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ROMANIA

WASTE MINIMIZATION IMPACT PROGRAM

EVALUATION OF THE WASTE MINIMIZATION PROGRAM

AT

CLUJANA S.A.

JUNE 19 - 20, 1997

USAID/WEC COOPERATIVE AGREEMENT
NO. ANE-0004-A-00-0048-00

World Environment Center
419 Park Avenue South
New York, New York 10016

OCTOBER 1997

REPORT DISTRIBUTION:

UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT

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Project Description:	N/A
Project Type:	Waste Minimization Impact Program Assessment
Country:	Romania
Industrial Sector:	Shoe Manufacturer
Dates:	June 19 - 20, 1997
Funding Source:	United States Agency for International Development
Participants:	Clujana Staff and WEC/PPC Team
Project:	N/A
Business Development:	N/A

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I. INTRODUCTION

A joint WEC/PPC team including Louis Gilde, Project Consultant, Robert Locke, Project Consultant, Vladimir Gheorghievici, Pollution Prevention Director, and Frank Szymborski, WEC Project Manager, visited Clujana which had participated in the Waste Minimization Seminar in Bucharest.

The plant visit was to:

- Provide guidance and assistance in establishing an effective waste minimization program; and

- Ascertain the progress in the identification and implementation of the WMIP project.

During the discussions with the plant's technical staff, it became evident that Clujana personnel are interested in developing a formal waste minimization program. However, due to a lack of funds, the plant proposed to concentrate its efforts on those projects that could contribute to reducing production costs and/or improving product quality. In this regard, the plant requested WEC to provide additional expertise to improve manufacturing/process procedures.

WEC acknowledges the contribution made by the volunteer project consultants, Messrs. Louis Gilde and Robert Locke, who gave freely of their time and energy in assisting WEC in its Waste Minimization Impact Program in Romania.

II. EXECUTIVE SUMMARY

A WEC team visited S.C. Clujana S.A. June 19-20, 1997. This report identifies potential projects for improvement in the tannery, rubber and sole factory areas. Problems are listed with suggested solutions and benefits. Efforts to undertake solutions should reduce operating cost, increase efficiency and reduce air and water pollution.

Clujana management has demonstrated an interest in waste management practices through their existing efforts in promoting recycle of waste leather from the thinning operations and other scrap pieces for off-site uses. Other waste reduction measures have been introduced, relative to preventing off-site pollution, by sale of corrugated boxes, sale of wood waste to employees, and recycle of old shoe forms to the supplying vendor (s). Conservation of energy is applied by turning off unnecessary lighting and machines, particularly during lunch periods.

It is expected that WEC's 10 step Waste Minimization Program will be adopted following the receipt of this report. A follow-up visit to assist management in developing further the team approach to encourage all employees in this effort is warranted once WEC's program has been instituted.

The publication "Fundamentals of Pollution Control for the Leather Industry" by Dr. Thomas G. Thorstensen, Shoe Trades Publishing Co., Arlington, Massachusetts, is recommended for further guidance.

III. FINDINGS

Introduction

We were impressed with the professionalism of the employees and management at Clujana S.A., Cluj-Napoca. It was obvious that the company's lack of financial resources limited what could be accomplished.

Clujana has undertaken waste minimization and by-product recovery which is reviewed briefly in addendum A.

Many of the suggestions in this report were known to the staff of Clujana, but frequently the limitations of finances handicapped improvements in operations.

The institution of WEC's 10 step program of waste minimization involving every worker in the factory will result in savings and strengthen the economics of Clujana. The 10 step program only works if everyone from top management to the lowest employee is totally dedicated to the effort in action and deeds.

Potential Projects

TANNERY

Problems:

1. Factory personnel are aware of environmental problems, but due to lack of money the condition has not been corrected. The excess fat discharged to the waste water pretreatment system causes interference with the removal of chrome from the tanning process. Excess chrome levels discharged to the municipal treatment system can result in monetary penalties. In addition, due to high solids levels, excess quantities of ferrous sulfate and lime consequently must be used to complete clarification of the waste water before discharge.

2. The waste water pretreatment system is not fully functional as originally designed. This basically is being operated as a batch process rather than a continuous flow through treatment system.

3. At the Basin cugratare mecanice (all nomenclature and numbering from drawing 1h 493.431) (#1) (traveling screen) it appears that the quantity of solids and hair collected is not representative of the factory discharge production rate of hide rinsing and hair removal. Also, the rotary brushes for cleaning the screen appear to be ineffective.

Solutions:

1. The first step in the waste water treatment system of the Beamhouse waste water was a traveling screen. Normally a traveling screen is inserted over an outlet to filter waste water flowing perpendicular to the screen face. In this instance, the screen is placed in a static basin, and only incidentally collects solids. An above grade rotary drum screen, with backwash sprays may be more effective for solids and hair removal. Employment of this equipment would require a non-clog submersible pump in Basin cugratare mecanice and a high pressure/low volume in-line backwash pump for the backwash sprays. The rotary drum screen would not have to be any larger than .92 m, and could probably be purchased as used equipment from the U.S. for less than 3000$ USD. The pumps should be available in-country.

2. Segregating the various waste water discharges for specific treatment is of great importance. All flows high in fat should be kept separate from waste water that needs to be treated for chrome removal. By keeping the waste flows separate, the waste treatment systems (grease removal vs. chrome removal) becomes more efficient. Reconstruction of the solids skimmer on Basin de amagenizare (#4) is critical toward reducing fat from the treated waste water discharge. With the present facility and operation, fat is being discharged from #4 and is being transferred to other portions of the treatment system. This interferes with treatment efficiency as well as causing excess levels of fat in the final effluent. The savings in effluent penalties should offset the reconstruction cost of the treatment system. Segregation of separate sources of fat directly to Basin #4 should be investigated. The rendering room operations must be fully investigated to determine if an investment in capital will increase recoverable fat, improve efficiency and decrease fat discharged to the pretreatment system.

3. Current technology is chrome tanning of leather exhibits minimum chrome residual in waste water discharge. The technique is to maximize chrome uptake by pH adjustment and recycle of the residual waste water for pickle float. This is an approach used in the U.S. and Polish tanning operations.

a. During our discussions at Clujana, we recommended that experimental tests be conducted to undertake the chrome minimization approach. Basically the discharge from the drums of the chrome solution is collected to be used as the pickle float in the initial stage of the chrome tanning process. This in effect utilized the residual chrome, which is introduced in excess of the amount actually required to tan the hide.

b. An alternative batch treatment method is now in progress in a Greek tannery in cooperation of Greek authorities with Dutch counterparts and the European Economic Community. This process is referenced in the Toxics Use Reduction Institute (TURI). They are located at University Avenue, Lowell, MA, 01854, USA.

4. Discharge of the chrome treatment solution is on a batch basis. There could be several rotary drum treatment discharges per day, at an approximate 80 cubic meter volume each. This waste water is at an approximate 1.8% chrome concentration at a pH of 3. It is recommended that this waste water be collected as a separate discharge to the now unused. Basin de tratare chimica (no. 7). In this Basin, the treatment would consist of:

a. lowering pH to 2.5 with acid;
b. adding bisulfate while mixing to an ORP of +280 mV for 10 minutes;
c. raising pH to 6.0 with caustic;
d. adding an organic sulfur precipitant (polythiocarbonate) to - 300 ORP;
e. raising pH to 9.0;
f. adding polyquarternary-amine cationic polymer;
g. dosing a trace of anionic flocculent.

This batch treatment will achieve chrome removal to the part-per-billion range.

5. A waste minimization program to fully utilize the chrome solution, with chrome in the residual water is further described in the following document:

International Cleaner Production Information Clearinghouse (ICPIC).
Maintained by the United Nations Environmental Programme (UNEP)
Industry and Environment Centre
39-43, quai Andre Citroen
75739 Paris Cedex 15, France
Tel. (33-1) 44-37-14-59

6. We did not discuss the details of the vegetable tanning process, but recommend Clujana's consideration of the Bayer's C-RFP process. This information can be received from the Industry and Environment Centre referenced above.

7. Convert the pretreatment system to function as a continuous flow operation by installing variable speed pumps. These should be staged to handle nominal flow with a backup pumps for peak flow. This will improve the operating efficiency of the system while reducing excess energy and chemical charges.

Benefits:

1. By improving the efficiency of the waste water pretreatment operations, the factory will not have to pay discharge penalties for exceeding the municipal treatment discharge limits, and it could recover a fat by-product for reprocessing or sale.

2. The economical use of chrome for tanning is the preferred technology to reduce potential chrome residual in the waste water from this section of the factory. The

reduction in chrome usage will improve the economy of producing leather and avoid the payment of discharge payments to the municipal system.

3. If the recommended process technology for tanning hides is not practicable at this time, segregation of this waste stream is warranted so that precipitation of the chrome can be economically achieved and the recovered chrome solids recycled to reduce costs for makeup chrome purchase. In this case, the chrome solids would have to be chemically treated for reuse.

RUBBER PLANT

Problem:

1. Solvent emission from the inner ling bonding process is a significant air contamination with the potential to adversely affect plant personnel. The cost of the solvents lost is estimated to be 300$USD per day.

Solution:

1. The solvent emissions from the curing ovens of the inner liner bonding process can be captured by a vapor condenser. This simple air to coolant heat exchanger using either cold water or some other refrigerant as the cryogenic fluid is warranted. A description of such a system will be provided. An alternative, but more costly program would be activated carbon adsorption. This would, however, require greater energy use since the carbon would have to be desorbed by heat treatment and the vapors condensed to recover the solvent.

Benefits:

1. By collecting the air emissions from the curing ovens at the inner liner operation solvents now lost, representing about 75,000$ USD/year, can be recovered. These recovered solvents would reduce makeup solvent purchases. However, this recovered solvent mixture would have to be selectively distilled for recycle.

2. The reduction of solvent emissions will greatly improve environmental ambient air conditions within the confines of the factory especially during air inversions and generally improve outside ambient air quality conditions.

SHOE FACTORY

Problem:

1. The removal of selvage from the fabricated shoe/boot soles is by an abrasive grinder. The shavings are exhausted to dry cyclones located outside of the buildings.

Although there where no visible emissions from the cyclones, there is an energy heat drain on the internal building under winter time conditions.

Solution:

1. Where heels were being polished, the air scrubber used was exhausted back into the work area. A similar system or baghouse or other high efficiency filtration system should be installed in the abrasive grinder area to enable return of air to the work area. There may be some loss in the caloric level of the returned air, but considerably less than making up 100% heat loss as presently exists.

Benefit:

1. Conservation of heat energy by recycling the exhaust air from the dry cyclones will be realized. Factory personnel can calculate the energy savings with the change of air flow in the winter. During summertime conditions, when comfort heating in the work place is not required, recycling air can be discontinued allowing outside fresh air to circulate through the process operating area.

REMARKS

1. Institute the WEC 10 step waste minimization program.

2. The WEC 10 step program only works if <u>everyone</u> from top management to the lowest employee is totally dedicated to the effort in action and deeds.

3. This concept should not only be employed on existing operations, but should be incorporated in the design and construction of new systems in the years ahead. Each employee needs to have the opportunity to suggest changes and experience the thrill of contribution to the overall company welfare and economic benefit.

4. An air flotation system with the use of chemical polymers would increase the efficiency of fat recovery to a greater degree than the existing mechanical system. This would require a capital expenditure and at this time is not in the factory budget but should be considered in future years.

5. Study is warranted to ascertain if waste by-products could be economically used to produce casings for meats such as for sausage and baloney.

ACTION REQUIRED:

CLUJANA

1. Initiate the WEC 10 step waste minimization program.

2. Incorporate the attached "Boosting equipment reliability" guidelines, as an ongoing management program of employee involvement in reducing operating costs.

3. As an alternative to recovering the residual chrome waste from the chrome tannage phase, investigate the process modifications cited in the United Nations Environment Programme (UNEP) at the Industry Environment Centre, France.

4. Investigate the Bayer's C-RFP Vegetable Tannage process as an alternative technique. The economic advantages and the ecological benefits may increase plant efficiency.

5. If the chrome tanning alternatives cannot be applied, collect the chrome residual waste water as a separate waste water stream and batch treat to recover the chrome for recycle. This second alternative will also have cost and environmental benefits by avoiding penalties, recovering of the chrome, reducing chrome costs and benefits by avoiding penalties, recovering of the chrome, reducing chrome costs and recycling water for industrial use.

W.E.C.

1. When available, provide details on engineering design for economical recovery of the spent solvents from the inner liner curing ovens.

2. When available, provide detailed information on a filter/heat exchanger system to recover heated air for recycle under winter time conditions.

ADDENDUM A

Clujana's Existing Waste Minimization Program:

From the interviews of factory staff, it is apparent that a waste minimization program is in effect vis-à-vis an environmental impact aspect. The staff pointed out that the following steps are being taken relative to waste disposal:

a) Corrugated boxes are being sold to a local company who picks up accumulated waste;

b) Wood waste is being sold to employees, presumably for residential use as an energy source;

c) Shoe forms containing a metal substrate are being recycled to the vendor. Presumably, the non-metallic portion is being used either as raw material source or can become an energy source as a fuel;

d) Leather shavings and scrapings are used as raw materials for secondary products for internal uses;

e) Fat rendering by-product is either used as lubricants or sold;

f) Other leather waste is being sold to off-site persons for unidentified purposes;

g) It was noted the electrical energy is being saved by turning off lights in the work areas during lunch time.

APPENDIX I

(BUSINESS CARDS OF CONTACTS)

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APPENDIX II

(LIST OF MATERIAL FORWARD TO CLUJANA)

BROCHURES AND OTHER PERTINENT INFORMATION PREVIOUSLY FORWARDED TO CLUJANA:

1. Leather Technician's Handbook
2. Practical Leather Technology
3. Industrial Ventilation