars lasting from a few hours to a full week. The specifics of each outline could be altered a bit in sequence, but not in overall strategy. Preparation of real training agendas, to be delivered in Sri Lanka, would be the scope of another assignment that would ideally be conducted in association with local experts with extensive training experience of their own.

#### CEOs and Senior Managers

*Duration: One day*

Introductions, agenda, training benefits

WM, productivity, and quality

Environmental trends affecting industry

Industry's environmental stakeholders and their motivations

Summary: Environmental threats and opportunities

Case studies of executives who are implementing environmental strategies

Resources: International environmental management guidelines and resources

Tools for strategic environmental management:

Product life cycle analysis  
Principles of environmentally sound product design  
Supplier management strategies  
WM strategies  
Environmental accounting and risk assessment  
Green marketing and product labeling  
Total quality environmental management  
Management strategies for environmental sustainability:  
Leadership commitment  
Full cost accounting for waste costs  
Baseline measurement for performance improvement  
Understanding and using employee motivations  
Communicating with stakeholders  
Resources: Organizations providing environmental management assistance  
Group discussion of action steps and recommendations to government and others.

#### Facility and Production Managers

*Duration: One or two full days*

Introductions, agenda, training benefits

WM, productivity, and quality

Summary: Environmental threats and opportunities

Baseline: Current and future costs of waste and pollution

Baseline: Current and future concerns of stakeholders

Baseline: Qualitative assessment of environmental risks

Opportunity assessment: Potential cost savings from WM

WM strategies

Case studies

Environmental auditing techniques

Green marketing strategies

Motivating employees

Training techniques

Resources: International environmental management guidelines and resources

Resources: Organizations providing environmental management assistance

#### Technical Staff

*Duration: Three to five days, including one day of site visits*

Introductions, agenda, training benefits

WM, productivity, and quality

Environmental trends affecting industry

Industry's environmental stakeholders and their motivations

Summary: Environmental threats and opportunities

Case studies

Motivations of employees for environmental improvement

General WM strategies

Case studies

Calculation of current waste costs

Forecasting of waste costs  
Qualitative environmental risk analysis for project prioritization  
Environmental audit procedures  
Preparation for site visits  
Review of site visit findings  
Group discussions of strategies for improvement  
Review of motivational approaches  
Resources: Organizations providing environmental management assistance

### Business Advisers

*Duration: One day*

Introductions, agenda, training benefits  
Why industry creates pollution  
Goals for environmentally sustainable industry  
Case studies  
How to discuss environmental issues with industry managers  
Green business strategies and case studies  
Resources for industrial environmental improvement  
Basics of negotiation for environmental improvement programs  
Use of stakeholders for influencing business  
Training strategies

**APPENDIX C**  
**ACRONYMS USED IN THIS REPORT**



## APPENDIX C

### ACRONYMS USED IN THIS REPORT

|        |   |
|--------|---|
| CEA    | Central Environmental Authority                         |
| CISIR  | Ceylon Institute for Scientific and Industrial Research |
| EBE    | Environmental Business Exchange                         |
| EIA    | Environmental Impact Assessment                         |
| EP3    | Environmental Pollution Prevention Project              |
| GOSL   | Government of Sri Lanka                                 |
| IESC   | International Executive Service Corps                   |
| IRG    | International Resources Group Ltd.                      |
| ITMIN  | Industrial Technology and Market Information Network    |
| MEIP   | Metropolitan Environmental Improvement Project          |
| NAREPP | Natural Resources and Environmental Policy Project      |
| NDB    | National Development Bank                               |
| NIBM   | National Institute of Business Management               |
| NWMP   | National Waste Minimization Program                     |
| PCAF   | Pollution Control and Abatement Fund                    |
| PPI    | Promotion of Private Infrastructure project             |
| TIPS   | Technology Initiative for the Private Sector            |
| UNIDO  | United Nations Industrial Development Organisation      |
| USAEP  | U.S.-Asia Environmental Partnership                     |
| USAID  | United States Agency for International Development      |
| WEC    | World Environment Center                                |
| WM     | waste minimization                                      |

**APPENDIX D**

**ITINERARY**

## APPENDIX D

### ITINERARY

- Feb. 25, 1994      Arrival in Colombo, Sri Lanka
- Feb. 26              Meeting with Donald Brosky (3M)
- Feb. 27              a) Briefing by M. Thiruchelvam, USAID project manager.  
b) Coordination meeting with David S. McCauley (NAREPP), Jim Gallup, and Raghu K. Raghavan (EP3), Richard de Silva (World Bank). At NAREPP office.  
c) Meeting with Avanthi Jayatilake (CISIR), Vijit T. Ratnarajah (ITMIN), Erik I. Vajda (UNIDO). At CISIR.  
d) Meeting with David S. McCauley and M. Thiruchelvam
- Feb. 28              Review of documents and project scope; begin report writing
- March 1              a) Meeting with Chairman, National Development Bank  
b) Meeting with representatives of banks participating in the PCAF  
c) Meeting with Ceylon National Chamber of Industries  
d) Meeting with Andrew Milsted, UNIDO Industrial Pollution Reduction Programme
- March 2              a) Visit to ALCOP Cables with Donald Brosky
- March 3              b) Visit to Mona Plastics Ltd. with Donald Brosky
- March 6              a) Meeting with Director of Consultancy, National Institute of Business Management  
b) Meeting with William Foerderer, Private Enterprise Officer, USAID Sri Lanka
- March 7              Report writing day
- March 8              Report writing day
- March 9              Meeting with Metropolitan Environmental Improvement Programme
- March 10             a) Report writing; submittal of draft report to USAID  
b) Briefing to USAID mission staff on findings and conclusions
- March 11             depart Colombo

**APPENDIX E**  
**PERSONS AND ORGANIZATIONS VISITED**

## APPENDIX E

### PERSONS AND ORGANIZATIONS VISITED

Nihal Abeysekera, Chairman, Ceylon National Chamber of Industries

Donald L. Brosky, Pollution Prevention Specialist, 3M Environmental Technology and Services

M.S.S. Fernandopulle, Editor, *Lanka Business Week*

William S. Foerderer, Private Enterprise Officer, USAID Mission to Sri Lanka

Dr. Jim Gallup, Manager, USAID Environmental Pollution Prevention Project

Avanthi Jayatilake, Project Management Specialist (Environment), USAID Sri Lanka

Rohan Karunaratne, Chief Engineer, Mona Plastics (Pvt) Ltd.

David S. McCauley, Ph.D., Sr. Environmental Policy Advisor/Chief of Party, Natural Resources and Environmental Policy Project, USAID Sri Lanka

Lal de Mel, Director, Chemical Industries (Colombo) Ltd.

Andrew Milsted, Chief Technical Advisor, UNIDO Industrial Pollution Reduction Programme

Azeez M. Mubarak, Head, Chemical and Environmental Technology Division, Ceylon Institute of Scientific and Industrial Research

S.M.J. Neangoda, Director of Consultancy, National Institute of Business Management

Ravi Pereira, National Program Coordinator, Metropolitan Environmental Improvement Programme

Aravinda Perera, Senior Manager, Development Banking, Sampath Bank Ltd.

Raghu K. Raghavan, Program Coordinator, USAID Environmental Pollution Prevention Project

Vijit T. Ratnarajah, Senior Manager, Industrial Technology Market Information Network

T. Satyamurthy, Director/General Manager, ALCOP Cables, Ltd.

C. Richard de Silva, Consultant, Official Co-Financing and Trust Funds, The World Bank

D.K. de Silva, Production Superintendent, ALCOP Cables, Ltd.

Dr. Nimal Sanderatne, Chairman, National Development Bank

M. Thiruchelvam, U.S.-AEP Coordinator, USAID Mission to Sri Lanka

Erik I. Vajda, UN Advisor on Industrial Information, United Nations Industrial Development Organisation

S.C. Weerackody, Manager, Project Finance, Commercial Bank of Ceylon, Ltd.

N.W.E. Wijewantha, Secretary General, Ceylon National Chamber of Industries

**APPENDIX F**  
**LIST OF DOCUMENTS RECEIVED**

## APPENDIX F

### LIST OF DOCUMENTS RECEIVED

*Annual Report 1994*, Chemical and Environmental Technology Division, Ceylon Institute of Scientific and Industrial Research.

Draft "Private Finance Development Project: Pollution Control and Abatement Fund: *Operating Instructions*." National Development Bank of Sri Lanka.

Brochure, "Sourcing Industrial, Technological and Market Information for You". Industrial Technology and Market Information Network (ITMIN).

Final Draft Report, "Sri Lanka-Minnesota Scoping Mission on Institution-Building for Waste Minimization." World Environment Center, March 1994.

*Conceptual Plan for Source Management and Control (Waste Minimization) of Industrial Pollution in Sri Lanka*. Annex C, Final Report for the MEIP/SMI-IV, Consultancy Services for Strategy, Guidelines and Institutional Strengthening for Industrial Pollution Management. The World Bank, Sri Lanka Office.

Paper, "*Environmental Audits Program in Sri Lanka and WEC's Environmental Business Exchange*." Sachi Itagaki, December 1993.

Concept Paper, "*Identifying "Green" Investment Opportunities in Sri Lanka*." U.S.-Asia Environmental Partnership, Program for Sri Lanka.

Brochure, "The Natural Resources and Environmental Policy Project." USAID Sri Lanka.

*Prospectus 1994*, Newsletters and program brochures. The National Institute of Business Management

*Lanka Business Week* magazine, dated January 1995.

Brochure. "The Metropolitan Environmental Improvement Project in Asia." The World Bank, 1994.



**APPENDIX G**  
**BUSINESS CARDS OF PERSONS CONTACTED**



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info

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Natural Resources and Environmental Policy Project  
International Resources Group, Ltd.

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

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**APPENDIX H**  
**CIRRICULUM VITAE**

## CURRICULUM VITAE

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### **EXPERIENCE**

1/94 - **Pollution Prevention Manager, Shapiro & Associates, Inc.** Seattle, WA  
Provide consulting services in pollution prevention and industrial environmental management to business and government, including facility assessments, training, management systems development, information systems, strategic environmental planning, technology review, marketing and communications.

5/91 - 1/94 **Environmental Planner, Washington Dept. of Ecology** Bellevue, WA  
Helped organizations prevent pollution by reducing chemical use and waste generation. Provided on-site planning and technical assistance to all facility staff levels. Responsible for ensuring the adequate preparation of over 100 pollution prevention plans by industrial facilities, including technical assistance, review and compliance; had most facility planning responsibility of all agency staff. Helped develop state pollution prevention regulations and guidelines. Led agency workgroup on cost analysis for pollution prevention. Made regular presentations to business, public interest, academic and government groups. Developed communication materials, including training programs, slide shows, press releases, articles. Obtained national and local media coverage. Senior lecturer for agency's Industrial Pollution Prevention Planning course.

1/93 - 12/93 **Consultant, US Agency for International Development**  
Spent six weeks in Indonesia as leader of three-person team designing a long-term Clean Production technical assistance project for USAID Indonesia. Conducted two one-week assignments in the Philippines doing full-day Waste Minimization seminars for industry groups and making presentations at environmental conferences and workshops. Conducted a two-week assignment in the Philippines as instructor in a five-day waste minimization workshop for business and government leaders, including 12 of 14 Regional Environmental Directors for the Philippines.

4/90 - 5/91 **President, Aqua Marine Enterprises, Inc.** Seattle, WA  
Communications and public relations consultant. Conducted market research; designed and installed marketing information systems; wrote articles, press releases, business plans, brochures, etc.

6/88 - 4/90 **Marketing Manager, BioSonics, Inc.** Seattle, WA  
Managed new marketing department in sonar engineering and consulting firm. Recruited and managed staff, interns and contractors. Developed and managed budget. Developed marketing information system. Wrote business plans. Designed and produced company marketing materials. Represented company at conferences and shows.

5/84 - 5/86 **Environmental Planner, US Army Corps of Engineers** Seattle, WA  
Managed environmental studies for Corps marine projects. Prepared EISs and environmental assessments. Designed, negotiated and managed studies conducted by contractors; made presentations to public; chaired interagency work groups. Developed expertise in wetlands, sediments, fisheries, sampling.

2/84 - 5/84 **Policy Analyst, Washington Environmental Council** Seattle, WA  
Researched and prepared technical briefs and articles on marine environmental issues. Obtained and implemented grant to research wastewater discharges to Puget Sound.

9/80 - 7/82 **Research Assistant, Harvard Museum of Zoology** Cambridge, MA  
Conducted laboratory and field studies of marine biology and ichthyology.

**EDUCATION**

- 6/1988 **Master of Business Administration** *Seattle, WA*  
**University of Washington** Majors: Marketing, Finance
- 6/1988 **Master of Marine Affairs** *Seattle, WA*  
**University of Washington** Major: Marine Technology Management
- 6/1983 **Bachelor of Arts cum laude** *Cambridge, MA*  
**Harvard University** Major: History of Science. Minor: Marine Ecology

**TRAINING**

- 6/93 **Quality Enhancement Simulation Training** *Seattle, WA*  
 24 -Hour Course. Sponsor: Washington Dept. of Ecology.
- 5/93 **Total Quality Environmental Management** *Seattle, WA*  
 16-Hour Course. Sponsor: Washington State University Conferences.
- 4/93 **Real Property Environmental Assessment** *Seattle, WA*  
 8-Hour Course. Sponsor: Environmental Hazards Control, Inc.
- 3/93 **Total Quality Management** *Seattle, WA*  
 24-Hour Course. Sponsor: Padgett-Thompson Company.
- 7/92 **Principles of Supervision** *Tacoma, WA*  
 28-Hour Course. Sponsor: Washington Dept. of Personnel.
- 2/92 **Pollution Prevention Assessment Methods** *Bellevue, WA*  
 32-Hour Course. Sponsors: Washington Dept. of Ecology, US EPA.
- 12/91 **Hazardous Materials Safety and Emergency Response** *Bellevue, WA*  
 40-Hour Course. Sponsors: Washington Dept. of Ecology, CADRE Group.
- 12/91 **EPA Basic Inspector Certification** *Bellevue, WA*  
 24-Hour Course. Sponsor: US EPA.
- 8/91 **Pollution Prevention Instructor Training** *Seattle, WA*  
 24-Hour Course. Sponsor: US EPA.

**SELECTED PUBLICATIONS**

- "Management Accounting and Environmental Compliance" *Journal of Cost Accounting* (in print)
- Cost Analysis for Pollution Prevention Washington Department of Ecology
- "Pollution Prevention Afloat". *Sea Magazine*, November 1991
- "Fish Size Representation for Sonar Displays." *Marine Electronics*, Jan/Feb 1990
- "Smart Sonar Shopping." *Sea Magazine*, April 1989
- Sonar for Fisheries Research. BioSonics, Inc. Seattle, 1990
- Introduction to Dredged Material Management. U.S. Army Corps of Engineers, 1987.

### **SELECTED WORKSHOPS TAUGHT**

- Pollution Prevention Workshops.** ASEAN Environmental Improvement Project, Manila, Philippines, June, 1994. Attended by over 150 industrial plant managers and engineers.
- Pollution Prevention Planning Course.** Half-days monthly, Washington Department of Ecology, Bellevue, WA
- Pollution Prevention Planning.** Washington Department of Ecology. Half-day, various locations, 4 - 6 times annually.
- Environmental Accounting and Cost Analysis for Pollution Prevention.** Half-day, Washington Department of Ecology, Bellevue, WA, April 1993.
- Workshop on Waste Minimization: An Emerging Corporate Strategy.** Five days, Philippine Dept. of Environmental and Natural Resources, Manila, Philippines, March 1993.
- Waste Minimization: A Strategy for Inspectors.** One day, Philippine Dept. of Environmental and Natural Resources, Manila, Philippines, March 1993.
- Waste Minimization Strategies.** One day, Voluntary Organization of Industry Concerned for the Environment (VOICE), Manila, Philippines, March 1993.
- Pollution Prevention for Small Business.** Half-day, Chemical Free Fremont, Seattle, WA, January 1993, October 1992.

### **SELECTED PRESENTATIONS GIVEN**

- (1) **Elements of a Corporate Environmental Policy; (2) The Greening of the Corporation.** Conference on Corporate Environmental Policies, Philippine Business for the Environment, Cebu City, Philippines, October 1993.
- (1) **First - Wave Pollution Prevention Results in Washington; (2) International Pollution Prevention Case Study: The Philippines.** Summer Conference, American Institute of Chemical Engineers, Seattle, WA, August 1993.
- Small Business Challenges and Solutions: State Technical Assistance Program Perspectives.**  
US EPA Annual Invitational Pollution Prevention Conference, Woods Hole, MA, June 1993.
- International Pollution Prevention.** National Roundtable of State Pollution Prevention Programs, San Diego, CA, April 1993.
- Elements of a Corporate Environmental Policy.** Conference on Corporate Environmental Policies, Philippine Business for the Environment, Manila, Philippines, March 1993.
- Pollution Prevention: A Strategy for Inspectors.** US EPA Region X Basic Inspector Training, Seattle, WA, December 1992; January 1991.
- First-Wave Pollution Prevention Results in Washington State.** US EPA Pollution Prevention Office, Washington DC, November 1992.
- Strategies for Industrial Pollution Prevention from Washington State.** US Agency for International Development, Asia Bureau, Washington DC, November 1992.
- Environmental Accounting for Pollution Prevention.** HazMat West '92 Conference and Trade Show, Long Beach, CA, October 1992.
- (1) **Hazardous Waste: The Cost-Benefit Analysis. (2) Pollution Prevention Strategies for Laboratories.** Waste Information Network EXPO, Seattle, WA, October 1992.
- Helping Small Business with Environmental Cost Analysis.** King County METRO Hazardous Waste Section, Seattle, WA, September 1992.
- Pollution Prevention Planning.** Annual Conference, National Association of Environmental Professionals, Seattle, WA August 1992.
- Pollution Prevention Planning.** Environmental Management Expo '92, Seattle, WA, May 1992.
- (1) **Pollution Prevention Planning in Washington; (2) Water Conservation and Wastewater Reduction.** US Navy Hazardous Waste Minimization Conference, San Jose, CA, Feb 1992





### **CLASSROOM TEACHING EXPERIENCE**

Senior Instructor, *Industrial Pollution Prevention Planning* course, Washington Department of Ecology. Six-month course meeting monthly for environmental managers of industrial facilities.

Panelist, *Roundtable on Business and the Environment*, video series, City University, Bellevue, WA.

Guest Lecturer, Environmental Management Program, Graduate School of Business Administration, University of Washington.

Guest Lecturer, School of Marine Studies, University of Washington.

### **PROFESSIONAL ASSOCIATIONS**

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| <i>Director,</i> | Puget Sound Alliance.  |
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| <i>Officer,</i>  | Marine Technology Society, Puget Sound Chapter.  |
| <i>Member,</i>   | US Technical Advisory Group to ISO TC 207, International Environmental Management Standards. |
| <i>Member,</i>   | ASTM Committee E-50 (Environmental Assessment).  |
| <i>Member,</i>   | Northwest Business Environmental Network.  |

### **ACTIVITIES AND HONORS**

|                                     |   |
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| <i>Profiled,</i>                    | "Who's Who in Northwest Environmental Industry", Puget Sound Business Journal, Nov. 1993. |
| <i>Advisor,</i>                     | Environmental Management Program, University of Washington Graduate School of Business.   |
| <i>Certificate of Appreciation,</i> | Philippine Dept. of Environment and Natural Resources.                                    |
| <i>Certificate of Appreciation,</i> | Philippine Business for the Environment.  |
| <i>Green Tree Award,</i>            | Washington Environmental Council.   |
| <i>Bradner Scholarship,</i>         | University of Washington.   |
| <i>Dean's List</i>                  | Harvard University, 1980-1983.  |

### **PERSONAL**

Born 10 / 1961; married; interested in the oceans, environmental politics, making music. Lived in the Bahamas, Mexico, Australia, and Micronesia for over eight years.

*References available upon request.*

### Pollution Prevention Planning

As an environmental planner for the Washington Dept. of Ecology from 1991 to 1994, I helped the following organizations complete Pollution Prevention Plans. The plans focused on reducing chemical use and hazardous waste generation. A star (\*) means I conducted a pollution prevention audit as well as planning and research assistance. I reviewed all plans for adequacy with state requirements:

|                          |                   |                        |                    |
|--------------------------|-------------------|------------------------|--------------------|
| General Electric*        | aircraft engines  | Precision Engineering* | machining          |
| Jamco America*           | aircraft parts    | Production Milling*    | machining          |
| Precision Airmotive*     | aircraft repair   | Alliant Techsystems*   | marine electronics |
| Sea-Tac Airport*         | airport           | Samson Ocean Systems*  | marine rope        |
| Intalco*                 | aluminum smelter  | ATL*                   | medical devices    |
| Bowen Scarff Ford*       | auto repair       | Quinton Instrument*    | medical devices    |
| Hydro Swirl*             | bathubs           | Alaskan Copper Works   | metal fabricator   |
| Rainier Brewing*         | brewery           | Calvert Industries*    | metal finisher     |
| Mutual Materials*        | brick maker       | Acu-Line               | metal finishing    |
| Olympic Brake & Supply   | car parts         | All Fab                | metal finishing    |
| Bardahl*                 | chemical blender  | Art Brass Plating      | metal finishing    |
| Circuit Technology       | circuit boards    | ASKO Processing        | metal finishing    |
| Heath Techna*            | composites        | Blue Streak Finishers  | metal finishing    |
| Paragon Trade Brands*    | diapers           | Color Tech             | metal finishing    |
| Belshaw Brothers         | donut fryers      | Production Plating     | metal finishing    |
| Data I/O Corporation*    | electronics       | Protective Coatings    | metal finishing    |
| Eldec*                   | electronics       | Seafab Metal           | metal finishing    |
| Ariana Marine*           | fiberglass boats  | Seattle Technical      | metal finishing    |
| Bayliner*                | fiberglass boats  | TC Systems             | metal finishing    |
| C Dory                   | fiberglass boats  | Western Steel Casting  | metal forging      |
| Delta Marine*            | fiberglass boats  | Young Corp             | metal forging      |
| Mirage Marine            | fiberglass boats  | Ace Galvanizing        | metal galvanizing  |
| Olympic Boat*            | fiberglass boats  | Scott Galvanizing      | metal galvanizing  |
| Wright Brothers*         | fiberglass boats  | Northstar Casteel*     | metal products     |
| Chemgrate                | fiberglass grates | Pacific Metallurgical* | metal treating     |
| King Fiberglass          | fiberglass resins | Davis Wire Co          | metal wire         |
| Chemical Proof*          | fiberglass tanks  | Seattle Times Company* | newspaper          |
| Ershigs                  | fiberglass tanks  | BP Oil Company*        | oil storage        |
| Fibrex Corporation       | fiberglass tanks  | Gudmunson Co.*         | painting           |
| Lamson Products*         | fishing reels     | Laitala Enterprises*   | painting           |
| Fisher Mills*            | flour mill        | Beloit Manhattan*      | paper rollers      |
| Ball Ineon Glass*        | glass bottles     | Cello Bag              | plastic bags       |
| VN Graphics*             | graphics printing | Princeton Packaging    | printed bags       |
| Pacific Grinding Wheel*  | grinding wheels   | Mannesman Tally*       | printers           |
| Fred Hutchinson *        | hospital          | Georgia Pacific*       | pulp and paper     |
| Hydraulic Repair         | hydraulic parts   | Scott Paper*           | pulp and paper     |
| Western Pneumatic Tube   | hydraulic systems | Seattle Steel*         | scrap steel mill   |
| US Printing Ink          | ink blender       | NOAA Marine Center*    | shipping           |
| Smithway Company*        | insulated pipes   | Lake Union Drydock*    | shipyard           |
| Labels West*             | label printing    | Marco Seattle*         | shipyard           |
| Laboratory of Pathology* | laboratory        | Todd Shipyard*         | shipyard           |
| Lauks Testing Lab*       | laboratory        | Unimar*                | shipyard           |
| Weyerhaeuser Labs*       | laboratory        | Maritime Contractors*  | shipyard           |
| Overall Laundry Services | laundry           | ALPAC                  | soft drinks        |
|                          |                   | Pacific Coca Cola*     | soft drinks        |
|                          |                   | VIOX Corp*             | specialty glass    |
|                          |                   | Spectrum Glass         | specialty glass    |
|                          |                   | MRI Corporation        | tin recovery       |
|                          |                   | Bert-Well*             | truck interiors    |
|                          |                   | George Heiser Body*    | truck repair       |
|                          |                   | Crowley Marine         | tugboats           |
|                          |                   | Foss Maritime Company* | tugboats           |
|                          |                   | Univ. of Washington*   | university         |
|                          |                   | Snohomish County PUD*  | utility            |
|                          |                   | Coastal Manufacturing  | vehicle trailers   |
|                          |                   | Achilles*              | vinyl film maker   |
|                          |                   | Cascade Cabinet*       | wood cabinets      |

|                          |                |                           |                    |
|--------------------------|----------------|---------------------------|--------------------|
| Western Cabinet*         | wood cabinets  | Seattle Parks Dept.*      | government agency  |
| Dunbar Enterprises*      | wood finishing | Seattle Water Dept.       | government agency  |
| Contour Laminates        | wood furniture | City of Federal Way*      | government agency  |
| Brooks Mftg*             | wood treatment | King Cty. Health Dept*.   | laboratory         |
| Chemco*                  | wood treatment | Pacific Environmental *   | laboratory         |
| JH Baxter                | wood treatment | Fastbrite Electroplaters* | metal finishers    |
| Oeser Company*           | wood treatment | OMJ Company*              | metal finishers    |
| Pacific Sound Resources* | wood treatment | Mobil Oil Philippines     | petroleum products |
|                          |                | Larry's Markets*          | supermarket        |
|                          |                | Woodland Park Zoo*        | zoological park    |
|                          |                | Seaview Marina*           | marina             |
|                          |                | Lake Marine*              | boatyard           |

### ***Other Businesses Assisted***

|                        |                    |
|------------------------|--------------------|
| ShoeMart*              | department store   |
| Nordstroms*            | department store   |
| General Milling *      | food manufacturer, |
| Century Canning Corp.* | fish cannery       |

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## Consulting Projects Managed

### ***International Projects***

**University Clean Technology Program.** Consult on program development and resources. Conduct factory visits, industry and government training workshops, lectures. Speak at Clean Technology conference in Shanghai in Sept. 1995. Client: Institute for Environmental Studies, Hong Kong University of Science and Technology. November 1994 and throughout 1995.

**Seminar for CEOs on Strategic Environmental Management.** Two-hour presentation for company owners and Chief Executive Officers. Client: ASEAN Environmental Improvement Project. To be presented in Manila and Kuala Lumpur, January 1995 (training currently being designed).

**Workshop on Pollution Prevention Finance and Accounting.** One-day workshop for facility managers and financial officers. Client: ASEAN Environmental Improvement Project. To be presented in Manila and Kuala Lumpur, January 1995 (training currently being designed).

**Development of Training Curriculum for Industrial Environmental Management.** Program and technical consultation to a Malaysian non-governmental organization. Client: ASEAN Environmental Improvement Project. October 1994, January 1995, on-going throughout 1995.

**Pollution Prevention Library Design.** Specifications for the contents of a technical library and information center in Manila, to be a pilot project for the ASEAN Waste Reduction Information Network. Client: ASEAN Environmental Improvement Project. In progress.

**Directory of Industry Environmental Information Resources.** Identifies over 600 environmental contacts at trade journals, trade associations, government programs and leading companies in 18 United States manufacturing industries, from Aerospace to Wood Products. Client: ASEAN Environmental Improvement Project. November 1994.

**Survey of Pollution Prevention Resources.** Survey of 50 pollution prevention technical assistance specialists across the U.S. to identify their most useful pollution prevention information resources. Purpose: "Ground truth" for P2 library design. Client: ASEAN Environmental Improvement Project. November 1994.

**Workshop on Pollution Prevention for Industrial Facility Managers** (two-day workshop). Client: ASEAN Environmental Improvement Project. Manila, Singapore, Jakarta. 40-90 people per workshop. June and October, 1994.

**Workshop on Pollution Prevention for Consultants** (two-day workshop). Client: ASEAN Environmental Improvement Project. Manila, Singapore, Jakarta. 20-50 people per workshop. June and October, 1994.

**Waste Reduction Assessments for Industrial Facility Managers** (one-day workshop). Client: ASEAN Environmental Improvement Project. Manila, Kuala Lumpur, Bangkok. 40-60 people per workshop. June and October, 1994.

**Workshop on Pollution Prevention for International Development Banking** (one-day workshop). Client: The World Bank, Washington D.C. Sponsored by the East Asia and Pacific Environment Unit. May 1994.

**Workshop on Pollution Prevention for a Local Government Task Force** (one-day workshop). Client: ASEAN Environmental Improvement Project. Cebu City, Philippines. 25 people. October 1993.

**Workshop on Pollution Prevention for Industrial Facility Managers** (one-day workshop). Client: ASEAN Environmental Improvement Project. Cebu City, Philippines. 50 people. October 1993.

**Workshop on Pollution Prevention for Government Environmental Inspectors** (one-day workshop). Client: Philippine Department of Environment and Natural Resources. Manila. 50 people. March 1993.

**Workshop on Waste Minimization: An Emerging Corporate Strategy** (five-day workshop). Client: US Agency for International Development. Manila. 60 people, plus 150 people in one-day kick-off conference. January 1993.

**Workshop on Pollution Prevention for an Industry Association** (one day). Client: Philippine Business for the Environment. Manila. 40 people. March 1993.

**Design of a Clean Production Technical Assistance Strategy for Indonesia.** Conducted for the U.S. Agency for International Development, Indonesia Mission. November-December 1993.

### ***U.S. Projects***

**Pollution Prevention Plan for US Navy, Whidbey Naval Air Station.** Development of a technical and management plan for pollution prevention. Client: US Navy. In progress.

**Workshop on Management Accounting for Pollution Prevention** (half-day workshop). Washington Society of CPAs, Seattle. November 1994.

**Pollution Prevention Plan for a Printing Company.** Development of a chemical use and waste reduction plan meeting state requirements. Client: Dataprint, Inc., Seattle. September 1994.

### ***About SHAPIRO***

Shapiro and Associates, Inc. (SHAPIRO) is an environmental consulting company founded in 1974, with 75 professionals in three offices (Seattle, Portland, San Diego). The company has conducted over 1500 environmental projects, including impact statements, planning, regulatory analysis, ecological sciences, and public involvement.