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WEC STAFF TRIP REPORT

TO

ROMANIA

DECEMBER 4 - 11, 1993

WORLD ENVIRONMENT CENTER
419 PARK AVENUE SOUTH, SUITE 1800
NEW YORK, NEW YORK 10016

DECEMBER 1993

REPORT DISTRIBUTION:

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File

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I. EXECUTIVE SUMMARY

Mr. Garrick J. Solovey, Malcolm Pirnie, Inc., Liviu Ionescu, Country Coordinator, and Thomas J. McGrath, WEC staff, visited Arpechim and discussed final details for collection and reporting of the data for the Waste Minimization Demonstration Project.

The WEC team visited Dero, on a WMDP reconnaissance trip. Dero is a viable candidate for a WMDP.

Mr. Georgescu, Ministry of Industries, and the OAR were briefed on the visit.

WEC has decided that the venue for the workshop portion of its Waste Minimization Impact Program would be more cost effective in a location outside of Bucharest.

II. MEETINGS

December 6 - 7 - Arpechim, Pitesti

Messrs. Garrick J. Solovey, Malcolm Pirnie, Inc., Liviu Ionescu, WEC country coordinator, and Thomas J. McGrath, WEC staff, visited with the Technical Department staff of Arpechim to finalize details of the WMDP. Please refer to Mr. Solovey's report.

December 7 - 10 - Dero, Ploiesti

Messrs. Solovey, Ionescu, and McGrath visited Dero, the largest manufacturer of detergents in Romania, on a reconnaissance visit to identify potential processes for a WMDP.

The visit was successful with several processes identified for consideration. Please refer to Mr. Solovey's report.

December 9 - Meeting with Ministry of Industries

Mr. Alexandru Georgescu, Director for Ecology, Directorate for Research, Development and Ecology, Ministry of Industries, who was unable to meet with WEC in Bucharest on December 9, traveled to Ploiesti to discuss WEC activities.

The following subjects were discussed:

- Zlatna

WEC advised that it expects to have the final report ready for distribution no later than the first week in January.

- Waste Minimization Impact Program

WEC staff discussed the proposed visit to the U.S. The Romanian companies would arrive in New York for a visit with WEC, then travel to a U.S. multinational corporation to discuss its environmental management system for the balance of the week.

The delegation will then travel to Washington, D.C. for meetings with U.S. AID, EPA, Chemical Manufacturers Association, and the American Petroleum Institute. It will then return to Romania. Total number of days in the U.S. would be 12.

Mr. Georgescu commented that it is a good schedule; it is not too short or too

long.

Following up on WEC's request, he submitted the following enterprises which the Romanian Government recommends be the participants in the WMIP. These are in addition to three enterprises participating in the WMDP.

The companies are:

1) "Petrobrazi" S.A. , Ploiesti

2) "Petrotel" S.A., Ploiesti

3) "Rafo" S.A., Onesti

4) "Rafinaria Darmanesti" S.A., Ploiesti

5) "Rafinaria Astra" S.A., Ploiesti

6) "Chimcomplex" S.A., Borzesti

7) "Oltchim" S.A., Rm. Vilcea

Mr. Georgescu will provide a one page description of each enterprise and a curriculum vitae of its General Director.

WEC advised that the travel date would probably be in early May.

December 10 - Meeting with Chamber of Commerce and Industry of Romania

Mr. Sandu, Department Manager, took the WEC representatives to view several possible venues in Bucharest for the WMIP workshop. Details of their possible support for the workshops were discussed.

Subsequently, WEC decided that the cost of conducting the WMIP workshop in Bucharest would be too high for the local participants. Therefore, other venues will be reviewed.

Meeting with U.S. Agency for International Development

The WEC team briefed Mr. Richard J. Hough, U.S. AID Representative, and his staff on the status of the various projects.

III. APPENDICES

MALCOLM PIRNIE

MALCOLM PIRNIE, INC.
ENVIRONMENTAL ENGINEERS, SCIENTISTS & PLANNERS

December 22, 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
December 6, 1993

Dear Mr. McGrath:

This trip report summarizes the highlights and findings associated with our trip to the Arpechim refinery and petrochemical facility December 6, 1993. The purpose of the trip was to review the ongoing demonstration project at Arpechim and reporting of system data over the next few months.

This trip report is presented in the following sections:

- Background
- Overview of Arpechim
- Meeting Participants
- Status of Arpechim Project

BACKGROUND

The World Environment Center (WEC) has a Cooperative Agreement with the U. S. Agency for International Development (US AID) to provide U. S. expertise for technology and skills transfer to Eastern European industry and governments. The objectives are:

- Effective pollution reduction through waste minimization
- Better worker health and safety
- Improved operations and cost savings
- Increased social awareness

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The WEC has contracted with Malcolm Pirnie, Inc. to assist with identifying and implementing these projects.

OVERVIEW

Arpechim S.A. includes both refinery and petrochemical operations. It is located in the city of Pitesti, which is 110 kilometers west of Bucharest. This facility was built in two phases during the 1970's. It has two atmospheric and vacuum distillation units that can process up to 3.5 million tons of crude per year. It produces a wide range of petroleum products and feedstocks for the petrochemical industry.

The key factors that have influenced current operations are:

- Inconsistent supply and quality of crude oil
- Limited capital for plant equipment, facilities and spare parts
- Significant infiltration of hydrocarbons into process waters and wastewaters
- High levels of fugitive and vapor losses in its process lines

ATTENDEES

The meeting at the Arpechim facility was held December 6, 1993. The key participants included:

Participant	Title	Organization
Thomas McGrath	Vice President	WEC
Garrick Solovey	Consultant	Malcolm Pirnie
Liviu Ionescu	In Country Coordinator	WEC
Ion Cojocaru	R&D Director	Arpechim
Gheorghe Florea	Environmental Manager	Arpechim
Constantin Miu	Director of Utilities	Arpechim

STATUS OF ARPECHIM PROJECT

A one day visit to Arpechim was held to review the status of the on-going demonstration project and discuss further actions. In summary, the following highlights are noted:

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- The Ionics total carbon analyzer has been installed at the power station. The written request has been made to Ionics for a site visit to complete start-up and training. (See enclosed photographs).

- Agreements were made with respect to data collection and reporting procedures. Arpechim will provide WEC/Malcolm Pirnie with weekly data for evaluation. Typical information will include flow rates, contamination levels, upset conditions and cost savings.

- It is intended to establish a three month demonstration period (through March 1994) to establish environmental and cost benefits. Data will be extrapolated on an annual basis, as appropriate.

- A return trip to Arpechim is scheduled for March 1994.

In conclusion, the Arpechim project needs Ionics' assistance as the next critical step. We will contact them and help facilitate those arrangements.

Very truly yours,

MALCOLM PIRNIE, INC.

Garrick J. Solovey

Garrick J. Solovey, P.E.
Senior Associate

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bc: D. Ellis, WHI
J. Stankunas, WHI
M. Sobczak, WHI
M. P. Robinson, Jr., NEW
P. K. Feeney, NEW
J. Stouch, COL

AJS

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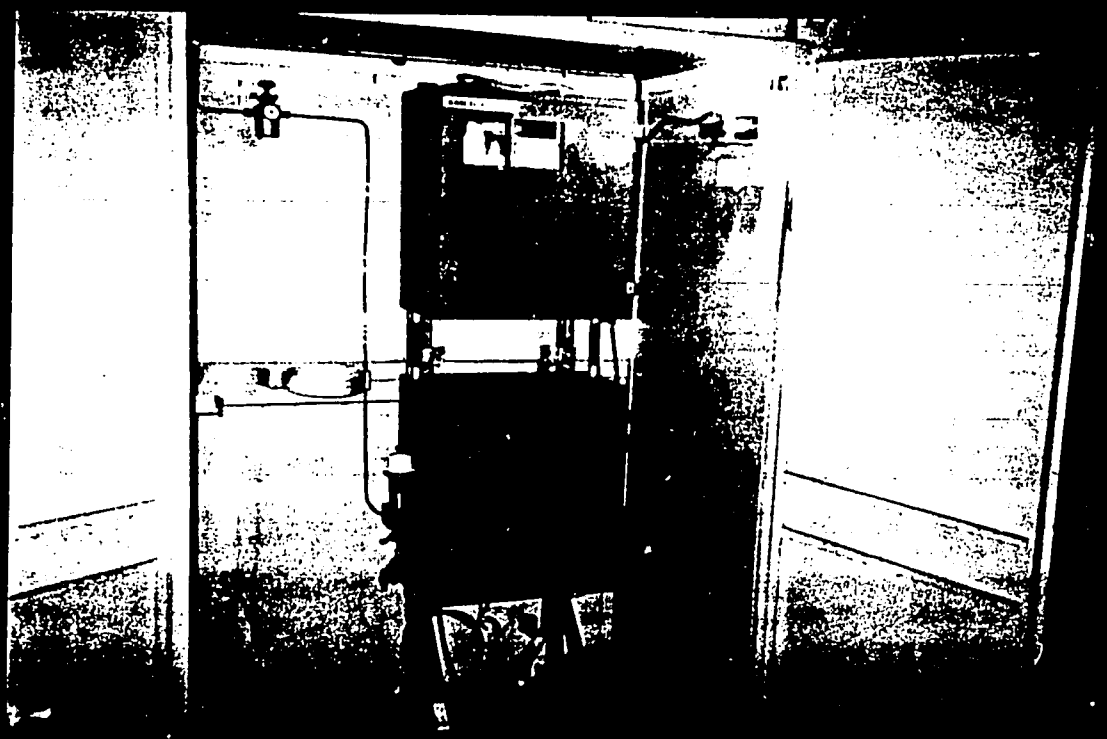

Total Carbon Analyzer
installed at ~~Arpe~~
Arpechim

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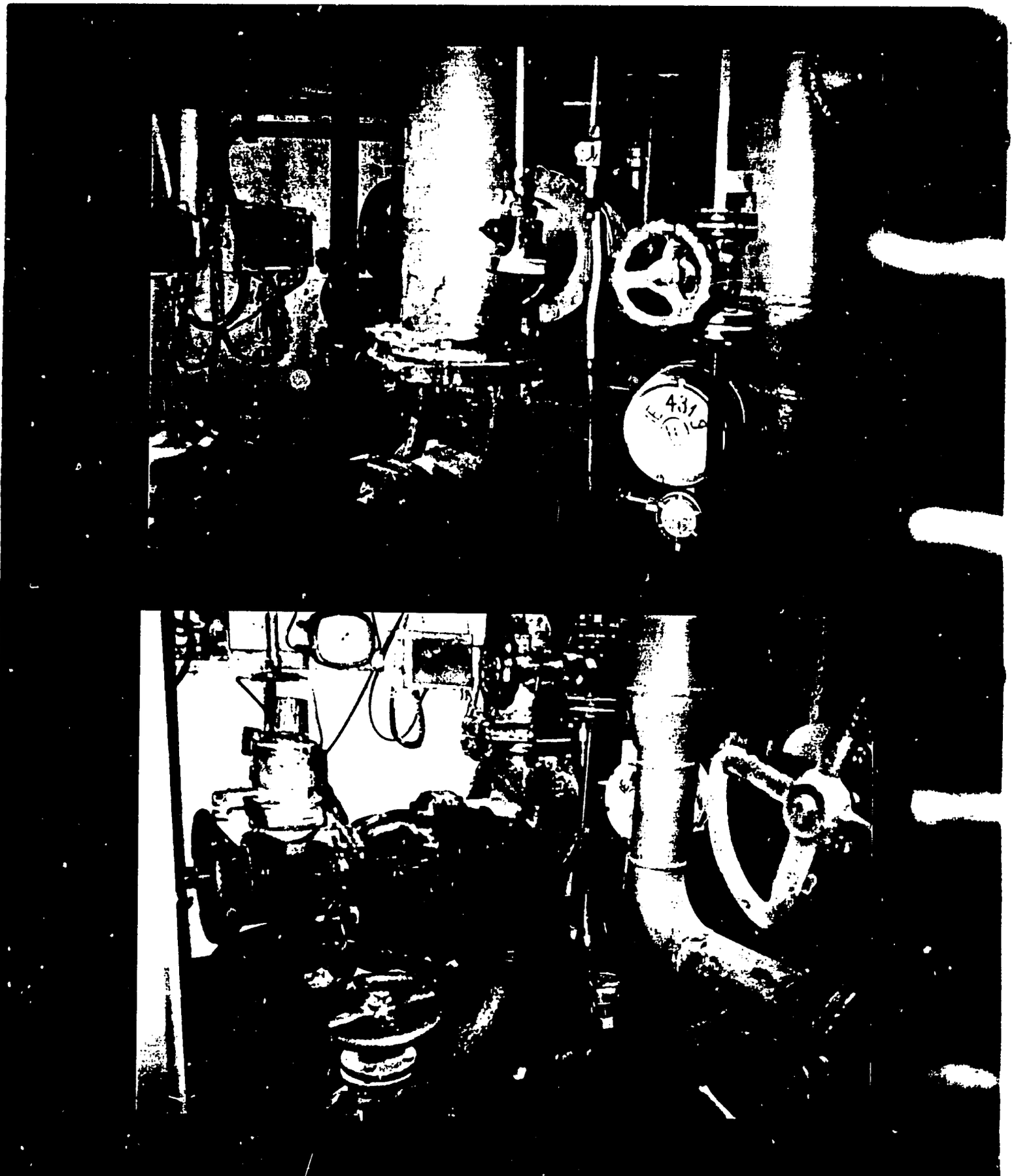

Sample lines to
Total Carbon Analyzer

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MALCOLM PIRNIE, INC.
ENVIRONMENTAL ENGINEERS, SCIENTISTS & PLANNERS

December 22, 1993

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WORLD ENVIRONMENT CENTER

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
DERO S.A. Facility, Ploesti, Romania
December 7 through December 10, 1993

Dear Mr. McGrath:

This trip report summarizes the highlights and findings associated with our trip to the DERO chemical plant during the week of December 6, 1993. The purpose of the trip was to assess the feasibility of a new waste minimization project at DERO. We have included brief discussions of potential projects that were considered for waste minimization initiatives and general recommendations for plant operational/environmental improvements.

Finally, this report describes and defines the preliminary scope of work and cost analysis of the Waste Minimization Project selected for implementation at DERO.

This trip report is presented in the following sections:

- Background
- Overview of DERO
- Meeting Participants
- Findings at the DERO Facility
- Recommendation and Observations

BACKGROUND

The World Environment Center (WEC) has a Cooperative Agreement with the U. S. Agency for International Development (US AID) to provide U. S. expertise for technology and skills transfer to Eastern European industry and governments. The objectives are:

- Effective pollution reduction through waste minimization

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- Better worker health and safety
- Improved operations and cost savings
- Increased social awareness

The WEC has contracted with Malcolm Pirnie, Inc. to assist with identifying and implementing these projects.

OVERVIEW OF DERO

DERO S.A., located in Ploesti, is a one hour drive north of Bucharest. This facility produces soaps, detergents, sulphated products, napthenic acids (for rubber and paints), organic solvents, firefighting foam, metal octoates (for paints), degreasers, dye penetrants (for NDE), thermal stabilizers (for plastics) and sulphation products (for detergents, textiles and concrete). The production of detergent and napthanic acid comprises over 50 percent of their business. DERO detergent products account for 40 percent of the Romanian market.

The key factors that have influenced current operations are:

- Availability and cost of feedstocks
- Shortage of capital for investment in equipment and process improvements
- Problems with natural gas availability
- Large material losses in bulk material handling systems
- Significant air emissions and lost product in wastewaters

ATTENDEES

The meeting at DERO was held from December 7 through December 10, 1993. The key participants included:

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Participant	Title	Organization
Thomas McGrath	Vice President	WEC
Garrick Solovey	Consultant	Malcolm Pirnie
Liviu Ionescu	In Country Coordinator	WEC
Paulian Ionescu	General Manager	DERO
Georghe Lita	Technical Manager	DERO
Aurelia Dobrescu	Production Manager	DERO
Mr. Valeanu	Department Manager, Detergent	DERO
Ms. Nicoleau	Foreman, Detergent	DERO
Ms. Iancu	Laboratory and Safety Department	DERO

FINDINGS AT THE DERO FACILITY

The site visit from December 7 through December 10 consisted of the following major activities:

- Informational briefing on DERO operations and future trends.

- In-depth discussions of major processes, waste streams and environmental issues.

- Tour of plant specific areas including:

  - Wastewater treatment
  - Material handling equipment and systems
  - Process reactors, equipment and systems
  - Feedstock silos and baghouse units
  - Atomizers and wet scrubbers
  - Feedstock unloading areas

  (See enclosed photographs).

- A briefing to the waste minimization team.

- Identification and preliminary evaluation of potential waste minimization projects to be considered for WEC funding. Several of these projects included:

  - Loss (>5 percent) of dry raw material through baghouses during pneumatic filling of the six storage silos. When baghouse equipment and piping becomes clogged the system becomes overpressurized and product is lost through equipment fittings. Frequently bags rupture causing further product losses through the stack.

- Feedstock mixtures (powder) is lost (>5 percent) during pneumatic transport to reactor vessels for blending with liquids and water. High humidity in the cyclone, baghouse, screw conveyor and piping (300 m from silo) creates clogging.

- Losses of product in the liquid detergent lines are caused by overflow of the six blending tanks. Weekly occurances result in significant product loss and increased load to the wastewater treatment plant.

- Operational problems in the three wet scrubbers servicing the atomizers result in significant stack air emissions when water level is too low. Additionally, scrubber water containing detergent product (35 percent concentration) is continually lost to plant wastewater because of inability to adequately monitor flow and concentrations.

The focus of the WEC candidate projects did not include those having significant capital requirements. We centered discussion around those projects which:

- Experience environmental improvement
- Reduce waste streams
- Demonstrate economic benefit

The proposed project having the greatest benefit involved the wet scrubbers servicing the atomizers (three units). Installation of high/low water level indicators in the scrubbers would aid control and efficiency. This could reduce serious foaming and also avoid a potential "dry" condition in the scrubber facility in significant powder air discharges to the surrounding neighborhoods. These "dry" situations routinely occur about three times per year when the city water supply is interrupted. A low level indication could be used to shutdown the process and avoid emissions.

Additionally, scrubber water containing up to 35 percent product (by concentration) is continually discharged to the wastewater plant. It has been found that a 15 to 35 percent concentration is the optimum range for scrubber operation. Installation of a flow meter and viscometer to characterize the waste stream would permit greater decision making capability in recovering and diverting the scrubber water into the production process.

It has been estimated that each wet scrubber loses a maximum of 250 tons per year of product to the wastewater plant. On the basis that the cheapest product is currently $855 per ton and assuming a 50 percent recovery factor the following savings can be realized:

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$$S = M \times C \times R$$

Where:

S = Savings
M = Product loss for three scrubbers (750 tons)
C = Cost of cheapest product ($855/ton)
R = Recovery factor = 50 percent (assumed)

S = 750 x 855 x 0.50

S = $320,625 or 34.4 million Lei ($1US = 1074 Lei)

An additional project to be considered depending upon available project funds relates to the overflow of the blending tanks in the liquid detergent plant. To assist the plant operator in preventing spills, a high level switch to turn off the fill pump could be installed on each of the six tanks. Spill conditions now occur on a weekly basis resulting in lost product and increased load to the wastewater treatment plant. It is estimated that 10 tons of product per month are lost. Based on a product cost of 1.3 million lei per ton the following savings could be realized:

$$S = M \times C \times R$$

Where:

S = Savings
M = Product loss = 120 tons per year
C = 1.3 million Lei per ton
R = Recovery factor = 75 percent (assumed)

S = 120 x 1,300,000 x 0.75

S = 117 million Lei or $109,000 per year ($1US = 1074 Lei)

S = $109,000 per year

The next action is for DERO to provide WEC/Malcolm Pirnie with detailed technical system requirements in order to identify appropriate equipment on-site and develop cost estimates. It has been agreed that DERO will be responsible for all installation activities and costs.

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It is hoped to finalize equipment selection and place orders by late January 1994. On the basis of 30 day equipment delivery, installation at DERO is tentatively planned for March 1994.

RECOMMENDATIONS AND OBSERVATIONS

As part of the site visit, several recommendations were developed. The following suggestions are provided for consideration:

- Finalize the proposal for the Waste Minimization Project and implement as soon as practical. Include the means to document and demonstrate that the project has fulfilled its objectives for waste minimization and operational improvement. The return trip would probably occur in mid March. This will be confirmed based upon equipment availability.

- During the return visit to DERO, conduct a 4-hour in-plant waste minimization workshop to include plant staff.

- Have the DERO waste minimization team begin to identify, evaluate and prioritize future waste minimization projects. Help them with this effort during the next visit.

- Suggest the following areas for further evaluation by DERO:

  - Complete an air emissions sampling program to better measure control technology performance. Pursue the possibility of obtaining portable sampling equipment on loan through WEC/USAID.

  - Define in-plant O&M training requirements.

  - Perform a plant-wide energy conservation study.

  - Implement improved practices and procedures to minimize spills.

  - Have the waste minimization team begin to develop a schedule and protocols for a baseline assessment of each process line to include:

    Waste stream characterization
    Review of procedures and practices
    Evaluation of equipment
    "True cost" evaluations
    Potential options
    Identification of long-term and "fast track" waste minimization projects

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In conclusion, we found the DERO staff to be totally cooperative and ready to assist us. It is our belief that they are committed to the concept of pollution prevention and recognize the associated operational improvement potential.

Very truly yours,

MALCOLM PIRNIE, INC.

Garrick J. Solovey

Garrick J. Solovey, P.E.
Senior Associate

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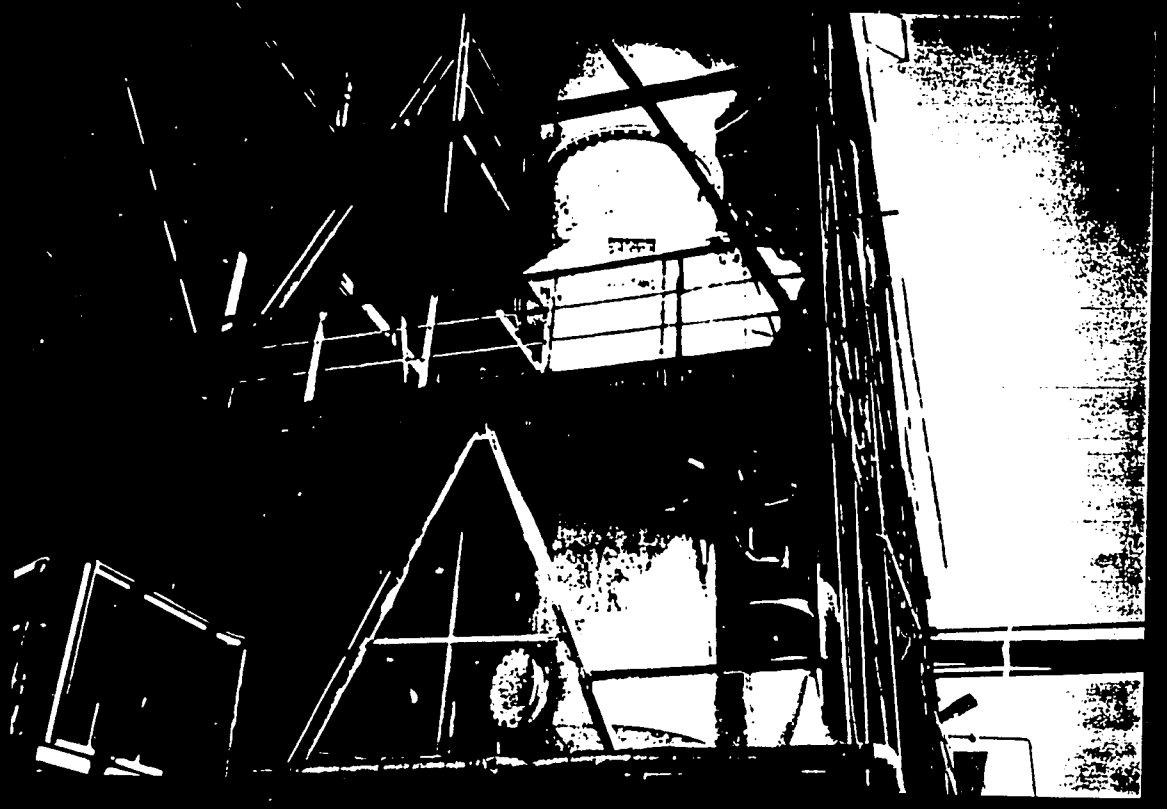
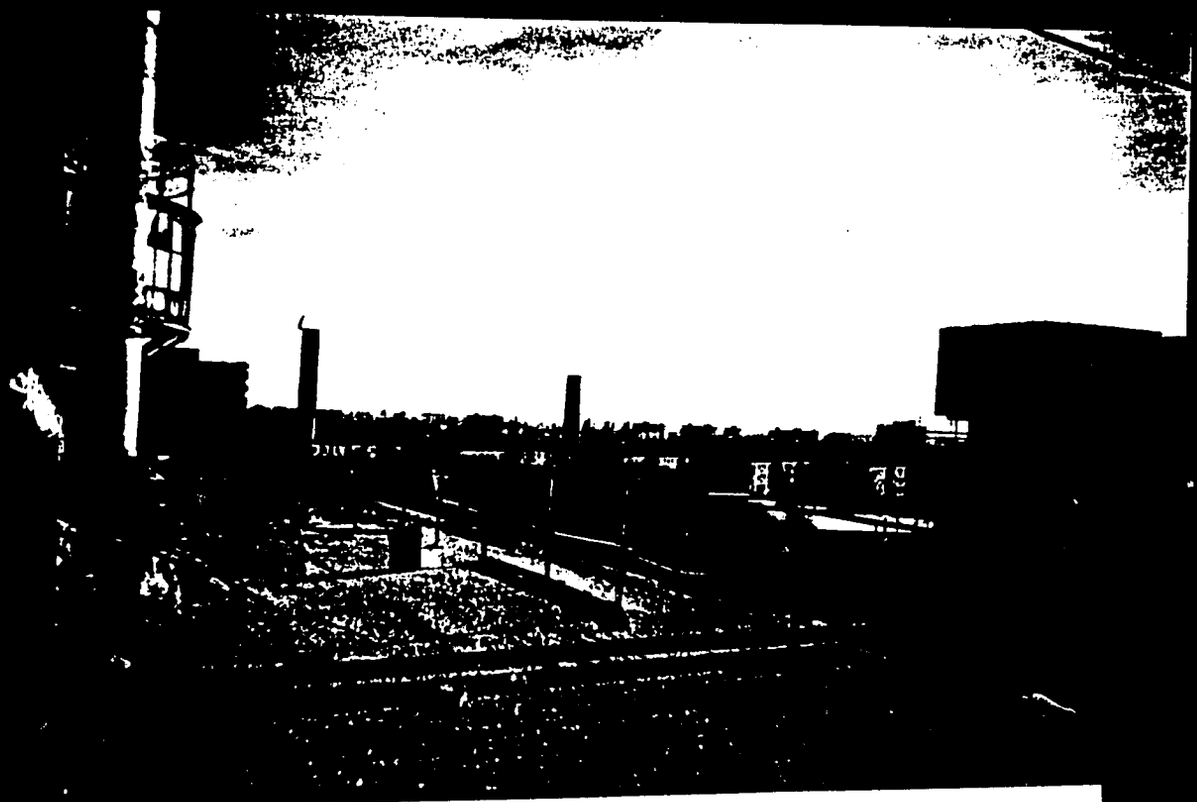


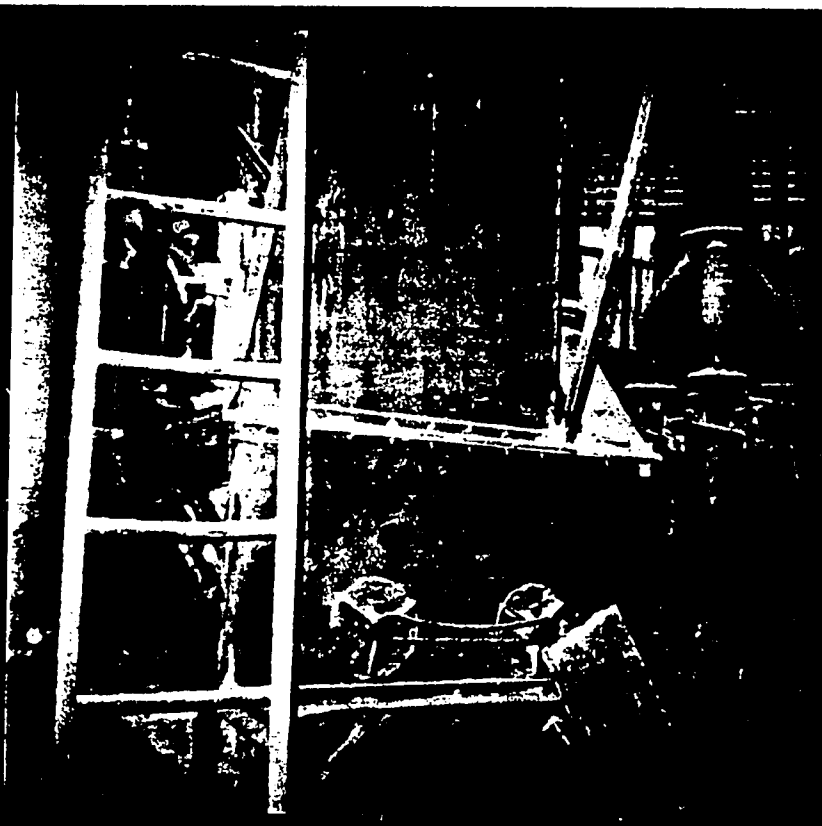
Wet Scrubber

Scrubber Water
(lost product

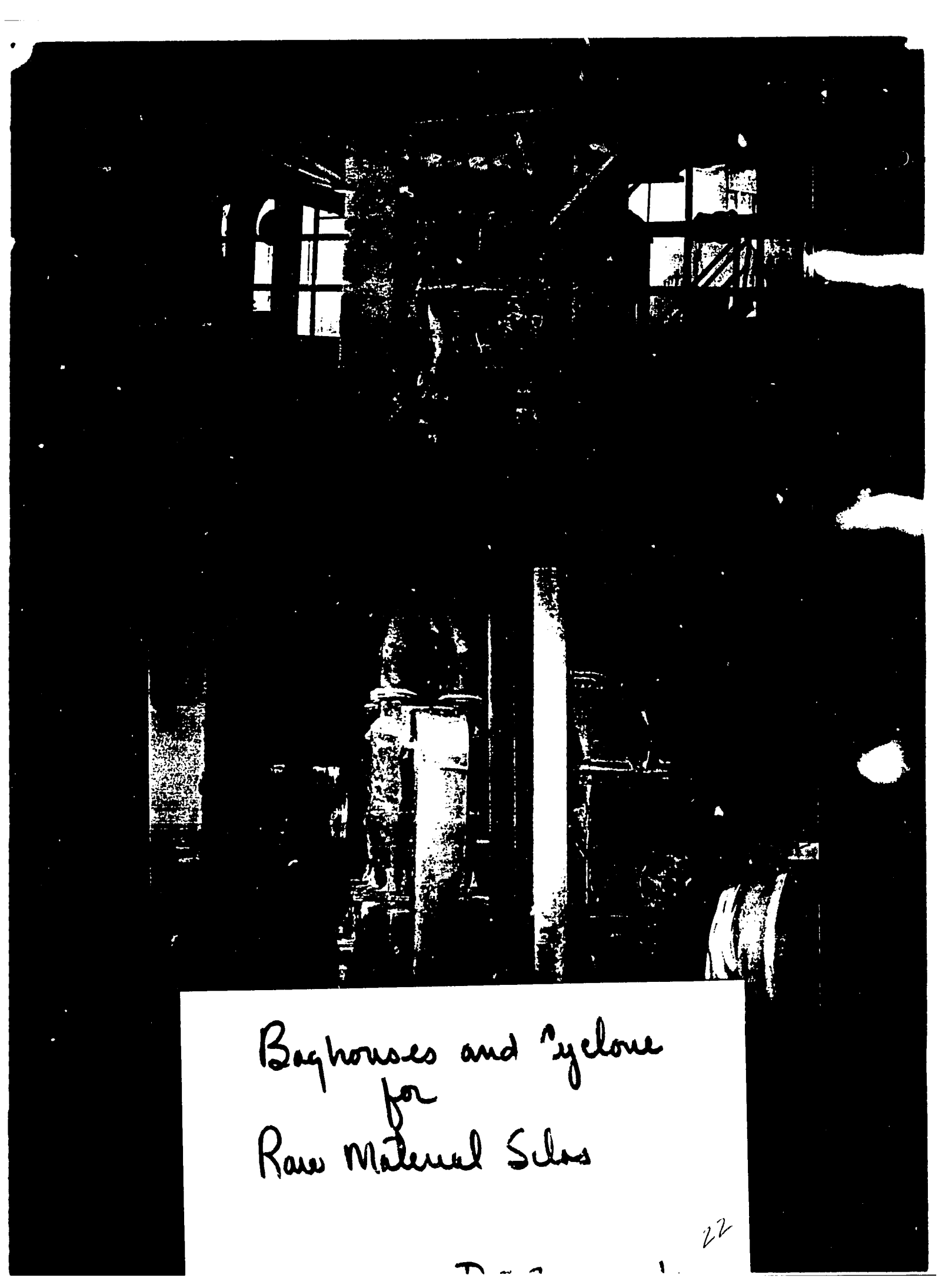
Stack Emissions
from Wet Scrubber



Areas around DERO
subject to emissions



Baghouse and
View of Filters



Baghouses and Cyclone
for
Raw Material Silos

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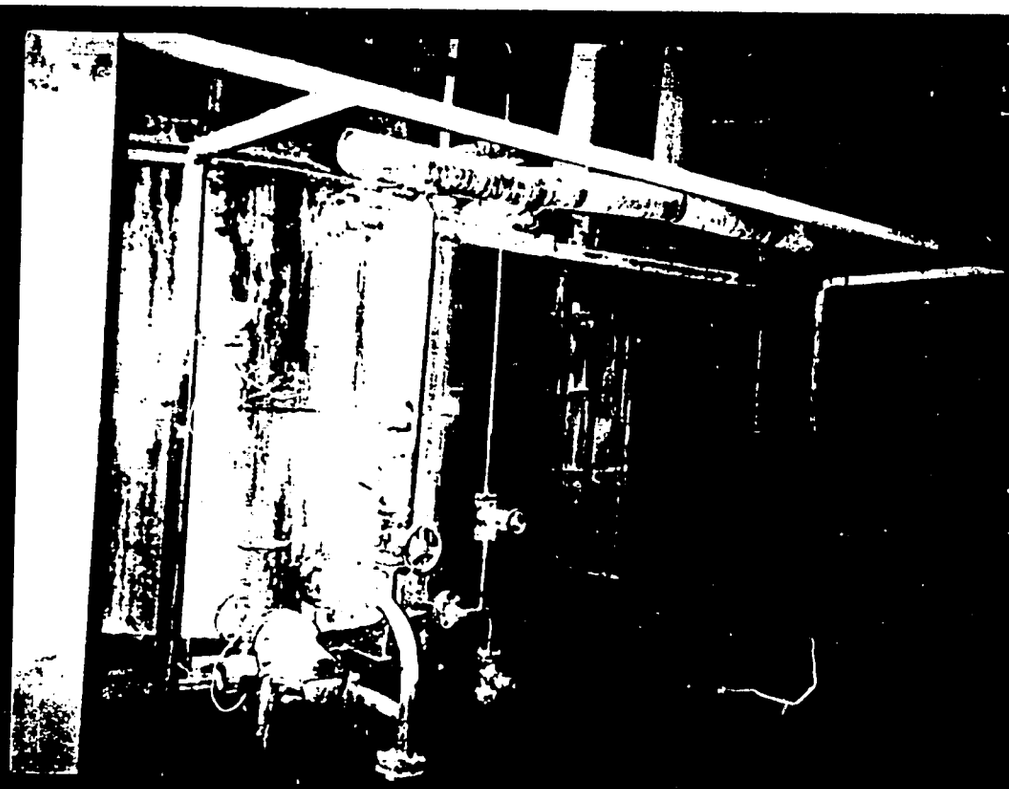

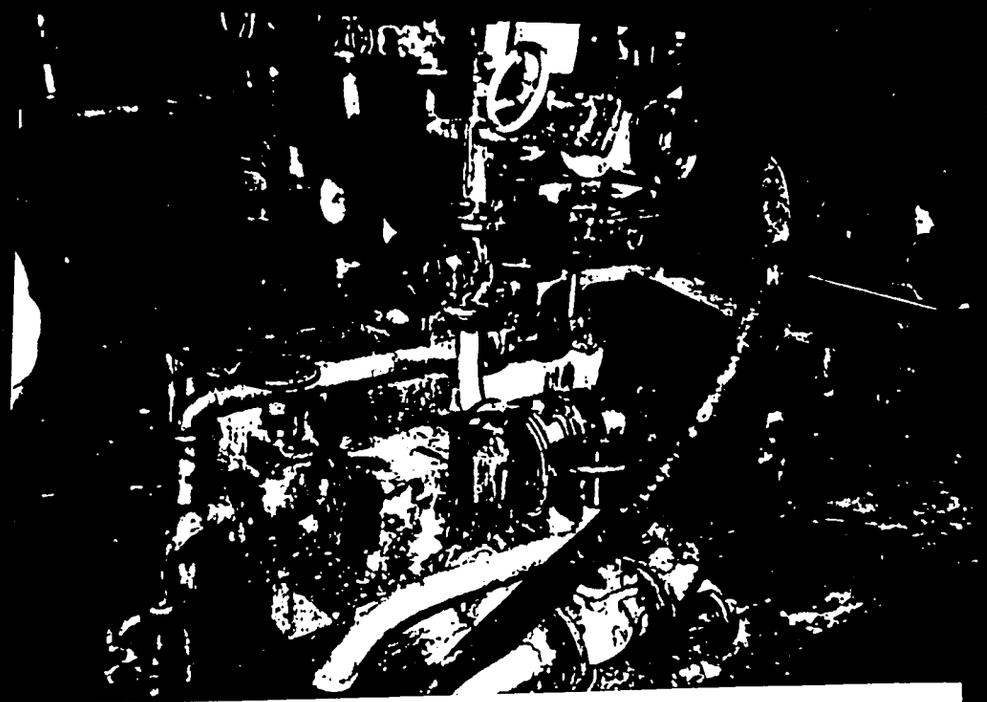

Liquid
Detergent Blending
Tanks and Pumps

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