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REAL-TIME TOXIC EMISSIONS MONITORING SYSTEM

**New Delhi, Bangalore, and Bombay, India
November 6-21, 1993**

Prepared for:

U.S. ASIA ENVIRONMENTAL PARTNERSHIP



WORLD ENVIRONMENT CENTER (WEC)

DISCLAIMER

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I. EXECUTIVE SUMMARY

Indian environmental laws, policies, and public awareness in general are now at the point where there is an appreciation for the need for air quality monitoring. Many Indian businessmen and government officials realize that such monitoring is appropriate and necessary for both industrial and urban application.

Under the auspices of the United States-Asia Environmental Partnership (US-AEP) Environmental Business Exchange (EBE) program, through a Cooperative Agreement with the World Environment Center (WEC), Kris Kudrnac, CEO of k3 CORP traveled to India from November 6 through 21, 1993. This report presents Mr. Kudrnac's findings and recommendations resulting from his visit. k3 CORP specializes in the development, design, and installation of environmental monitoring systems. The central purpose of the mission was to introduce k3's systems, specifically its Integrated Environmental Monitoring And Alarm System (IEMAAS), to the Indian business and government sectors. The intent was to accomplish this introduction through Mr. Kudrnac's attendance at the Indo-U.S. Joint Business Council Meeting, with the goal of demonstrating IEMAAS; various meetings with Indian Environmental authorities, potential partners, and customers, with the goal of educating them to k3's applications, and; the New Delhi Trade Show, with the goal of making additional environmental and business contacts.

These specific objectives were met. The trip also generated several additional environmental information transfer benefits. First, many of the Indian contacts had initially been unaware of the technology or the environmental monitoring philosophy presented by k3 CORP. As a result of these meetings, they determined that both had application in the Indian environment. It was also determined that there is a serious shortage of internal funding for such technology in India, and that assistance from outside organizations is needed.

Finally, the trip resulted in first and second contacts being made with a number of viable Indian partners for k3 CORP. The process for selection of a final Indian partner(s) should be completed within the next 60 days. Several meetings with customers were also successfully completed, with follow-on action plans being put in place.

II. INTRODUCTION

k3 CORP is a corporation located in Great Falls, Virginia, which specializes in the development, design, and installation of environmental monitoring systems. These systems typically are installed in large chemical plants, power plants, or other factories where toxic chemicals or pollutants are present. Systems are also installed in and around cities, where they monitor air and water quality. Common characteristics of all k3 systems is that they operate continuously, in real-time, and collect large amounts of data which they display in a graphic, easy to understand format. k3's systems are far more than data collection systems; they are safety/environmental management tools.

k3's President, Kris Kudrman, has a chemical engineering background [Massachusetts Institute of Technology (MIT), MChE '73] as well as a business background (Harvard, MBA '77). His practical experience has involved running several international businesses, particularly in the chemical and environmental areas. He now focuses on developing k3's environmental monitoring business, and running a joint venture located in Central Europe which is similarly oriented.

The exchange was sponsored by US-AEP EBE program through its Cooperative Agreement with WEC. The exchange took place between November 6 and November 21, 1993, and included travel to New Delhi, Bangalore, and Bombay, India.

The purpose of k3 CORP's exchange was to introduce the company's Integrated Environmental Monitoring And Alarm System (IEMAAS) to potential Indian customers and to explore potential marketing opportunities. The exchange included three specific goals:

- Attending the Indo-U.S. Joint Business Council Meeting in New Delhi, and demonstrating k3 CORP's IEMAAS technology
- Attending meetings with a number of potential Indian consumers, to inform them of the benefits of the IEMAAS technology and approach to environmental monitoring, and its applications in India, as well as exploring opportunities for marketing the technology in India
- Attending the New Delhi Trade Show as a further opportunity to develop Indian business contacts.

The presentation and software demonstration at the Indo-U.S. JBC meeting was successfully completed, with approximately 100 people attending the demonstration. This presentation also resulted in 33 follow-on contacts which were followed up during the trip, through personal meetings. The eight meetings which had been scheduled from Washington D.C. prior to the trip were held, as were 12 additional meetings which were

the result of in-country developments. Finally, the New Delhi Trade Show was attended, although it was found to be of marginal benefit because of the type of exhibitors present.

III. DISCUSSIONS AND FINDINGS

A. Introduction

Mr. Kudrnac held meetings with Indian environmental authorities and business executives, including potential partners and customers, with the goal of introducing k3's systems, their uses, and benefits. The meetings were held in New Delhi, Bangalore, and Bombay, India. His overall impression of the Indian market for k3's products, and other related U.S.-produced environmental monitoring hardware, is that the market is very large, and is in the early stages of obtaining the motivation and funding to make purchases. However, it seems clear that a strong Indian partner is mandatory for any U.S. company, other than possibly the largest ones who would install their own presence, wishing to do business.

Based on many discussions, it is clear that significant bureaucratic impediments exist to doing business, from import duties, to transportation fees, to the many permits and documents required to proceed with an Indian project. All the more reason for an Indian partner, who will be local, accustomed to the bureaucracy, and in a better position to get these matters dealt with than someone attempting to do so from the U.S. via long-distance calls or faxes.

The level of interest on the part of the potential Indian partners which we spent time with was significant. As of the date of this report, two weeks after returning from India, we are in the process of bidding a \$2 million environmental monitoring system in conjunction with Chemtex, and a \$100,000 job in conjunction with Chemtrols. We have also had continuing follow-on correspondence with Instrumentation Ltd., and Yokogawa Blue Star, in both cases indicating considerable interest in cooperative project work.

B. Activities

1. Indo-U.S. Joint Business Council Meeting - New Delhi - November, 9-10

Attended the two day meeting and gave a presentation and demonstration of Integrated Monitoring And Alarm System (IEMAAS) technology. Approximately 100 people were present.

Based on comments from those present, the technology and the approach to environmental monitoring presented were previously little known in India. There was considerable interest, and several follow-on meetings were scheduled.

2. Meetings with Potential Partners and Customers

a. **Yokogawa Blue Star Ltd.**

On November 9, Mr. Kudrnac met with C.L. Madan, Managing Director of Yokogawa Blue Star (YBS). YBS is a Japanese-Indian joint venture active in the process control field. Madan is interested in the possibility of expanding YBS' business into the environmental monitoring field. They are a potential Indian partner for k3's activities. YBS has annual sales of approximately \$15 million, employs 400 people, and has sales offices in the major Indian cities.

Reviewed k3's technology and scheduled a visit to YBS's Bangalore plant to meet with senior marketing, operations, and project personnel. Visited the Bangalore facility on November 17, and gave two presentations. YBS is interested in k3's software as well as the U.S.-produced sensors and analyzers which k3 uses in its systems. A follow-up action plan was developed to determine how best k3 and YBS can cooperate in the future.

b. **Indo-American Chamber of Commerce (ICC) Meeting**

On November 11, Mr. Kudrnac gave a presentation to approximately 150 attendees of the ICC meeting. This was followed by a number of one-on-one meetings, including Chemtex, Chevron, and Fremont Group.

c. **Shriram Institute**

Mr. Kudrnac gave a presentation on November 12 to this R&D organization which is involved in various environmental and other programs. Shriram is a non-profit, non-government organization (NGO), which employs approximately 350 people and has revenues of about \$1.2 million. The goal was to inform them about our technology, leading to future referrals, and also to gather information about the state of the environment and environmental policy in India.

d. **Chemtex Engineering of India Ltd.**

The initial contact with Chemtex was made at the Joint Business Council (JBC) presentation, followed up by Chemtex at the ICC meeting. A further meeting was held in Delhi with Chemtex's resident marketing manager, N. Krisnamurthy. A follow-on meeting at Chemtex's Bombay offices with senior management was planned for November 19.

Chemtex, based in New York, is a global technology transfer/engineering company specializing in synthetic fiber plants. The Indian operations employ about 500 people. The company has an interest in adding an environmental capability to its list of skills, and

it was in this context that k3's technology and skills were discussed. The outcome of the meetings was an agreement to meet with Chemtex's CEO in New York to further discuss ways of cooperating not only in India, but also in other developing economies where Chemtex is active, including China, Indonesia, Russia, and C.I.S.

e. Development Alternatives

On November 13, Mr. Kudrnac met with Mr. Ashok Khosla, President of this non-profit NGO which is based in New Delhi. Also present at the meeting and presentation were a number of representatives from the Netherlands National Institute of Public Health and Environmental Protection. Mr. Kudrnac informed them of k3's technology with a view to Khosla being a source of future contacts and leads.

f. Chevron Oil

Mr. Kudrnac met with Mr. M. Rao initially at the ICC meeting. Met again to discuss k3's technology in detail, and to learn about India's environmental policies and trends for the future.

g. Central Pollution Control Board

Mr. Kudrnac met with Dr. B. Sengupta, head of the implementation branch of this organization. Discussed urban applications of k3's technology, and learned the extent to which air quality monitoring is in place in India (very limited, and in poor repair). Sengupta expressed interest in k3's technology, particularly as part of a government sponsored package.

h. Birla Software & Consultancy Inc.

Mr. Kudrnac met with senior management to present k3's technology and discuss possibilities for cooperation. Birla is one of the largest industrial conglomerates in India (revenues of almost \$600 million), and this particular group, which is new, has interests in the environmental field. Their main usefulness would probably come in introducing k3's technologies to the various Birla manufacturing plants.

i. Hinditron Tektronix Instruments (HTI) Ltd.

Mr. Kudrnac initially met with HTI's Chairman, Hemant Sonawala, at the JBC meeting. He subsequently met with their Technical Director, R. Kannan, in Bombay, to present k3's technology and discuss cooperation in the Indian market. HTI is anxious to cooperate with k3. Their Technical Director accompanied K. Kudrnac to a meeting with Cyanides & Chemicals Co., a potential customer.

j. Instrumentation Limited (IL)

Mr. Kudrnac met with General Manager and Analyzer Division Manager to present k3's technology and discuss cooperation in Indian market. IL is a large instrument manufacturer/assembler (4,000 employees, revenues of about \$50 million), which is interested in expanding into the environmental area. The company is owned by the Indian Government. The company is interested in incorporating k3's software and U.S.-produced analyzers into their turn-key projects.

k. Cyanides & Chemicals Co. (CCC)

Mr. Kudrnac met with the senior management of this potential customer. He presented k3's technology and discussed a proposal by k3 which CCC had received earlier. They are very interested in purchasing a complete system, including U.S.-produced toxic gas sensors, but they would require financial assistance.

During the meeting they discussed various possibilities for reducing the system cost, including the possibility of using USAID funding to some extent - TEST/ICICI funds. k3 will follow this up.

l. Andrew Yule & Co. Ltd.

Mr. Kudrnac met with the General Manager of the Government of India enterprise which is involved in process instrumentation and control, as well as in many other fields. He presented k3's technologies and discussed possibilities for cooperation. This company appeared to be very unfocused, and did not appear to be a good potential partner for k3.

m. Chemtrols Engineering Pvt. Ltd.

Mr. Kudrnac met with the owner and senior management of this process instrumentation and control company. He presented k3's technologies and discussed the potential for cooperation in India, which is considerable. Chemtrols is a small (\$5 million in revenues, 60 employees) very focused company which wants to expand into environmental monitoring. It has already installed a small number of basic monitoring systems, and wishes to cooperate with k3 in a number of areas, including purchasing k3 software, U.S.-produced environmental sensors and analyzers. Mr. Kudrnac visited one of their current customers (a coal-fired power plant expansion), where k3's technologies were presented and a number of technical questions were answered. A follow-up action plan was prepared, and both parties agreed to cooperate on a number of initial projects.

3. Meetings with Sponsor Agencies

a. Industrial Credit & Investment Corporation of India (ICICI)

Mr. Kudrnac met with several managers involved with the TEST program. He presented k3's technologies, and discussed possibilities for cooperation with ICICI for funding of various projects. The parties discussed concept of "demonstration projects," such as an integrated air quality monitoring system for the Bombay region.

b. USAID, U.S. Embassy Personnel Meetings

On several occasions, Mr. Kudrnac met with U.S. Embassy personnel, during which k3's technologies and their applicability to the Indian environmental situation were discussed.

He also met with David Hess, in charge of TDE/USAID, and discussed k3's activities in India. In addition, he met several times with Amitabha Ray, USAID, to discuss k3's activities and plans in India.

c. Coopers & Lybrand/Metropolitan Environmental Improvement Program (MEIP)

Mr. Kudrnac met with Julie Rezler, project manager for the MEIP program in Bombay. He presented k3's technology, and discussed, at length, the possibilities for implementing this technology in India. Rezler had a number of excellent contacts (Chemical Producers Association, Bombay) which she will provide to k3 for follow-up presentations and meetings.

4. New Delhi Trade Show - November 16

Mr. Kudrnac spent several hours at this show. He obtained copies of several environmental regulations from the Central Pollution Control Board (CPCB) display, and spoke with a number of exhibitors. This show is definitely not a worthwhile investment in its current form.

IV. CONCLUSIONS AND RECOMMENDATIONS

Based on meetings with over 100 government environmental authorities, business leaders, potential partners, and customers, it seems clear that India is at the point in its environmental protection development where there is significant potential for American companies in general, and k3 CORP in particular, to get involved. The major hurdle is funding, particularly in the case of public projects.

Implementation of the following recommendations would be very helpful in establishing a U.S. presence in the environmental field in India.

Recommendation 1: Schedule another trip to India to present one-day seminars on k3's technology and related U.S.-produced environmental analyzer technology.

An additional trip to India should be scheduled, with the purpose of presenting several one-day seminars on k3's technology and related U.S.-produced environmental analyzer technology. The seminar would be presented by k3 and two or three other American participants. The groups to whom the presentations would be made would include various chemical industry groups, environmental groups, possibly the Ministry of Environment/Central Pollution Control Board, and other interested groups. This trip should take place in the first or second quarter of 1994.

Recommendation 2: Provide funding for one or more "model" environmental monitoring systems to be installed in India.

Funding should also be made available for one or more "model" or "demonstration" environmental monitoring systems, to be installed in India. Specific possibilities include ambient air monitoring systems for Bombay, Calcutta, or New Delhi, or an integrated monitoring System for an area of high chemical plant concentration (i.e., Bombay region). A critical component to the success of realizing any of these projects will be the obtaining of funds from USAID, World Bank, or some other international organization.

Such model systems would have a direct, in-country environmental benefit, but would also serve as American models for future Indian systems. The model(s) would tend to encourage future purchases of American products and technologies. This funding should be committed to as quickly as possible, so that planning for the project(s) can start, and implementation to be completed in 1994.

The cost of the suggested model systems would depend on which specific model is chosen for implementation, and the level of sophistication chosen. However, in general terms, an ambient air monitoring system for a city such as Bombay would cost in the region of

\$5 million, installed and running. An integrated ambient air/stack emission system in the region of chemical factories would probably cost in the region of \$6-8 million, depending on the number of factories monitored, and the geographic size of the region.

In terms of payback, a significant point to bear in mind is that several foreign competitors to American environmental analyzer manufacturers are in the habit of "buying" market share. One recent example involved Horiba (a Japanese environmental analyzer manufacturer), who offered their equipment to an end-user in a developing country at 40 percent below Horiba's U.S. distributor prices. Within this context of assisting American companies to gain a foothold in the Indian market, the payback on USAID funds should be significant, if difficult to accurately measure.

APPENDIX A
PERSONS & ORGANIZATIONS VISITED

PERSONS & ORGANIZATIONS VISITED

1. **Yokogawa Blue Star Ltd.**
C.L. Madan, Managing Director
2. **Indo-American Chamber of Commerce**
V. Rangaraj, Executive Director
3. **Chemtex Engineering of India Ltd.**
G.S. Rao, Vice President, Construction & Materials Management
D. Banerjee, General Manager, Engineering
D.P. Roy, General Manager, Project
P.J. Lakhapate, General Manager, Process & Utility
Navin C. Patel, P.E., Vice President, Engineering
N. Krishnamurthy, Marketing Manager
4. **Birla Consultancy & Software Services**
Vrajendra Maloo, Jt. Executive President
Sarit K. Bose, Executive President
5. **Development Alternatives**
Ashok Khosla, President
6. **Chevron Oil**
M. Rao
7. **Central Pollution Control Board**
Dr. B. Sengupta, Sr. Scientist & Head of
Pollution Control Implementation Division
8. **Hinditron Tektronix Instruments Ltd.**
Hemant Sonawala, Chairman
R. Kannan, Technical Director
9. **Instrumentation Limited**
S.R. Bhatnagar, Dy. General Manager
Dr. Satyendra K. Gupta, Dy. General Manager,
Analyser Products Division
10. **Cyanides & Chemicals Co.**

11. **Andrew Yule & Co. Ltd.**
G. Ganguli, General Manager, Air Pollution Control Unit
12. **Chemtrols Engineering Pvt. Ltd.**
R.R. Nair, Director, Operations
K. Nandakumar, Managing Director
C.P. Titus, Manager, Analyser Systems
Rakesh Gupta, Vice-President, Marketing
R. Radhakrishnan
Virlesh N. Desai, Assistant Product Manager
13. **Industrial Credit & Investment Corporation of India**
K. Harinathan, Manager, TEST Group
Girish R. Mahajan, TEST Programme
14. **USAID/India**
Amitabha Ray, Chief, Environment & Energy Division
Dick Goldman, Director, Office of Technology Development & Enterprise
David W. Hess, Technology Development & Enterprise
15. **U.S. Embassy**
Jonathan M. Bensky, Counselor for Commercial Affairs
16. **Coopers & Lybrand**
Ms. Julie Rezler, Project Manager, MEIP-Bombay
17. **Shriram Institute for Industrial Research**
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Dr. D.A. Dabholkar, Joint Director
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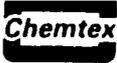
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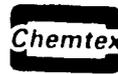
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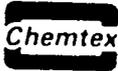
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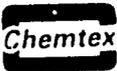
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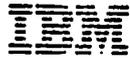
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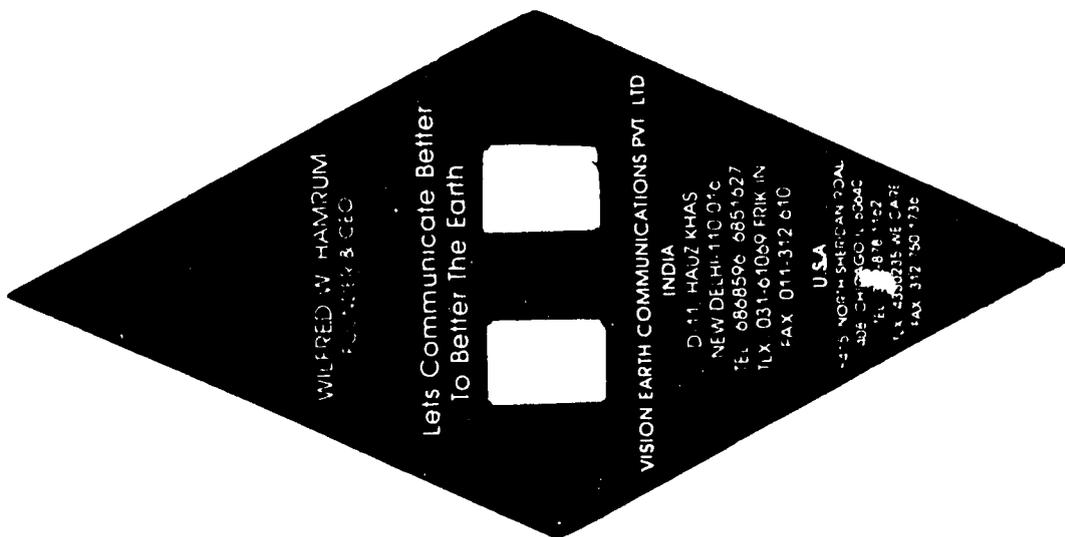
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APPENDIX C
CURRICULUM VITAE

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Curriculum Vitae

Kristian I. Kudrnac

Professional Experience

k3 CORP

President
1989 - Present

Major Achievements

- Arranged \$500,000+ financing for startup of k3 CORP. Approved as US DOD supplier of chemical agent detector paper. Closed several contracts with foreign governments for CADP and other specialty chemicals.
- Expanded trading activities to Central European market, focusing on both export of specialty products to the USA and import of US high tech products to the CE market. In the first year, developed several million dollars worth of new business.
- Established exclusive agencies in the USA for several Central European large (\$150 million+) manufacturing firms, and developed their US market strategies.
- Established a turn-key environmental monitoring system business based in Praha, Czech Republic, with exclusive agencies of several key US manufacturers.

Anachemia Chemicals Incorporated

President
1977-1989

Major Achievements

- Increased sales from \$200,000 to over \$4 million annually. Earnings increased from breakeven to 7%.
- Managed entry into biotechnology market, where the company is currently the leading manufacturer of biotech grade Phenol and other high purity chemicals.
- Established a dynamic, company-oriented team of 30 individuals, to accommodate future growth and profitability.
- Led financing and construction of a 30,000 square foot chemical plant to accommodate the increasing volume of business. Plant completed on time and budget.

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2

Summary

Introduced the Canadian parent company's laboratory chemical product line to the US market, and positioned the company as a customer oriented manufacturer of high purity lab chemicals. Cooperative efforts with biotechnology customers led to entry into this very profitable market niche. The company is now a major supplier in this market, and is well positioned for continuing strong and profitable expansion.

Anachemia Canada Inc.

Executive
Vice President
1982-1989

Major Achievements

- Increased sales from \$5 million to \$30 million annually through growth in existing markets, new products, and acquisition. Earnings increased to 9% of sales.
- Structured and implemented a leveraged buyout of the company's largest distributor, resulting in a 50% increase in sales and establishing the company as the largest Canadian laboratory chemical supplier.
- Increased margins to over 40% through improved company image, positioning, and cost reduction.
- Restructured senior management team, replacing VP-Sales, VP -Finance and VP-Operations. Reorganized these three functions to be more responsive to company needs.
- Negotiated a \$35 million multi-year contract with the US Department of Defense, and managed the company's government business.

Summary

Increased sales 600% and earnings to 9% by developing the company from a small and low perceived quality regional supplier of laboratory chemicals to the largest Canadian supplier, supplying quality products from plants and distribution centers from coast to coast. Restructured the organization and changed the corporate culture to accommodate the growth of the company and the changing business environment.

Corning Inc.

Senior Chemical
Engineer
1973-1975

Major Achievement

- Responsible for the development of a production process for manufacturing glass optical waveguide. Determined project objectives, manpower and capital equipment requirements, and coordinated the services of other groups involved in the project.

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Education

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Harvard Graduate School Of Business Administration
Boston, Massachusetts

Received *Master in Business Administration* degree in June 1977. Course emphasis on general management, with concentration in the area of Marketing, Operations Management, and Financial Control.

1972-1973

Massachusetts Institute Of Technology
Cambridge, Massachusetts

Received *Master in Chemical Engineering* in December 1973. Course emphasis on Process Design, Heat and Mass Transfer. Teaching Assistant in Heat and Mass Transfer course.

1967-1972

McGill University
Montreal, Canada

Received *Bachelor of Chemical Engineering*, Summa Cum Laude, in June 1972. Awarded Society of Chemical Industry Award, British Association James Watt Award, and University Scholar status.

30