PD-ABH-607

TRIP REPORT #2 ARPECHIM S.A.

PITESTI, ROMANIA

WASTE MINIMIZATION PROJECT

OCTOBER 18 - 22, 1993

WORLD ENVIRONMENT CENTER
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DECEMBER 1993

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File

TABLE OF CONTENTS

		Page
I.	Introduction	1
II.	Executive Summary	2 - 3
III.	Itinerary	4
IV.	Appendix	5
	1. Malcolm Pirnie, Inc. Interim Report #1 on Waste Minimization Demonstration Project at Arpechim S.A.	6
	2. Business Cards of Contacts	7

I. INTRODUCTION

Pursuant to the technical assistance program for Central and Eastern European countries funded by the U.S. Agency for International Development, the World Environment Center conducted a follow-up visit to Arpechim S.A. in Pitesti, Romania on October 18 - 22, 1993. The WEC team consisted of:

Thomas J. McGrath, Vice President

Liviu Ionescu, In-country Coordinator

Dr. Raymond L. Feder, Project Manager

Garrick J. Solovey, Malcolm Pirnie, Inc., Engineering Consultant

The purpose of this visit was to initiate the second phase of the steam condensate waste minimization project through the installation of instrumentation provided by WEC. Also, the World Environment Center was scheduled to conduct an in-house training session in the principles and techniques of waste minimization.

II. EXECUTIVE SUMMARY

The concept of the Waste Minimization Demonstration Project (WMDP) as originally proposed during the initial visit to Arpechim on March 22 - 25, 1993 was reviewed and revised because of plant operational changes. A description of the new modified WMDP and the results of this visit from October 18 - 22, 1993 are presented in the attached report by Malcolm Pirnie, Inc.

The WEC team consisted of:

Thomas J. McGrath, Vice President

Liviu Ionescu, In-country Coordinator

Raymond L. Feder, Project Manager

Garrick J. Solovey, Malcolm Pirnie, Inc., Engineering Consultant

The WEC team held discussions with senior plant personnel including Mikhail Georgescu, General Director, Ion Cojocaru, Director, Research and Development, Gheorge Florea, Environmental Manager; Constantin Miu, Utilities Manager.

A presentation by Mr. Solovey on how to develop and implement a waste minimization program at Arpechim to 23 plant personnel was given on October 21, 1993. The audience comprised of Department Directors, Plant Managers, and Specialists from various operating and technical departments.

The instrumentation previously ordered for the Arpechim WMDP had been received, examined for completeness, and arrangements made for installation.

Continuing in-depth discussions concerning revised waste minimization projects resulted in the identification of a new WMDP which can be implemented with the WEC instrumentation already received by Arpechim. This project is described in detail in the attached Trip Report by Mr. Solovey and is summarized as follows:

WMDP #1 - Reduction in loss of steam condensate.

An examination of Arpechim records for 1992 - 1993 indicated that approximately 70% of all condensate was diverted to the Arges River as a result of hydrocarbon contamination problems. Economic analysis by Arpechim shows that installation of an in-line total carbon analyzer in the condensate return will significantly reduce reaction time associated with the present technique of manual sampling and analysis with estimated annual benefits of approximately $185,000 as follows:

o	Reduction in lost pure condensate -	$108,000
o	Reduced damage to ion exchange resins -	67,000
o	Reduced cost of wastewater treatment -	10,000
	Total Savings/Year	$185,000

On October 22, 1993, the WEC team met with the U.S. AID Mission, the Ministry of Industries and Department of Chemical and Petrochemical Industry to brief them on the results of the visit to Arpechim S.A.

III. ITINERARY

October 17, 1993	-	Arrival in Bucharest and transfer to Pitesti
October 18-21, 1993	-	Visit to Arpechim; discussion of program; training session on principles of waste minimization; identification of WMDP; examination of WEC instrumentation (total carbon analyzer and conductivity meter).
October 22, 1993	-	Travel to Bucharest and meetings with: o U.S. AID o Ministry of Industry
October 23, 1993	-	Return to U.S.A.

IV. APPENDIX

MALCOLM PIRNIE, INC. REPORT

MALCOLM PIRNIE

MALCOLM PIRNIE, INC.
ENVIRONMENTAL ENGINEERS, SCIENTISTS & PLANNERS

RECEIVED
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WORLD ENVIRONMENT CENTER

November 8, 1993

Mr. Thomas J. McGrath
Vice President, Technical Programs
World Environment Center
419 Park Avenue South, Suite 1800
New York, New York 10016

Re: Trip Report - Arpechim S.A. Facility
Pitesti, Romania
October 18 through 22, 1993

This trip report summarizes the discussions and results of our recent trip to the Arpechim refinery and petrochemical plant. The purpose of the trip included:

- Initiate second phase of the steam condensate waste minimization project through the installation of the new total carbon analyzer and conductivity analyzer.
- Conduct an in-house waste minimization workshop to educate plant personnel and develop commitments for their in-house program.
- Brief Ministry officials in Bucharest on the progress and successes to date.

This trip report is presented in the following sections:

- Project Status Prior to Trip
- Meeting Participants
- Project Highlights
- Other Highlights
- Action Items

PROJECT STATUS PRIOR TO TRIP

Briefly, the project status up to this trip can be summarized as follows:

- A clear understanding of project objectives and economic benefits were established between Arpechim, WEC and Malcolm Pirnie.

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- Based upon the technical requirements, a total carbon analyzer and conductivity analyzer were selected and recommended by Malcolm Pirnie to WEC for purchase.

- WEC purchased the recommended equipment from Ionics, Inc. and arrangements were made for shipment to Romania. The equipment was shipped from the U.S.A. on September 30, 1993 and arrived at the Bucharest Airport the following week.

- Numerous technical information exchanges were made between WEC, Arpechim and Malcolm Pirnie with regard to equipment features, installation requirements and auxiliary parts. It was found that additional in-line plastic filters were required. These components were purchased and shipped separately to Mr. Livui Ionescu in Bucharest. Most other technical matters were also resolved.

MEETING PARTICIPANTS

World Environment Center

Thomas J. McGrath, Vice President
Dr. Raymond L. Feder, Project Manager
Livui Ionescu, In-Country Coordinator

Arpechim

Mihail Georgescu, General Director
Ion Cojocaru, R&D Director
Gheorge Florea, Environmental Manager
Mr. Moga, Engineer and Translater
Mr. Necula, Chief of Instrumentation
Alexandru Vasile, Protocol
Mr. Miu, Utilities Manager

Malcolm Pirnie

Garrick J. Solovey, Consultant

PROJECT HIGHLIGHTS

As a result of plant operational changes and the shutdown of selected refinery and petrochemical process lines, the original project was modified. It was necessary to discuss and redefine the project and perform a revised financial evaluation. The elements of the modified project are as follows:

RECYCLED PAPER

- A source of steam is a vital element in the successful operation of a refinery and petrochemical plant. However, a significant amount of steam condensate is lost due to hydrocarbon contamination infiltration from the catalytic cracker, reformers, steam tracing and other process equipment. This total condensate flow of 75 m^3/hr is returned to the power plant for treatment prior to re-introduction into the boilers. Here, this condensate is taken through such equipment including a regenerative heat exchanger, carbon filters and ion exchangers.

- If the condensate is contaminated with hydrocarbons it causes serious damage to the ion exchanger resins and fouls the power plant system. Re-routing the discharge of the contaminated condensate impacts the water treatment plant and/or causes environmental problems for the Arges River. Additionally, during re-routing, pure condensate is lost until the plant problem is verified and remedied. During 1992-93, records indicate that 70 percent of all condensate was lost as a result of contamination problems. (See Enclosure A).

- A major problem is the lengthy reaction time accrued by manual sampling to verify this situation and take the appropriate remedial action. Recently, the plant practice has been to release all condensate to the river to avoid serious potential problems.

- A conservative economic analysis has been performed by Arpechim (Enclosure B) which demonstrates that if a continuous total carbon analyzer is installed after the regenerative heat exchanger significant benefits can be achieved. It would be expected that the following yearly savings would be realized:

- Lost pure condensate	$ 108,000 (US)
- Damaged resins	67,100 (US)
- Wastewater treatment	10,152 (US)
Total Savings/Year	**$ 185,250 (US)**

For an equipment purchase of $28,000 (US), the payback period is less than 2 months.

- Mr. Mui will provide G. Solovey with sampling data results for the first month of equipment operation. A return trip to Arpechim is scheduled to inspect the installation and review the initial data. It is expected that the full term of this demonstration program will be 4 to 6 months. Final details of the monitoring program will be established and agreed to at that time.

OTHER HIGHLIGHTS

- A waste minimization workshop was conducted at the facility to introduce key plant management to the overall concepts. Additionally, emphasis was placed on our

MALCOLM PIRNIE

current project to demonstrate the success and viability of such efforts. Meeting minutes provided by Mr. Cojocaru are provided as Enclosure C.

ACTION ITEMS

- Arpechim will install the equipment and contact Ionics (U.K.) for start-up and training assistance.
- Mr. Mui (Arpechim) will provide G. Solovey (Malcolm Pirnie) with sampling data for the next 30 days. A monitoring demonstration program will be jointly developed for the next 6 months.
- A WEC return trip to Arpechim is scheduled for early December. The purpose will be to inspect the equipment and finalize the demonstration program. This visit will coincide with the trip to DERO S.A. in Ploiesti.
- WEC will present a waste minimization workshop next year centered around the Arpechim project. The audience will be Romanian chemical and refinery representatives. This request was made by Mr. Mihail Paraschiv, Secretary of State, Ministry of Industry. (Department of Chemical and Petro Chemical Industry).

In summary, the trip was successful and gained the full cooperation and enthusiasm at Arpechim and at the Ministry. All parties look forward to the next phase of the project and further progress

Very truly yours,

MALCOLM PIRNIE, INC.

Garrick J. Solovey

Garrick J. Solovey, P.E.
Consultant

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c: D. N. Ellis, Malcolm Pirnie
M. T. Sobczak, Malcolm Pirnie
J. J. Stankunas, Malcolm Pirnie
M. P. Robinson, Jr., Malcolm Pirnie
P. K. Feeney, Malcolm Pirnie
J. C. Stouch, Malcolm Pirnie
G. J. Solovey, Malcolm Pirnie

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ENCLOSURE A

ARPECHIM SA PITESTI
UTILITIES PLANT
REFINERY III

REPORT ABOUT THE RETURNING CONDENSATE AT THE DEMINERALIZATION STATION OF THE THERMAL POWER STATION-III REFINERY

MONTH	cm^3 OF CONDENSATE (TOTAL)	cm^3 OF CONDENSATE (CONTAMINATED)
	1991	
1. January	44680	32480
2. February	58600	40300
3. March	66200	27800
4. April	58300	32200
5. May	48225	28075
6. June	0	0 -technical revision
7. July	30800	21505
8. August	56000	47200
9. September	58400	42200
10. October	55100	47100
11. November	66500	57700
12. December	68200	56000
	1992	
1. January	68200m	49147
2. February	58300	41730
3. March	44800	26700
4. April	33160	16315

UTILITIES PLANT-REFINERY,
Ion Stănciulescu-Eng.

ECONOMICAL CALCULATION
EFFECTS OF THE TOTAL CARBON PROCESS ANALYZER IMPLEMENTATION AT THE REFINERY STEAM POWER PLANT

Taking into account the figures for 1992 year, the results are as follows:

1. During 1992 a total of 431,880 cubic meters of condensate contaminated with hidrocarbons was evacuated to canal (that is 70.7 % of the total condensate) . This represents :
431,800 x 1,000 lei/cm = 431,8 mil. lei,equivalent to 431,800 USD/Y

A complete laboratory test of a condensate sample can be done every 4 hours .Taking into account this fact we could have two situations:

1.1. Evacuation to canal of some pure condensate after the repairing works , or

1.2. Some contaminated condensate could enter the ion-exchange resins .

In the first case, if we admit that only 25 % of the period the condensate was of good quality , we could save :

108,000 USD / Y

In the second case if the contaminated condensate enters the vessels containing high acidity ionic resins , we could lose as much as 61 cm. of ionic resins , that is :

61 cm x 1,100 USD/t = 67,100 USD

2. By avoiding the evacuation to the canal of the above mentioned 25 % of condensate, the load of the water treatment unit will be reduced by about 13,5 cm/h .
In this case the savings are as follows :

13.5 x 94 lei/cm x 8000 h/y = 10.152 mil. lei/an
equivalent to 10,152 USD/Y

. ENCLOSURE C

S.C.ARPECHIM S.A. PITESTI

REPORT
CONCERNING THE " WASTE MINIMIZING WORKSHOP" AS A PART OF W.E.C. PROGRAM WITH ARPECHIM

On October 21,1993 , at 10,00 a.m. at the "Safety Center" of Arpechim S.A Pitesti was organized a meeting .

At this meeting took part the following participants :

. From "WEC - MALCOLM PIRNIE " :

- Thomas J.Mc.Grath - Vicepresident, Technical Programs
- Garrick J.Solovey - Senior Associate,Malcolm Pirnie
- Raymond L.Feder - Staff Consultant .

. From Arpechim S.A. Pitesti took part 23 persons, including 5 Department Directors, Plant Managers , Specialists of different Departments and Technological Sections from Refinery and Petrochemistry .

****

- The meeting was opened by Mr. I.Cojocaru , Technical Director, who pressented the major objectives and goals of the meeting .

- Mr. G. Solovey presented in his speech the principles of organizing and aproching the major problems of minimizing the losses as basic factor of Environmental Protection .

- Mr. Constantin Miu , Utilities Department Director, spoke about the importance and the economical effects of WEC Program Implementation at Arpechim Pitesti , as a first step of future Program developing .

- Mr. I. Cojocaru presented then the major strategy directions concerning the Environmental Protection and Waste Minimization Program as well as some possible future Projects .

- Mr. G. Solovey talked about some of his ideas resulted from his long experience in this field .

- Mr. Mc. Grath spoke about the Program which was presented before and after that concluded with some ideas regarding the WEC Program in Arpechim and pointed out expressly the following aspects :

. The necessity of changing the workers' mentality

. The Program must be made known to every employee

. Involving of all the Arpechim employees in the Waste Minimizing Program .

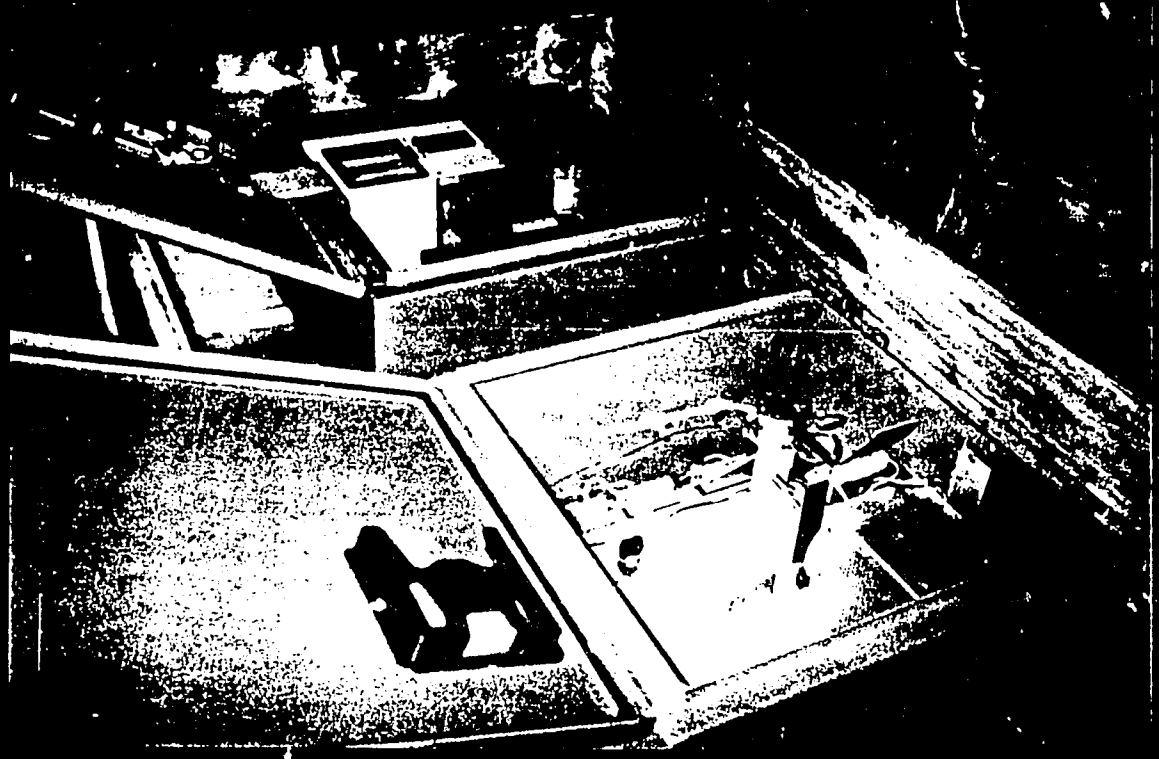
. Organizing in good conditions of all the activities concerning the Waste Minimizing Program .

. Good comunications between the managing staff and the rest of the employees.

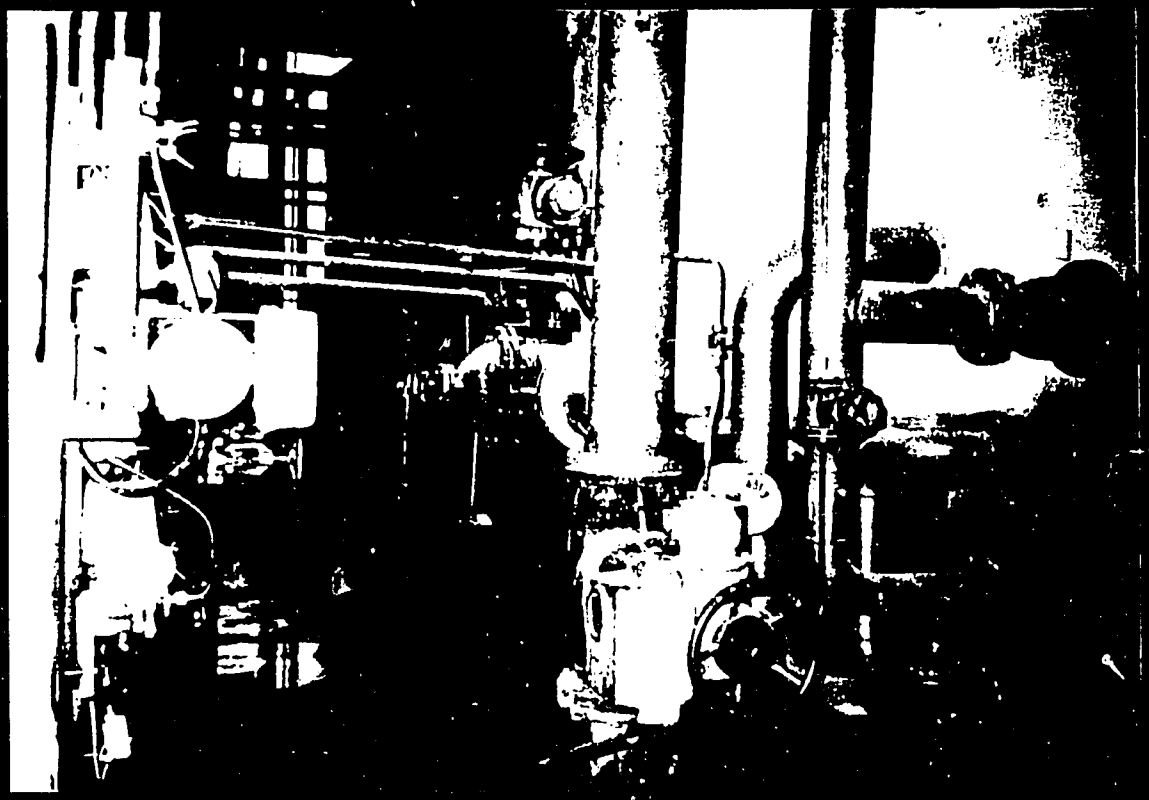
After the meeting was finished , the WEC team, together which Mr. Mc.Grath and some persons of Arpechim ,involved in the Program , had a small discussion with Mr. Mihail Georgescu, General Director of Arpechim S.A . With this occasion both parties pointed out their major interest for reducing the Environmental problems of Arpechim and for a future fruitful co-operation .

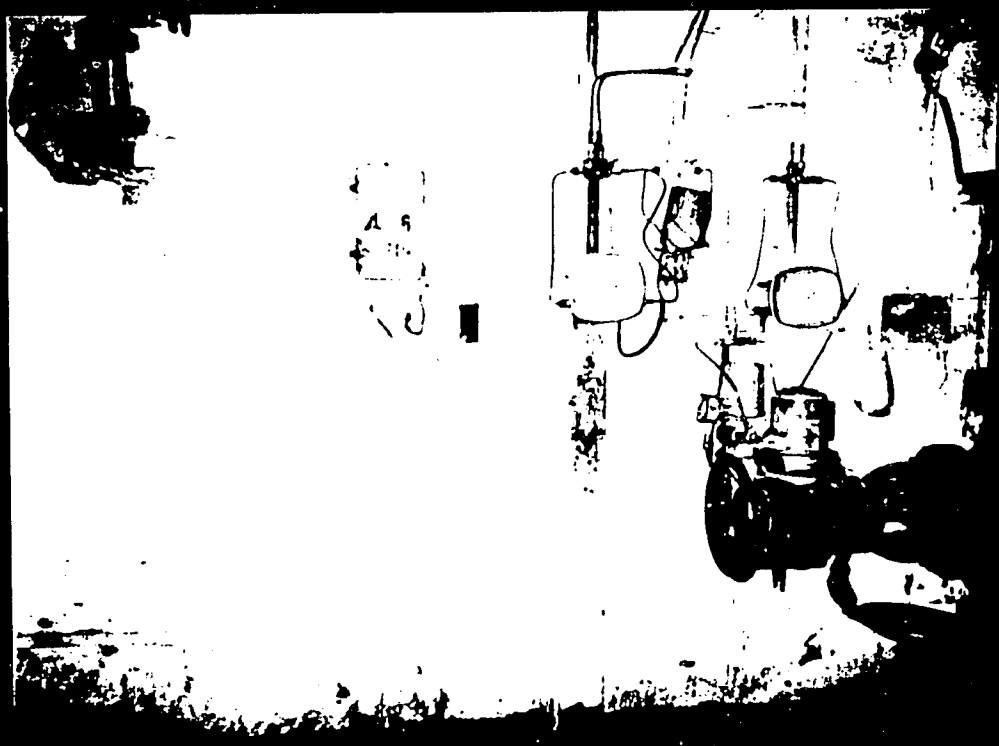
The delegation of WEC gave to Mr. I.Cojocaru some useful documentations regarding Waste Minimizing Program and Environmental Protection.

Pitesti
October 21,1993



TOTAL CARBON ANALYZER





EQUIPMENT INSTALLATION LOCATION

WASTE MINIMIZATION WORKSHOP

BUSINESS CARDS OF CONTACTS

MINISTRY
OF
INDUSTRIES

Department
of
Chemical
and
Petrochemical
Industry

Bucharest
Calea Victoriei 152
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-19