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**SHIRAM INDUSTRIAL ENTERPRISES LIMITED (SIEL)  
ENVIRONMENTAL MANAGEMENT AND SAFETY SYSTEMS SURVEY**

**United States of America  
January 15 - February 9, 1994**

**Prepared for:**

**US - ASIA ENVIRONMENTAL PARTNERSHIP**



**WORLD ENVIRONMENT CENTER**

## **DISCLAIMER**

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

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## EXECUTIVE SUMMARY

From January 15 to February 9, 1994 Surendra Kumar, the Assistant General Manager of Shiram Foods and Fertilizer Industries (SFFI), a unit of Shiram Industrial Enterprises Limited (SIEL) in New Delhi, India, participated in an Environmental Business Exchange in the United States. The purpose of the exchange was to expose Mr. Kumar to U.S. technology in management of environmental and safety systems. A secondary purpose to the exchange was the identification of possible joint venture partners in the United States.

Beside being the Shiram Foods representative on this exchange, Mr. Kumar advises the SIEL group on environment and safety matters and has total responsibility in the areas of environment and safety for SIEL's flagship unit SFFI of New Delhi. SIEL is involved in the manufacturing operations of edible vegetable oils, heavy chemicals, sugar, compressors, and most of its units have captive thermal power plants.

The EBE covered five areas: environmental regulations and norms; industrial parks; aquaculture; chemical/hazardous material facilities; and fly ash utilization in thermal power plants. During the exchange, the participant, Mr. Kumar, visited numerous facilities and met with Environmental Protection Agency (EPA) officials. The participant was able to witness first-hand, techniques of environmental management and safety systems. It was concluded that there exist many areas for future cooperation between India and the U.S. Likewise, technological developments on waste treatment in the U.S. provided a model which was recommended to be studied further for adaptation in India.

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).

## II. INTRODUCTION

Surendra Kumar, Assistant General Manager of Shriram Foods and Fertilizer Industries (SFFI), New Delhi, a unit of Shriram Industrial Enterprises Ltd.(SIEL), participated in an Environmental Business Exchange (EBE) from January 15 to February 9, 1994. The exchange covered five issues: the study of environmental regulations in comparison to its Indian counterparts; industrial parks and their infrastructure development and waste management systems; aquaculture and the understanding of environmental constraints in this area; environment and safety compliance in chemical and hazardous waste plants; and fly-ash utilization in thermal power plants.

Accordingly, Mr. Kumar met with U.S. Environmental Protection Agency Officials (EPA) in Washington, DC, visited industrial parks in Durham, North Carolina and Knoxville, Tennessee, aquaculture farms in Benito, Texas as well as attended meetings with aquaculture experts at Texas A&M University. Finally, the participant visited Dow Chemicals in Houston, Texas as well as a thermal power plant which is currently employing fly ash utilization.

The exchange was considered a success and the exposure to U.S. environmental management technology, useful. Mr. Kumar was able to identify numerous areas for further collaboration, particularly with regard to industrial parks. Another potential area for cooperation was in the study of environmental services in aquaculture. Mr. Kumar believed further dialogue with the experts at Texas A&M University could be very worthwhile.

### III. FINDINGS

#### A. Environmental Regulations and Norms

##### 1. Meeting with U.S. Environmental Protection Agency (US-EPA)

In general, environmental regulations and practices are more stringent in the United States. Indian industry has much to learn from the U.S. EPA, particularly in the chemical industry and other industries which generate hazardous waste.

The EPA employs approximately 1800 scientists and engineers to compose and monitor environmental regulations. The permit system utilized by the agency mandates that an Environmental Impact Assessment (EIA) be performed on site before the necessary permit is issued. Ingredients of an EIA include: proposed action and alternatives; engineering and technical description of activities; project source terms; and unresolved environmental health and safety standards. The process is extensive and serves to aid in compliance to overall environmental norms.

During discussions with EPA experts, a number of topics were covered. A questionnaire on the following was given for comments and reply:

- a. Environmental guidelines of EPA on:
  - Chemical and hazardous units, thermal power plants and other waste generating units
  - EIA and risk assessment criteria for industry
  - Acceptable computer models for hydrology, soil, ambient air quality, and stack dispersion
  - Pollution displacement and rehabilitation criteria
  - Buffer zone and green belt criteria
  - Considerations for social/human environment
- b. Minimum U.S. national standards, procedures and limitations
- c. Industry specific and location specific standards
- d. Dry river standards
- e. Crisis management criteria - on-site and off-site
- f. Standards of American industry in India
- g. Comments on absolute liability
- h. Role of regulatory bodies

- i. Role of government (state and local), experts, NGOs, public community participation, and composition of site appraisal committee.
- j. Rules on manufacture, storage, and import of hazardous chemicals
- k. Ambient air monitoring criteria
- l. Stack height criteria
- m. Provisions under "Permit System" in water, air, cess, and Environment Protection Act.

A number of laws and regulations were discussed throughout this meeting and Mr. Kumar was able to have many questions about U.S. regulations and norms answered.

**B. Industrial Parks**

Development of industrial parks in the United States is a unique marketing concept encompassing the development of infrastructure facilities, participation of the local community and government and experts in the vicinity. In addition, the focus in development of these parks in the U.S. has led to the operation of common effluent and sewerage treatment. This system of environmental management draws upon the latest technology in the area to select hardware and utilizes minimum manpower. The result is an efficient system of management. This was identified by the participant as an area for further dialogue between American entrepreneurs and their Indian counterparts.

1. Research Triangle Park (RTP)

Contact:

Ms. Jean Brewer  
Research Triangle Foundation  
2 Hanes Drive  
Durham, NC  
tel. 919-549-8181  
fax 919-549-8246

The Research Triangle Park, established in 1959, is composed of 6800 acres strategically located within 15 minutes of three universities as well as Durham/Raleigh International Airport.

RTP has proven to be quite successful in this area. Ninety percent of all companies located in the park have expanded. International Business Machines (IBM) is the park's largest employer, employing nearly 8500 in the park and 2500 in the

surrounding area. Aside from major growth in employees in recent years, the park's technological base has also expanded. Microelectronics, communications industries and super computer centers now make up a large part of the park's industrial base. The park is now comprised of 65 research and 50 services corporations with fifty percent from the U.S.

The local government is an active participant in the activities of the park. Local government runs all water, power, sewerage and effluent systems, thus making them an active partner in the success of the industrial park.

## 2. Tellico Reservoir Development Agency (TRDA) - Tellico West Industrial Properties

Contact:

Mr. Larry Collah  
TRDA  
59 Excellence Way  
Venore, TN  
tel. 615-884-6868  
fax 615-673-8599

Tellico Industrial Park is composed of 21,500 acres and can be accessed by highway, rail, air and water. As an employer of 2000, a community development plan was initiated in 1982 in order to further relations between industrial development and community development in this region. Not unlike other such parks, utilities are run by the local government and there exists a common effluent and sewerage treatment facility.

### **C. Aquaculture Farms**

#### 1. Southern Star Shrimp Farm

Contact:

Southern Star Shrimp Farm  
Route 2, Box 442E  
San Benito, TX  
tel. 210-748-2333  
fax 210-399-0125

Mr. Kumar met with aquaculture specialists to observe the latest technology in the field of aquaculture. Throughout the tour of the Shrimp Farm, he was accompanied by aquaculture specialist, Tony Risinger.



## 2. Harlingen Shrimp Farm

Contact:

Harlingen Shrimp Farm  
Route 3, 300K  
Centerline Road  
Los Fresnos, TX  
tel. 210-233-4872

The participant toured the facility with aquaculture specialist, Tony Risinger.

## 3. Texas A&M University, College Station

Contact:

Mr. Granvil Treece, Aquaculture Specialist  
Texas A&M University  
1716 Briarcrest, Suite 702  
Bryan, TX  
tel. 409-845-7527  
fax 409-845-7525

A tour of the Aquaculture Research Center at College Station was conducted. Some of the highlights were: the observation of research and development work on nutrients, quality and safety standards of shrimp farms and pilot plant studies. On the tour, Mr. Kumar was accompanied by Dr. Delbert Gatlin of the Aquaculture Research Center and Mr. Bill Salfer of the Aquaculture Management Association, both facilities located in College Station.

## **E. Chemical Plants**

### 1. Dow Chemicals, Houston, Texas

Contact:

Margaret Gaspard  
Safety Process Management  
Dow Chemicals  
Houston, TX  
tel. 409-238-7623  
fax 409-238-3689

Dow Chemicals produces a number of products such as magnesium, styrene, plastics, adhesives, solvents, glycerine, glycol, chlorine, caustic soda, and more. Adhering to the policy of "We will do it safety or we won't do it," Dow employs 120 people who are solely responsible for safety and waste management.

## 2. E.I. Du Pont de Nemour Facility, Niagara, New York

A tour of the Du Pont facility was conducted highlighting environmental and safety provisions. Compliance to the New York State permit system was noted. This facility, which operates beside Niagara Falls, is notable for its brine preparation through wastewater.

## **F. Fly Ash Utilization in Thermal Power Plants**

### 1. Radian Corporation, Austin, Texas

**Contact:**

Mr. Avi Patkar, Consultant  
Radian Corporation  
tel. 513-459-9048

This meeting with the environmental consultants brought many different aspects of fly ash utilization to light. The efficiency of this type of system is quite good, recycling some of the ash, however, major cost is involved. Costs of the kiln, as well as the cost of the pelletizing unit were discussed. Two companies were identified by Radian as manufacturers of pelletizing units: F.L. Schmidt of Germany and Filer-Pennsylvania, its U.S. subsidiary.

### 2. Conversion Systems, Inc. Horsham, Pennsylvania

**Contact:**

Mr. Robert Hilton, Vice President of Sales & Marketing  
Conversion Systems, Inc.  
200 Old Welsh Road  
Horsham, PA  
tel. 215-784-0990  
fax 215-784-0970

The tour of Conversion Systems, Inc. showed the participant the utilization of fluidized bed combustion ash pellets. Also observed was hydrothermal processing of pellets. Hydrothermal processing involves the chemistry of hot water under pressure to carry out dissolution, leaching and precipitation reactions. The hydrothermal activation of fly ash in a clinker mix by lime gives a fast pozzolonic reaction in solution.

It was concluded from the tour that: it is feasible to use FBC ash in cement; hydrothermal processing is necessary; porosity and size distribution of ash differ according to the process utilized; and most importantly, details of the working mechanism of the utilization of fly ash are still not yet clear.

### 3. Ferro Tech, Detroit, Michigan

Meeting with representatives from Ferro Tech, Mr. Kumar further discussed fly ash utilization technologies. Among the topics covered in the course of discussion were: agitation and pelletizing; compacting and briquetting; heat treatment - sintering; and waste agglomeration.

## **IV. CONCLUSIONS AND RECOMMENDATIONS**

This exchange was extremely educational and informative to its participant, Mr. Surendra Kumar. Further information from a variety of sources such as EPA, Dow Chemicals and Du Pont is expected to be sent to India. In addition, the following areas have been identified for further development and follow-up.

### **A. Environmental Protection Agency**

Follow up on:

1. Dispersion/emission models
2. Environment Management Plan
3. Details of Best Available Technology (BAT) based standard
4. Norms for chemical emergency preparedness and accident prevention
5. Response call: chemical industry commitment to improve health, safety, and environment
6. Dangerous good emergency response -- interactions on transportation rules and regulations

### **B. Industrial Parks**

Follow-up will include more study of techniques of environmental management including effluent treatment, and landscaping.

### **C. Aquaculture**

1. Pursue possibility of mutual exchange (or technology transfer) of developmental services, monitoring systems, formats for Environmental Impact Assessment - carried out through joint program with aquaculture farms and development wing of Texas A&M University, College Station, Texas.
2. Look for future collaboration between Texas A&M University and primary research institutions in India to develop acceptable environmental standards.

### **D. Chemical and Hazardous Plants**

1. Develop possible technology transfer of software development in areas of safety with Dow Chemicals and Du Pont.
2. Pursue potential exchange for technological development on waste treatment -- particularly in the area of biological waste treatment.

### **E. Fly Ash Utilization in Thermal Power Plants**

Follow-up plans will explore facilities in India for set-up of pilot plants by U.S. companies/agencies.

## APPENDICES

## APPENDIX A

### ITINERARY

#### January 19, 1994

- Meeting with EPA Officials regard Environmental Regulations
- Meeting with Jeff Hallet and Emily Harwitt of Sanders International
- Meeting with V. Srinivasan, WEC, regarding WEC's Emergency Prevention and Preparedness Program (LAMP)

#### January 20, 1994

- Meeting at Research Triangle Foundation, Ms. Jean Brewer, regarding the Research Triangle Park (RTP) and its management systems (Raleigh, North Carolina)
  - Address: Research Triangle Foundation
  - 2 Hanes Drive
  - Durham, NC
  - tel. 919-549-8181
  - fax 919-549-8246

#### January 21, 1994

- Meeting with Terry Rolan, Director, City of Durham, Water Resources Administration regarding wastewater treatment facilities for RTP.
  - Address: Water Resources Administration
  - 1600 Mistlake Drive
  - Durham, NC
  - tel. 919-560-4381
  - fax 919-560-4479

#### January 22 & 23, 1994 (Weekend - free time in McAllen, Texas)

#### January 24, 1994

- Visit Southern Star Shrimp Farm, San Benito, Texas -- accompanied by Mr. Tony Risinger, Aquaculture Specialist.
  - Address: Southern Star Shrimp Farm
  - Route 2, Box 442E
  - San Benito, TX
  - tel. 210-748-2333
  - fax 210-399-0125

- Visit to Harlingen Shrimp Farm, San Benito, Texas  
Address: Harlingen Shrimp Farm'  
Route 3, 300K  
Centerline Road  
Los Fresnos, TX  
tel. 210-233-4872

#### **January 25, 1994**

- Meeting with Mr. Granvil Treece, Aquaculture Specialist, Texas A&M University, College Station, Texas to discuss innovative technology and techniques related to shrimp culturing.  
Address: Texas A&M University  
1716 Briarcrest, Suite 702  
Bryan, TX  
tel. 409-845-7527  
fax 409-845-7525

- Tour of Aquaculture Research Center, College Station, Texas. Met with Dr. Dalbert Gatlin, tel. 409-847-9333 and Mr. Bill Neal, tel. 409-845-5759. Accompanied by Granvil Treece.

#### **January 26, 1994**

- Meeting with Aquaculture Management Association and tour its research facilities, College Station, Texas. Met with Mr. Bill Salfer, tel. 409-567-9532.

#### **January 27, 1994**

- Visit to Dow Chemical Company regarding safety process management in chemical industries.  
Contact: Margaret Gaspard, tel. 409-238-7623, fax 409-238-3689

#### **January 28, 1994**

- Meeting with Radian Corporation regarding Fly Ash Utilization Technologies  
Contact: Mr. Avi Patkar, tel. 513-459-9048

**January 29 & 30, 1994** - free time in Austin, Texas

#### **January 31, 1994**

- Meeting with Mr. Larry Collah, Tellico Reservoir Development Agency (TRDA) and tour of Tellico West Industrial Properties (Industrial Park), Venore, Tennessee.  
Address: TRDA  
59 Excellence Way



Venore, TN  
tel. 615-884-6868  
fax 615-673-8599

**February 1, 1994**

- Meeting with Big River regarding fly ash utilization technologies, Mr. Barclay Burks, President of Big River, Atlanta, Georgia, tel. 404-804-8070.

**February 2, 1994**

- Meeting with Mr. Robert Hilton, Vice President of Sales and Marketing, Conversion Systems, Inc. regarding fly ash utilization technologies.  
Address: 200 Old Welsh Road  
Horsham, PA  
tel. 215-784-0990  
fax 215-784-0970

**February 3, 1994**

- Visit to E.I. Du Point de Nemours facilities regarding Safety Process Management in Chemical Industries, Niagara, New York

**February 4, 1994**

- Meeting with Ferro Tech regarding fly ash utilization technologies, in Detroit, Michigan.

**February 5, 1994**

- Meeting with Mr. Kris Venkat, Phyton Catalytic, Inc. regarding aquaculture technology, in Ithaca, New York.

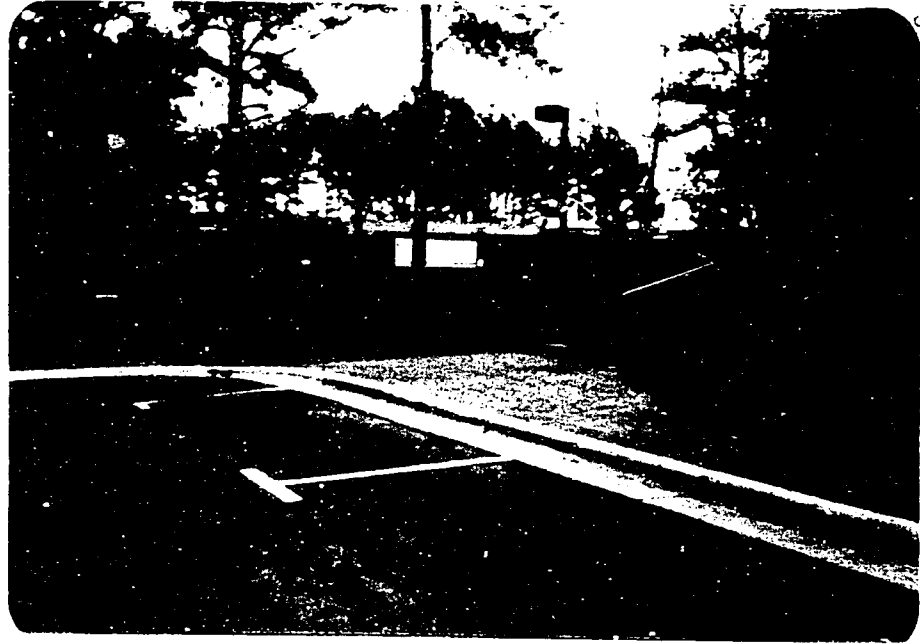
**APPENDIX B**

**BUSINESS CARDS OF PERSONS CONTACTED**



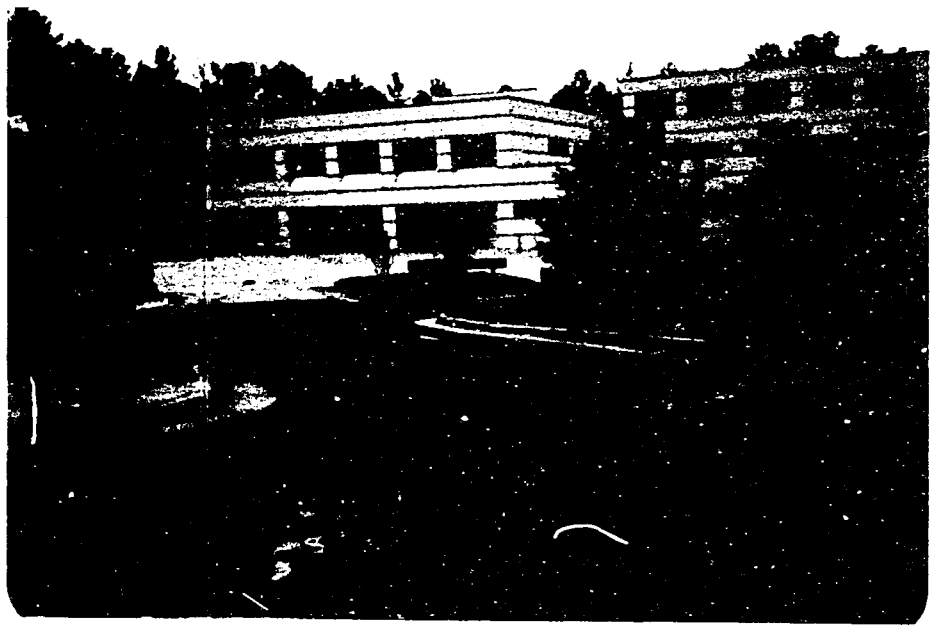
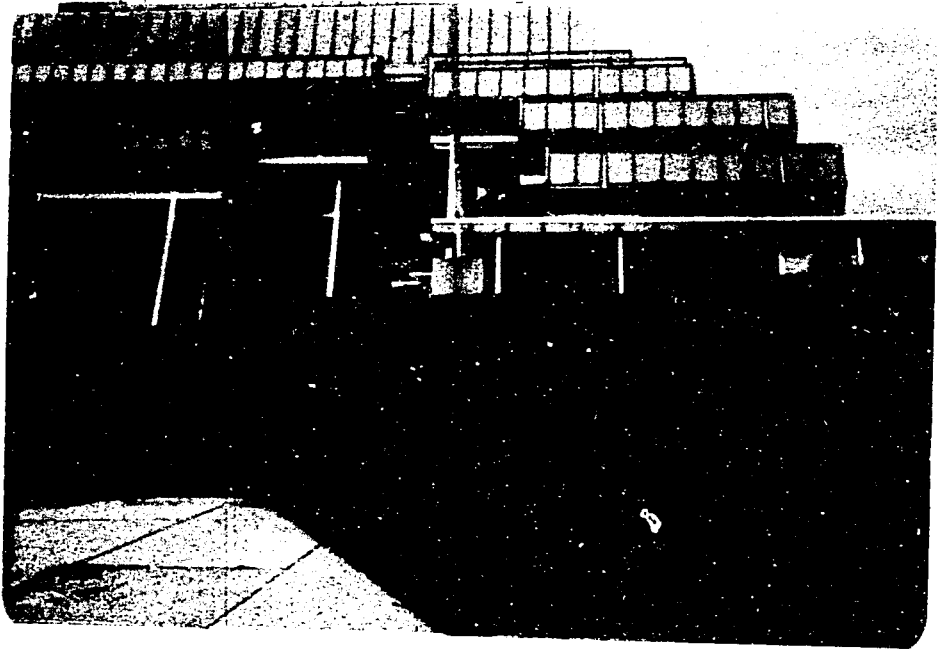
January 20-21

Visit to Industrial Park,  
Durham, North Carolina.



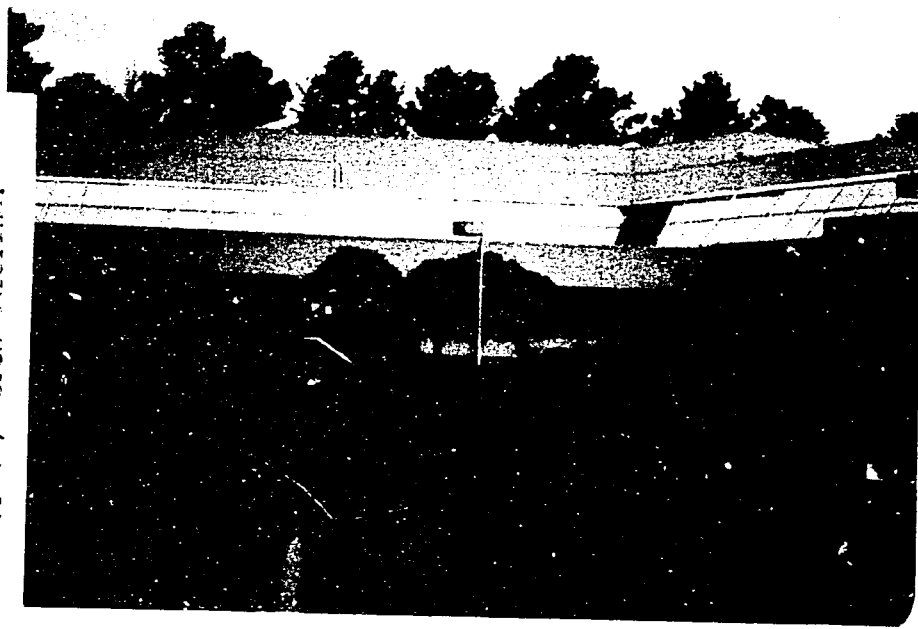
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January 26-41

Visit to Industrial Park,  
Durham, North Carolina.



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January 25  
With Mr. Granvil Treese,  
Aquaculture Specialist,  
A&M University, Texas.

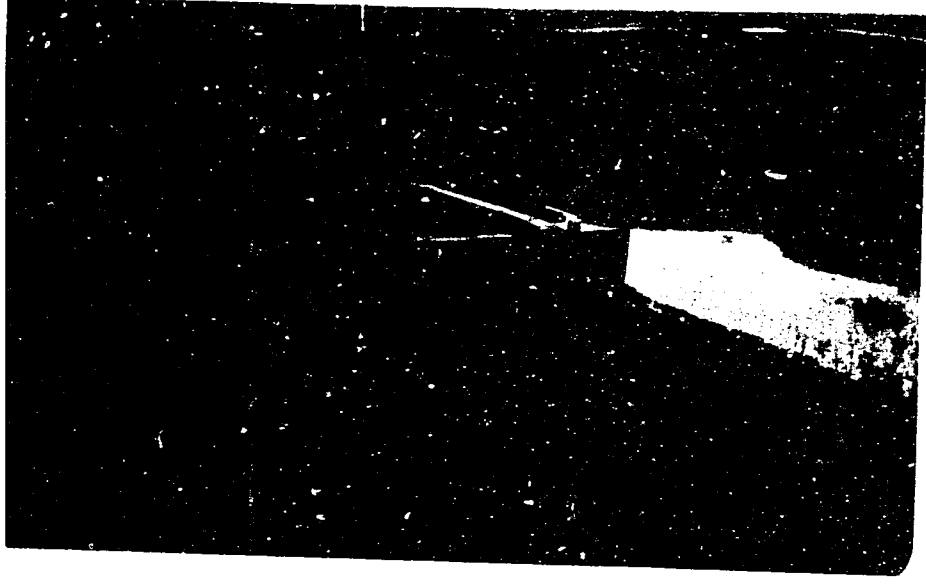


January 24  
With Mr. Tony Bisinger,  
Aquaculture specialist,

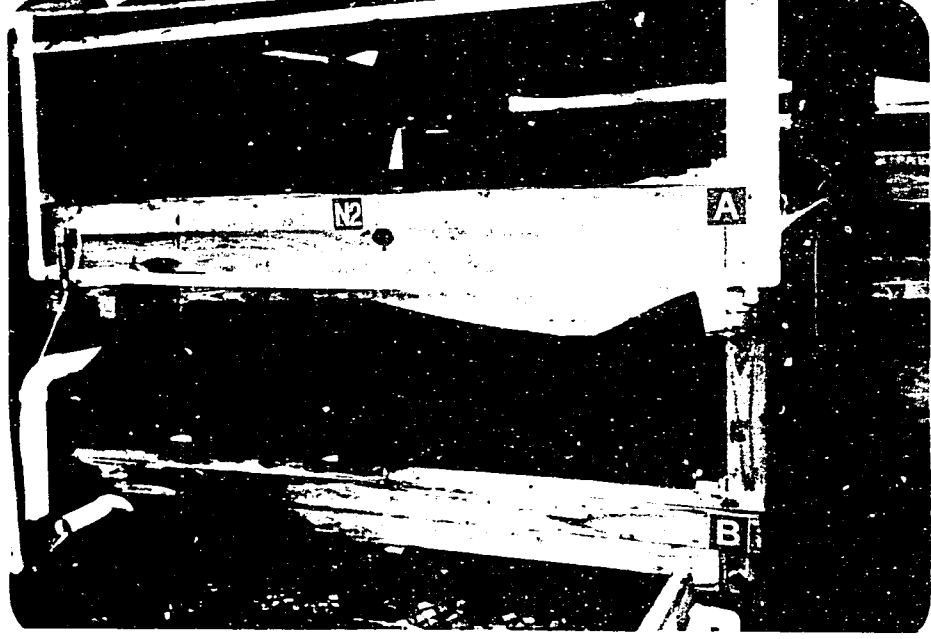
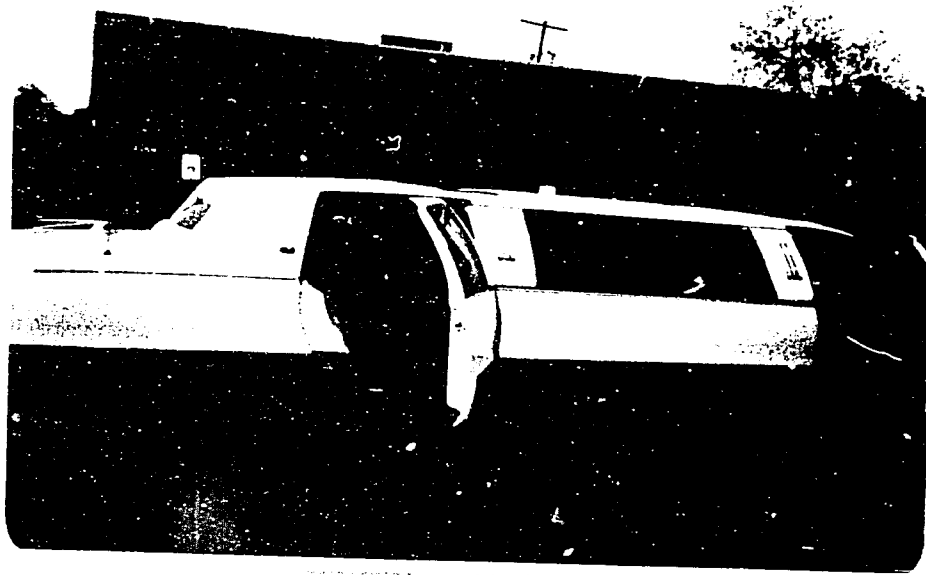
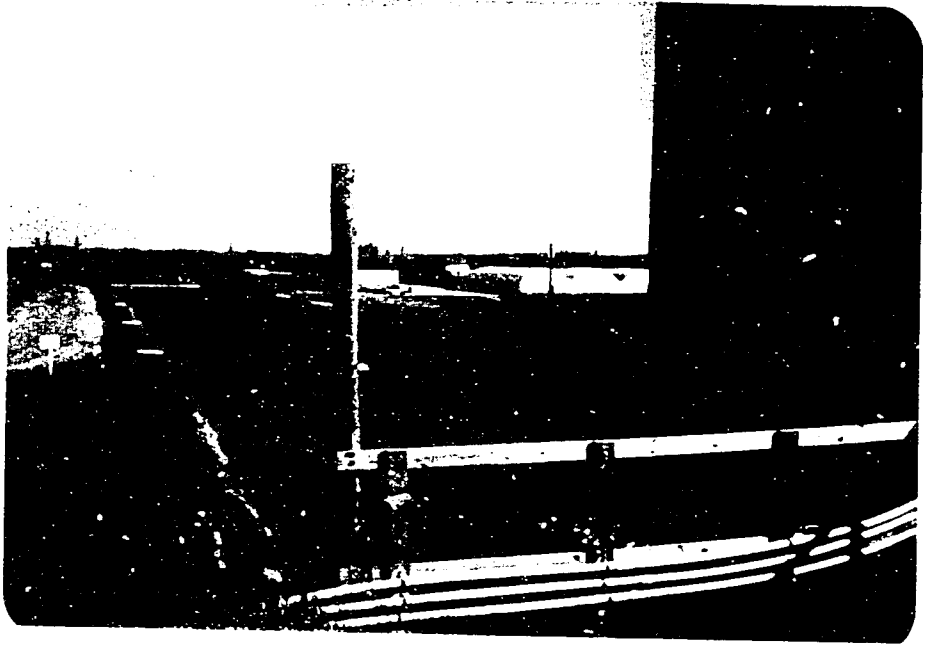


January 26  
With M/s Granvil Treese,  
Feenan D. Jennings & Billy  
P. Salzen in Research  
Centre, Aquaculture  
Management Association,  
College Str., Texas.

81



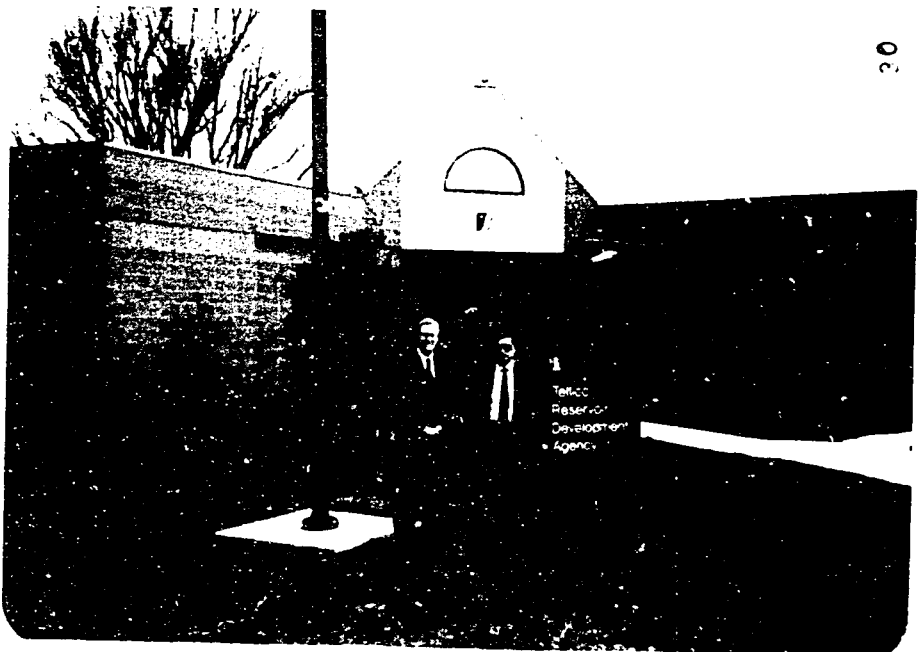
visit to Amniculture Farm,  
Benito, Tx.





Visit to Industrial Park,  
Vanore, Tennessee.

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13 Avenue J

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January 26  
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With M/s Granvil Preece,  
Peenan D. Jennings,  
Aquaculture Specialists.

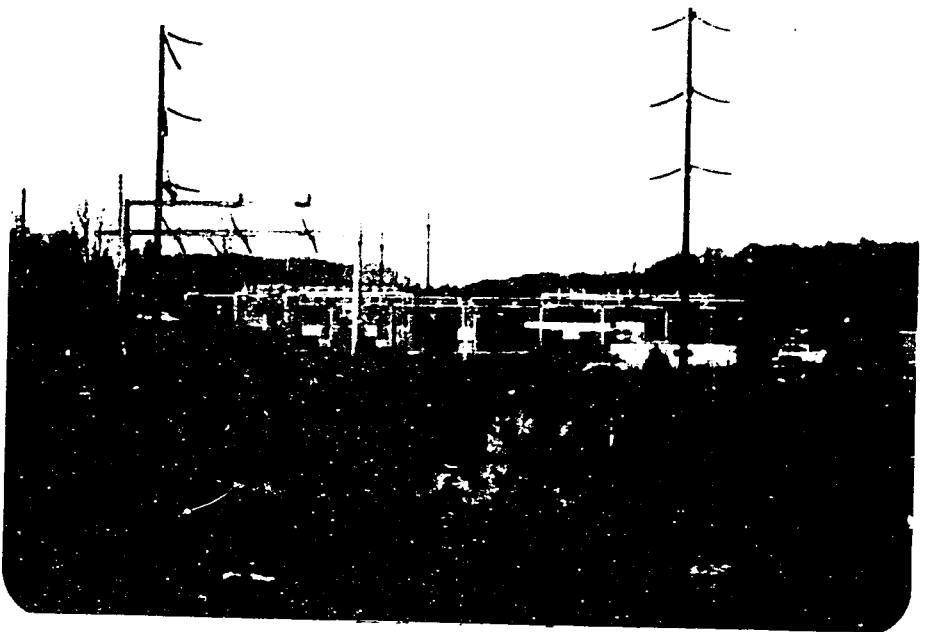


January 26  
1994

Visit to Aquaculture  
Management Association,  
Research Centre,  
College Station, Texas.

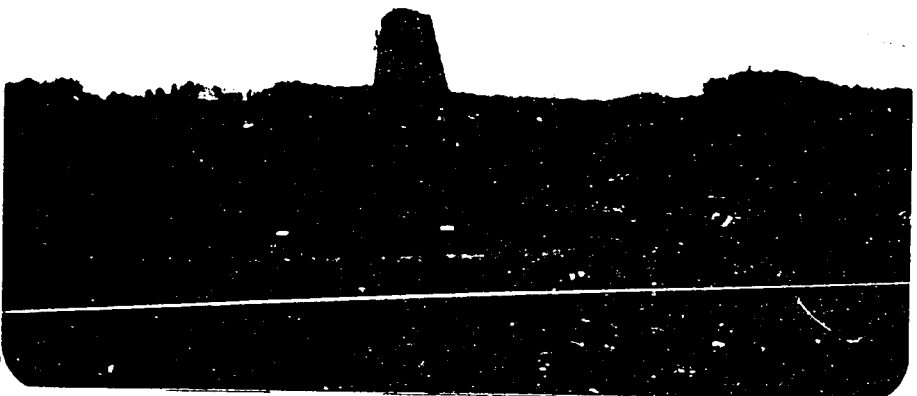


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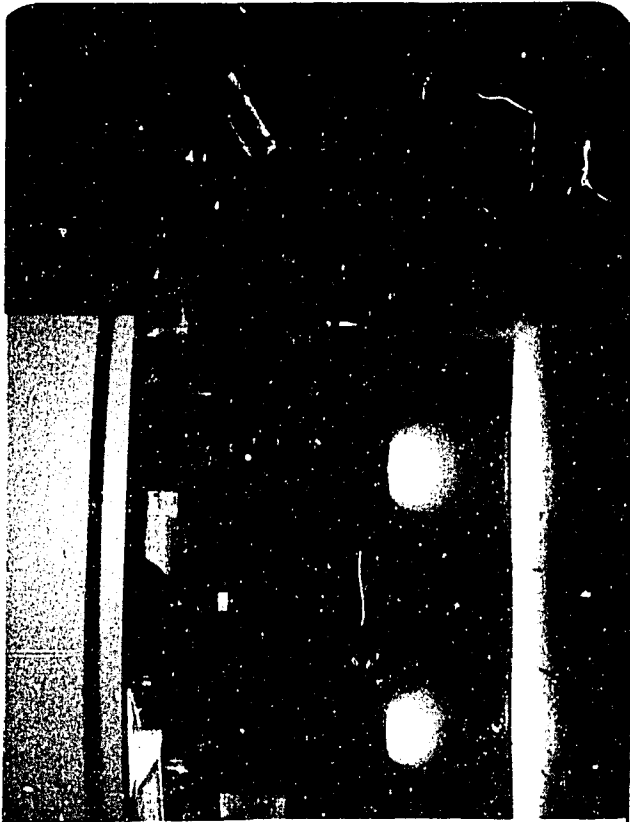
January 31 Visit to Industrial Park,  
1994 Vanore, Tennessee.



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January 28 Visit to Radian Corporation,  
1994 Austin, Tx.

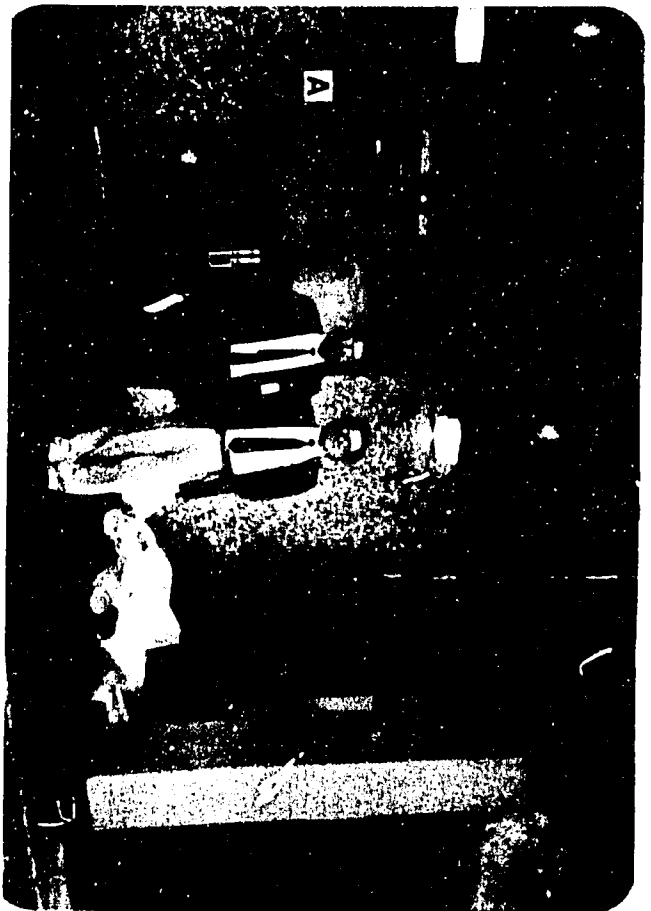
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January 27 With Ms Margaret Gaspari  
1994 Dow Chemicals Co.,  
Houston, Texas.



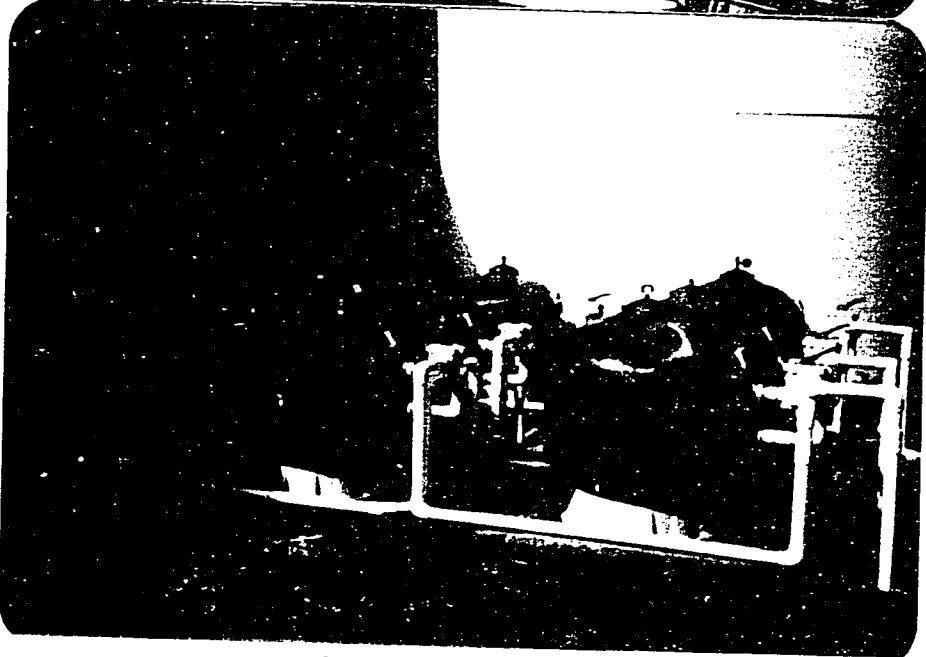
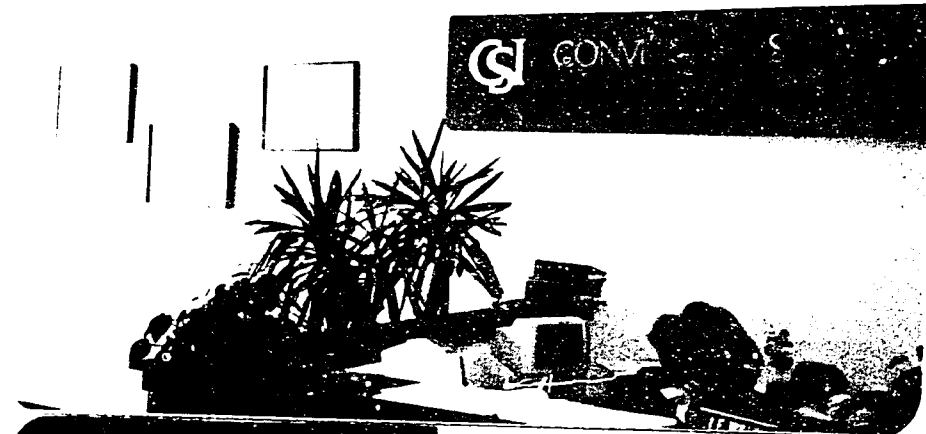
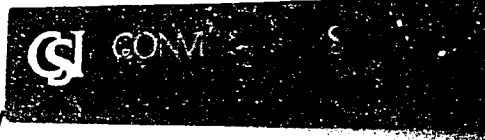
January 27 Dow Chemicals Co.,  
1994 Houston, Texas.



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1994

Conversion Systems Inc.,  
Reg. Fly Ash Utilisation  
Technologies, Horsham,  
Philadelphia.  
Contact Person:  
Mr. Craig H. Fleming,  
Sales Manager, Utilities.



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APPENDIX E(1)A

Literature/Documents on Industrial Parks

Sl. No.	Title	Author	Received on (Date)
1	Research Triangle Park Catalogue and details.	RTP Durham.	Jan. 20, 1994
2	Agreement between The Tellico Reservoir Development Agency and Tennessee Vally Authority.	TRDA and TVA, Vanore, Tennessee.	Feb. 14, 1994
3	Audio-Visual Cassette on Industrial Park.	TRDA, Vanore, Tennessee.	-do-
4	Catalogues on Technical & other details on Tellico Industrial Properties.	-do-	-do-
5	County Waste Water Permit Discharge to Stream.	Triangle WWTP Durham County	-do-
6	Administrative Code Section.	-do-	-do-
7	Volatile Synthetic Organic Chemicals.	City of Durham, Deptt. of Water Resources, North Carolina.	-do-
8	Waste Water Survey	-do-	-do-
9	Water Supply System of the City of Durham, North Carolina.	-do-	-do-
10	Sewer use ordinance.	-do-	-do-
11	Decade of Progress.	TRDA, Vanore, Tennessee.	-do-

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APPENDIX E(3)

Literature/Documents on Chemical/Hazardous Industries

Sl. No.	Title	Author	Received on (Date)
1	Catalogues on - Texas Operations, Dow, USA.	Dow Chemicals, Texas USA.	Jan. 27, 1994
	Dow at a glance.	-do-	-do-
	Tales of the Dow Skimmers.	-do-	-do-
	Responsible Care.	-do-	-do-
	Yrev neighbors beyond the Fence Lite.	-do-	-do-
2	Catalogue and literature on	DuPont Chemicals, Niagara, USA.	Feb. 03, 1994.
	- Waste Water Permit Limits.	-do-	-do-
	- Manufactuiring Division.	-do-	-do-
	- Safety Rules for Drivers.	-do-	-do-
	- Emergency Procedures (Visitors)	-do-	-do-
	- Process Exhaust Ventilation System.	-do-	-do-
	- Emergency Prevention and Preparedness.	-do-	-do-
	- Safety and Health - Responsibilities - Approach	-do-	-do-
	- Niachlor Process.	-do-	-do-
	- Risk Assessment and Process Hazards Management.	-do-	-do-

**CURRICULAM VITAE**  
-----

NAME : Surendra Kumar  
 FATHER'S NAME : Shri Tek Chand  
 DATE OF BIRTH : 23.08.1936.  
 OFFICIAL ADDRESS : Shriram Foods & Fertiliser Industries,  
 Shivaji Marg, New Delhi-110015.

Fax: 91-11-5432600  
 Telephone: 500190

PERMANENT ADDRESS: B-1/423 Janakpuri, New Delhi-110058.  
 Telephone: 5594150

EDUCATIONAL QUALIFICATIONS	Name of Examination Passed :-----	Examining Authority -----
	Bachelor of Science (Physics, Chemistry and Mathematics).	Agra University, Agra (India).
	Degree in Mechanical Engg. (Section A and Section B).	The Institution of Engineers, (India).

PROFESSIONAL QUALIFICATIONS	Member of Institution of Engineers. MIE-M/019354/7.	-do-
	Fellow Member of Institution of Engineers. FIE-F/013112/8.	-do-
	Chartered Engineer (India).	-do-
	Certificate Course on Environment Audit.	By UNIDO-ADL-CII.

PROFESSIONAL EXPERIENCE

- Started professional career in 1957 in a leading Industrial house of New Delhi (India) the Erstwhile DCM Ltd.
- Still working in a Senior Cadre as ASSTT.GENL.MANAGER (Environment) in Shriram Foods & Fertiliser Industries, a unit of SIEL (Shriram Industrial Enterprises Ltd.), New Delhi, one of the most progressive groups created out of Trifurcation of DCM Ltd. with an annual turnover of Approx.Rs.6000 million.

- Coordinating siting of a large chemical complex of Chlor-Alkali Industry, Thermal Power Plant and Industrial Estate for SIEL.

**PUBLICATIONS:**

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- Published number of papers in Leading Dailies of New Delhi on Environment. Delhi Law Review (Faculty of Law, Delhi University) published my paper on 'Industry in Harmony with Environment'.
- Made Audio Visuals on Environment and Safety. Appeared on Delhi Door Darshan in context with Environment Interviews.

**MEMBERSHIP OF PROFESSIONAL BODIES:**

-----

- Member of:
  - Core group of FICCI (Federation of Indian Chamber of Commerce & Industry) on Environment and representing it in No. of Forums.
  - CII (Confederation of Indian Industry) Environment Committee - Northern Chapter.
  - PHD CCI (Punjab Haryana Delhi Chamber of Commerce & Industry).
  - ASSOCAM, India (Associated Chambers of Commerce & Industry of India).
  - Environment and Safety Committee of BIS.