Chapter 4

Recycler Survey

4. Recycler Survey

4.1 Recyclers and Potential Recyclers Visited

The recyclers and potential recyclers surveyed are listed in Table 4.1.1

Table 4.1.1 Recyclers and Potential Recyclers Surveyed

Name	Main business	REM
REMAT NORD	Waste recycler (mainly non-HW)	
REMAT SUD	Ditto	
ROMRECYCLING	Ditto	
SOMETRA	Pb,Zn Smelter	Recycler of wastes containing heavy metals
RGB PHOENIX S.A.	Cu Smelter	Recycler of copper scrap
S.C. ROMPLUMB S.A.	Pb Smelter	Recycler of wastes containing lead
S.C.UVCP S.A	Recycler of pyrite ash	Recovery of precious and heavy metal from pyrite ash
AURUL S.A	Au,Ag recovery from old mining wastes (Tailings)	
ALRO S.A.	Aluminum primary smelter	Secondary aluminum smelting
LAFARGE ROMCIM	Cement and cement product producer	Potential recycler and treater of wastes
S.C. OILREG S.A	Waste oil re-generator	Production of recycled base oil and fuel oil

4.2 REMAT NORD, REMAT SUD and ROMRECYCLING

REMAT was founded in the Communist period. Now it is divided into several independent organizations. These REMAT local organizations were privatized in the mid-1990s. Generally, each county has one REMAT company, but there are two local companies in Bucharest. The total number of REMAT local companies is around 44. Because there are sixteen recyclers of recyclable waste like REMAT NORD and SUD in Bucharest, they compete severely with the other companies. Basically, these recyclers buy the wastes from factories, household and transporters.

REMAT collects and transports recyclable wastes from industry, from shops, and the community. Collected recyclable wastes are just dismantled, crushed, sorted and pre-treated. Then they are transported to other recyclers or final user for further treatment

ROMRECYCLING is also a private waste recycler like REMAT companies and was established in 1997. However the owner is a French company and this company puts its emphasis on recycling of non-ferrous recyclable waste. Table 4.2.1 contains a summary of

REMAT NORD, REMAT SUD and ROMRECYCLING. These companies handle mainly recyclable non-HW; however the team visited them in order to understand the whole picture of waste recycling in Romania.

Table 4.2.1 Summary of REMAT NORD, REMAT SUD and ROMRECYCLING

		REMAT NORD	REMAT SUD	ROMRECYCLING
Amount of recyclable wastes	Iron	2,000 ton/month	5-6,000ton/month	2,000 ton/month
	Non-ferrous	3 ton/month	20-25 ton/month	Appro.400 ton/month
	Copper		10-15 ton/month	200 ton/month
	Brass		< 1 ton/month	100～140 ton/month
	Bronze		Little	
	Aluminum		10 ton/month	80 ton/month
	Paper	200 ton/month	N/A	140 ton/month
	Plastic	10 ton/month	N/A	―
	Tire	3～4 ton/month	N/A	―
	Battery	20 ton/month	4-50 ton/month	100 ton/month
Employee		75	240	93
Turn over (Billion Lei)		60	140	1,230
Profit (Billion Lei)		5	N/A	N/A
Remark		Factory;75% Household;25% Iron;93% Domestic market	Largest in REMAT Companies Iron;80% Export (Advantage of low price) Non-ferrous;100% Domestic market	The owner is a French company. Commenced operation in 1997. Copper:80% Export

N/A; Not available

4.3 SOMETRA.

4.3.1 Outline of the Company

This is the largest refinery, which has a simultaneous lead and zinc smelting (Imperial Smelting Process, ISP) and refining processes, in Romania. The No.1 line has converted to the ISP process, and began operation in 1966. The No. 2 line was originally designed and was put into operation in 1985. The line was stopped in 1992 because of its low productivity and serious pollution.

Lead and zinc are refined by electrolysis and rectification, respectively, after the ISP smelting process. The sulphuric acid plant is now out of operation. Construction of a new sulphuric acid plant is being planned.

- Production Capacity: Refined Pb; 38 thousand tons/year,

  Refined Zn; 57 thousand tons/year,

- Number of Employees; 1,500

Table 4.3.1 Amount of Raw Material and Wastes of SOMETRA Smelter

Raw material	(ton/year)	Internal wastes*1	(ton/year)	External wastes	(ton/year)
Sulphide complex Concentrate	69,170	Dust	13,666	Zn Scrap	11
Zn Concentrate	48,304	Blue powder	12,795		
Pb Concentrate	17,628	Dross	17,398		
Total	135,102		43,859		11

(Source; SOMETRA)

*1: Basically these internal wastes are recycling inside the smelter (See 4.3.2).

SOMETRA was privatized in 1998, and has subsequently been putting its efforts into improvement of facilities and environmental protection. Figure 4.3.1 illustrates the simplified flow sheet of SOMETRA ISP smelter.

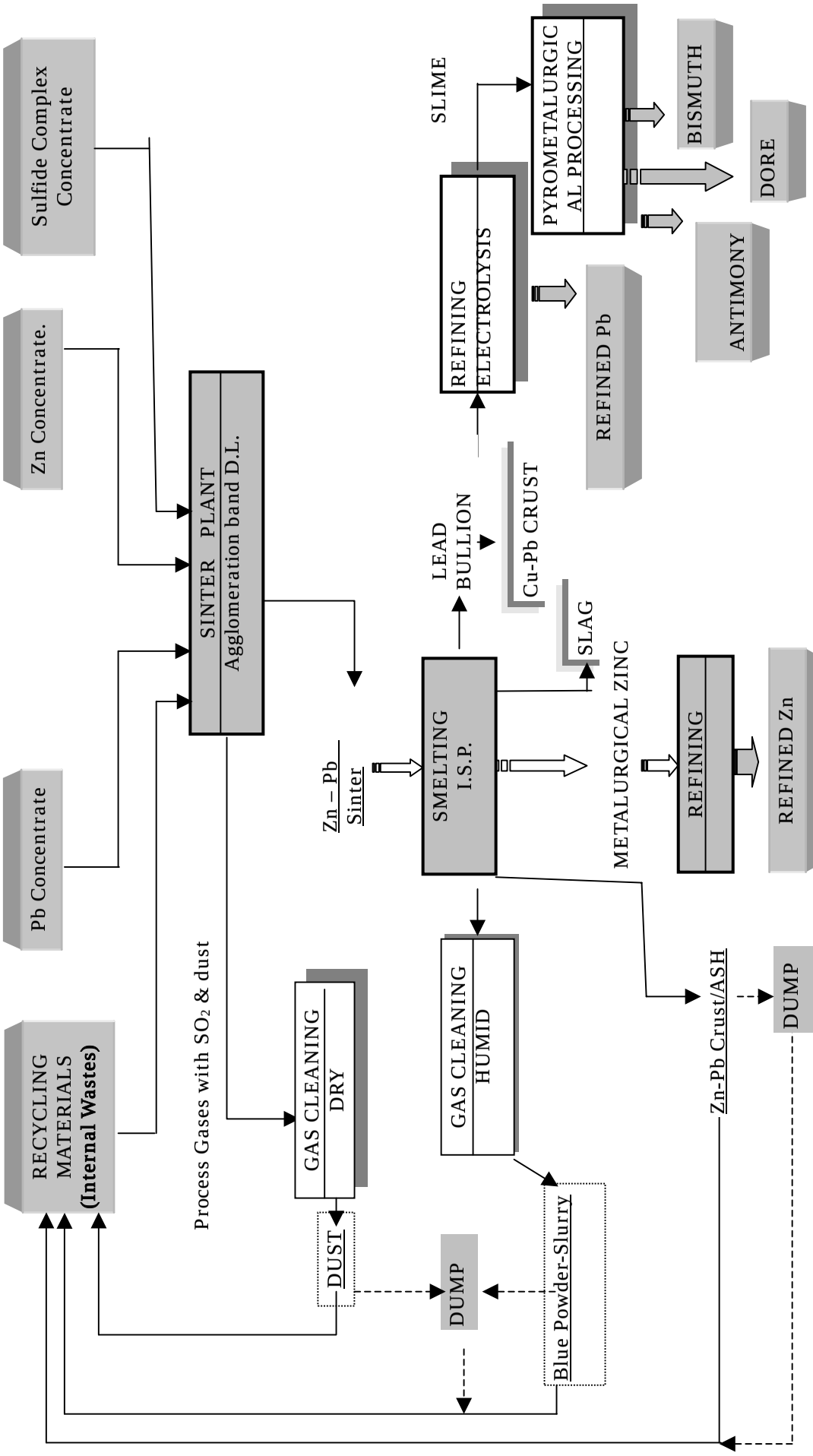


Figure 4.3.1 Flow Sheet of SOMTRA ISP Smelter

4.3.2 Recycle of the Internal Wastes

Since the sulphuric acid plant is now out of operation, the processing of lead and zinc concentrate (lead and zinc are in sulphide form in the concentrates) has been suspended and various kinds of slag and dust stored and dumped in the refinery are now treated (lead and zinc in these are mainly in the form of oxides). Although the amount of processed concentrate is decreasing, the production volume is increasing.

The largest amount of waste in the refinery is dust called blue powder. The blue powder is captured by the ISP method in the zinc condenser exhaust gas cleaning process when evaporated zinc is condensed and recovered. This blue powder contains 30-38% of lead and 20-35% of zinc. Presently 2,000 ton/month is treated. The accumulated blue powder will all be treated within a one and half year period at the current treatment rate.

In addition, SOMETRA has been recycling Zn-Pb dross (Pb; 35-45%, Zn; 23-33%), Dust (Pb; 50-65%, Zn; 4-11%) and lead electrolysed slime into the ISP furnace. Copper containing wastes like Pb-Cu dross (Pb; 40-75%, Cu; 10-18%) that are generated inside the smelter are exported, because this kind of waste circulates in the ISP process.

As stated above, SOMETRA is now treating in-plant slag and accepts little industrial waste from the outside, but it wants to accept industrial waste as recyclable material in the future. It is currently conducting a survey on the processing of waste batteries.

4.3.3 Problems in Terms of Internal and External Waste Recycling

SOMETRA itself thinks that following items are problems regarding HW management.

- Reduction of quantity and process improvement of Pb-Zn dross generation
- Reduction of quantity of blue powder
- Improvement of raw material feeding system for external wastes receiving
- Reduction of quantity of Cu-Pb
- Improvement of Pb production line for acid lead battery[1]
- Utilization of slag

[1] the lead electrode of an old-type battery is made of a lead-antimony alloy containing antimony of 2 to 5%. The electrode of a maintenance-free lead battery, which is common in Japan, is made of an alloy containing less antimony but a small amount of calcium instead. Old-type batteries seem to be still popular in Romania.

4.4 RGB PHOENIX S.A.

4.4.1 Outline of the Company

The PHOENIX smelter started operation of Outokump flashing furnace in 1948. Originally, the production capacity of electrolysis copper was 45 thousand tons/year which was only 20-30% of capacities of other commercial copper smelters in the world. The RGB group of Greece bought this company in 1999, then, PHOENIX was privatized. The number of employees decreased from 3,000 during the state-owned period to 850 at present.

If copper smelting continued, generation of SO_2 gas was required to treat and recover it as sulphuric acid. However, because the sulphuric acid price has fallen, in 2000, the company stopped both the copper smelting operation and sulphuric acid production. Since then only the copper electrolysis operation has remained.

- Capacity: Copper smelting: Operations now stopped. (Previous Capacity: Blister Copper ; 35thousand tons/year)
- Copper Electrolysis: Electrolysis Copper; 40 thousand tons/year

4.4.2 Recycling External Wastes

Phoenix now buys blister copper from Amplleum Smelter which is located in Zlatana, Alba county and also recyclable copper waste from waste recycling companies like REMAT.

Recyclable copper wastes are the wastes that contain approximately 95~97% of copper like motor coil and wire. The amount of this kind of recyclable copper wastes collected is presumed around 150 thousand tons annually in Romania nationwide.

Electrolysis copper production in 2001 remained at 150 thousand tons/year. Because Phoenix has enough production capacity, it intends to import these recyclable copper wastes by permission. It is said that the recycling of recyclable cooper waste is more profitable than sulphide concentrate.

4.4.3 Problems in Terms of HW Management

- The utilization of slag for construction material. (It has a slag which contains only 0.7% of copper, but is still kept inside the smelter)
- Improvement of filtering process of waste water treatment plant
- Improvement of historical wastes treatment

4.5 S.C. ROMPLUMB S.A.

4.5.1 Outline of the Company

ROMPLUMB commenced operation in 1944. Now it is a state-owned company and belongs to the primary product department under the Ministry of Industry and Resources.

Since this smelter, without a refining process, has a very old sintering machine and a blast furnace, it can only produce pig lead, which is an intermediate product. Despite the fact that major smelting facilities are old, ROMPLUMB used to be the most environmentally advanced company in Rumania.

Production Capacity: Lead bullion; 8 thousand tons/year. Up to 1996, lead bullion was sent to SOMETRA, Copca Mica for lead electrolysis in order to recover electrolysis lead which is a more refined metal of lead. Since 1997, ROMPLUMB has exported lead bullion. Lead content in lead bullion is 99.2-99.5%

Lead concentrate treatment: Capacity;28 thousand ton/year） Because Romanian concentrate consists of complex sulphide ores and contains other metals (Cu, Zn, pyrite, etc.), ROMPLUMB is not suitable for processing Romanian concentrate. The company currently imports less dirty concentrate from Poland. Average lead content in the lead concentrate; 63-64%

4.5.2 Recycling Internal and External wastes

ROMPLUMB has been promoting the recycling of internal and external wastes which contain lead. The present raw material ratio is concentrate, internal waste and external wastes with 60%, 2-6% and 10-15% respectively. Recycled materials consist of lead-containing waste and lead-oxide-containing waste from battery manufacturers and other companies. The current throughput is 2,000 to 2,500 tons/month.

Some of the slag generated in the past contains a lot of lead (5 to 8%). When lead was recovered from this slag by flotation, the lead grade in the slag decreased.

When concentrate containing a lot of copper was processed, matte was generated. It has been stored in the refinery.

In the future, ROMPLUMB wants to process waste such as medical waste including needles for syringes, laboratory waste, and shell cases.

4.5.3 Acid Lead Battery Recycling (Phare Fund P/J)

The primary aim of the project is to make a facility modernization plan for survival of the ROMPLUMB smelter. One of the improvement plans is to recover lead from industrial lead batteries such as those used for cars. This project which was started in October 2001 consists of three phases and will be completed in November 2002. The plant to recover lead from batteries requires a total investment of 2.6 million US$ (1.3 million US$ for the installation of battery shredding equipment). The plant has not been installed because financing is not yet available. The total generation of waste acid-lead batteries including industrial sources and car batteries is around 20-30 thousand tons/year nationwide.

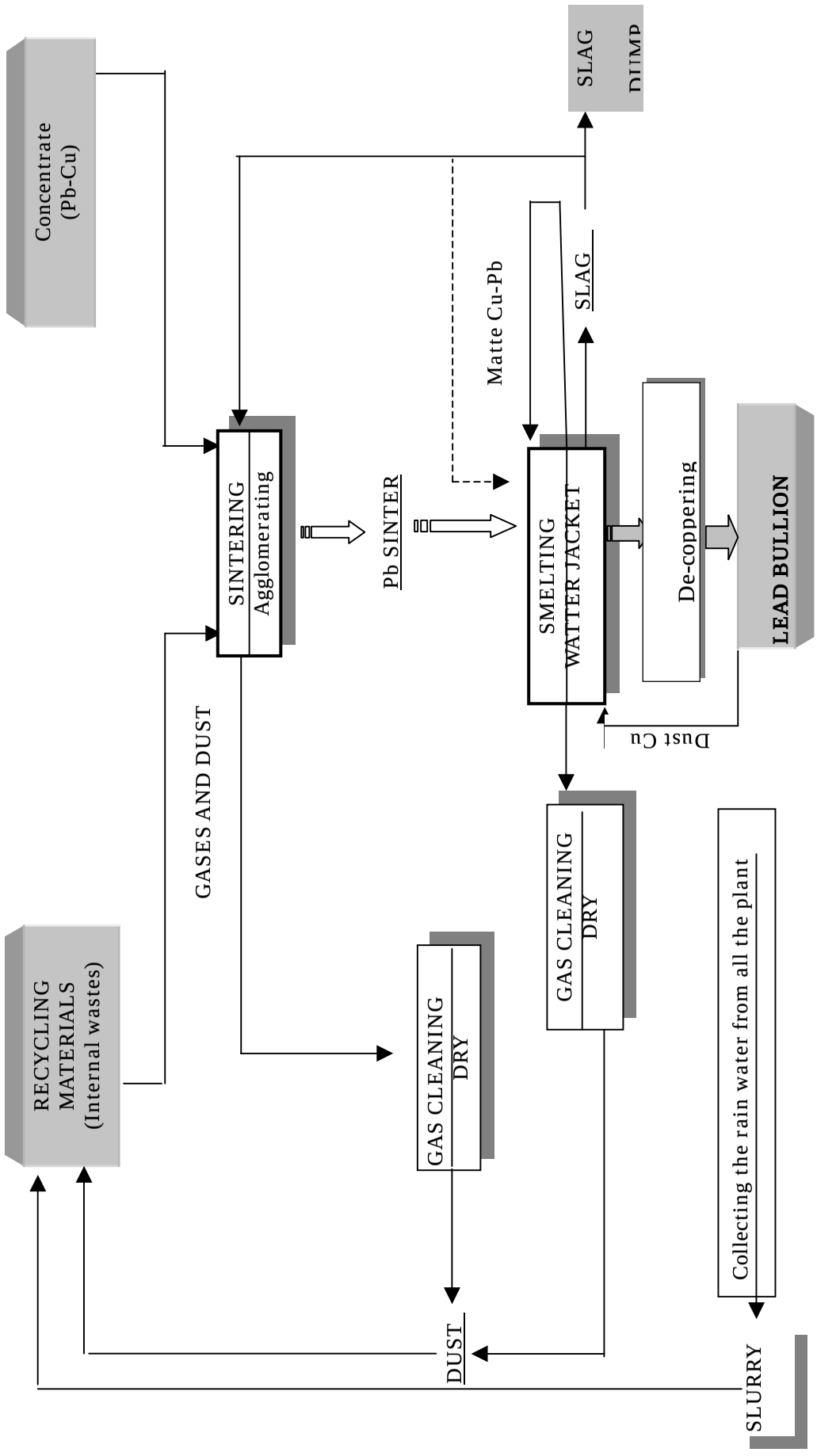


Figure 4.5.1 Flow Sheet of S.C. ROMPLUMB S.A. Pb Smelter

4.6 S.C. UVCP S.A.

4.6.1 Outline of the Company

S.C.UVCP S.A treats a residue generated in the process of manufacturing sulphuric acid from Pyrite (FeS_2) in a chemical and fertilizer factory. They produce iron oxide pellets for selling to a steel manufacturing company (SIDEX). This process is "Chloride vaporization process" which was developed and introduced in 1979 by Japanese companies. Through this process, precious and heavy metals are recovered form the pyrite ash as a by-product. Figure 4.6.1 shows a general flowchart of the chloride vaporization process .S.C.UVCP S.A is state owned company at present, but hopes to be privatized in the future. Number of employees is 600, and annual turnover, 3-4 million US$/year. A subsidy of 15 to 20% has been granted to the factory by the government because sales are too low to cover the manufacturing cost.

・Raw material

Pyrite ash (sinter): Capacity; 160 thousand tons/year,

Average Fe content; 44-45%

・Product

Iron oxide pellets: Capacity; 130 thousand tons/year, Average Fe content: 55-60%. There are two kinds of products depending on the size and hardness of pellet. Around 20% of the products is the off-spec and costs a half of standard products. Table shows recent production record of S.C. UVCP S.A. They consumes (recycles) around 80～90 thousand tons of pyrite ash and produces 40 ～60 thousand tons of iron pellet in a year. Also they get copper cement, gold concentrate and silver concentrate as the by-product.

Table 4.6.1 Production Record of S.C. UVCP S.A

	Unit	1995	1996	1997	1998	1999	2000
Raw material(wastes)							
Pyrite ash	t	93.180	75.636	77.886	79.320	80.832	91.620
Calcium chloride	t	6.598	6.916	7.005	4.600	6.032	6.184
Calcium carbonate	t						1.302
Products:							
Iron oxide pellets	t	51.190	39.630	44.085	47.900	53.300	57.250
Fe fine ore	t	26.460	23.400	20.820	18.200	14.060	19.100
Copper cement*1	t	32	57	10	33	49	25
Gold gypsum	kg	69	72	52	43	48	57
Silver gypsum	kg	384	476	287	551	454	380

(Source; Ministry of Industry and Resources)
*1: Average Cu content;70%

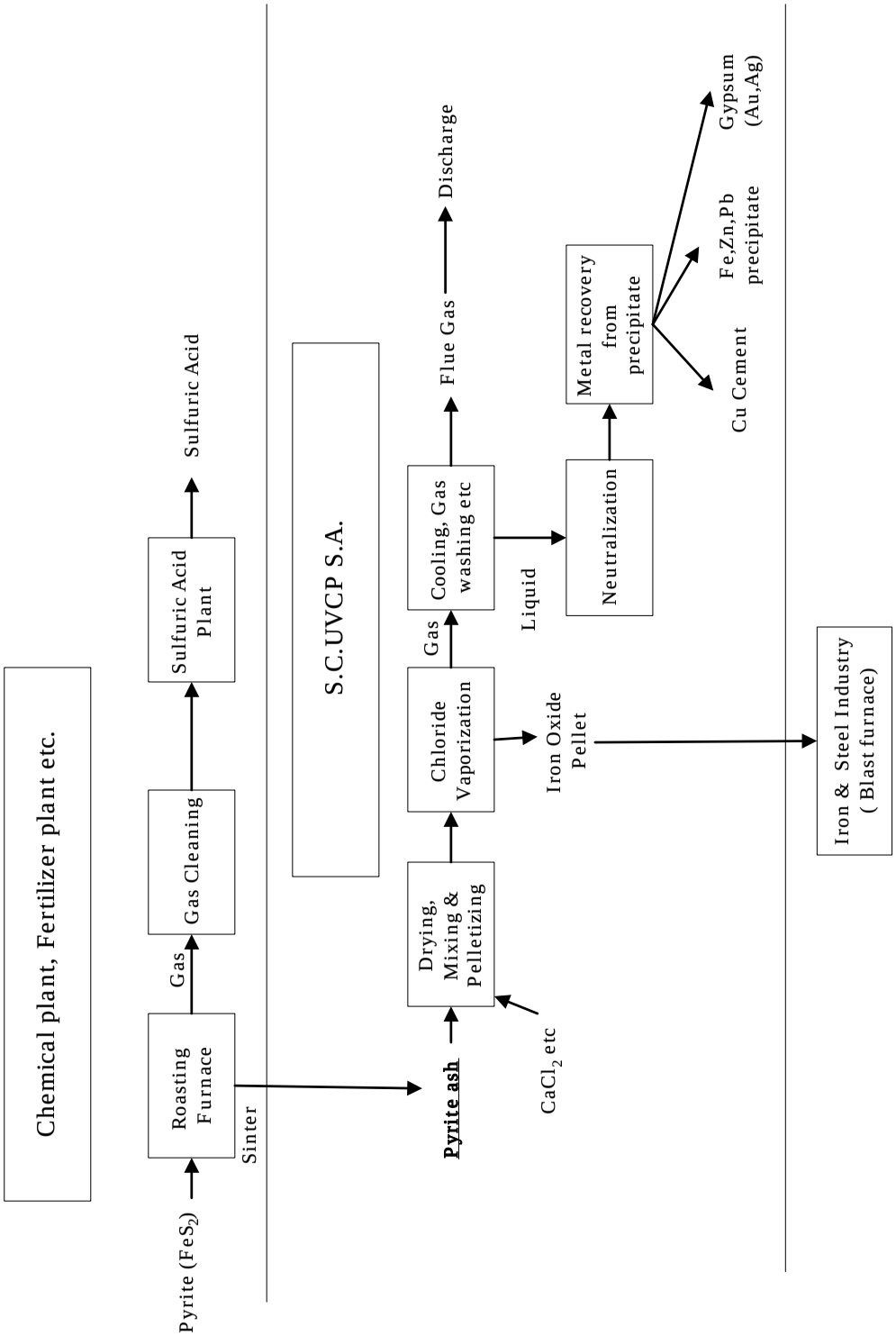


Figure 4.6.1 General Flow of Pyrite Ash Generation and Chloride Vaporization

The recycling or disposal of the waste other than pyrite ash has not yet been planned. An executive holds the view that it is still difficult for a waste disposal company to charge for the disposal of industrial waste in Romania. S.C.UVCP S.A has not conducted a marketing study of mainly industrial wastes yet from the recycling point of view.

23 years have passed since the operation was started. The plant is fairly decrepit, considering how few years have passed. Maybe, the investment made in this plant was sufficient for its sales volume. Nowadays it can be difficult to manage only by processing pyrite ash into iron oxide pellets. The plant needs to diversify into the processing of other industrial waste.

4.6.2 Situation of Pyrite Ash Generation

In S.C.UVCP S.A., the pyrite ash was transported from the dumping site of a chemical and fertilizer mill in the city. Raw material was available at zero cost. UVCP bore the transportation cost. This chemical and fertilizer factory, however, went bankrupt two months ago. No new pyrite ash has been generated. The remaining pyrite ash amounts to 6-700 thousand tons. The original pyrite is transported from the pyrite mines in the Moldovan region. This pyrite ash dumping site is located along the Danube river beside the bankrupt chemical and fertilizer factory. Windy conditions often suspend the pyrite ash, which may then affect the neighbouring areas. Other pyrite ash dumping sites include fertilizer companies in Constanta city and in Caugareasca. These two fertilizer companies also went bankrupt a few years ago and no new pyrite ash is generated by them. The pyrite ash has become “historical waste”. It is heard that the quality of these pyrite ash (the content of heavy metal) is similar to that of Turnu Magurele.

Table 4.6.2 summaries the situation of non-ferrous metal primary smelters mentioned above.

Table 4.6.2 Situation of Non-Ferrous Metal Primary Smelters in Romania

	SOMTRA	S.S. ROMPLUMB S.A	RGB PHOENIX S.A.	S.C. UVCP S.A.
Location	Copsa Mica	Baia Mare	Baia Mare	Turunu Megrere
County	Sibiu	Maramures	Maramures	Teleorman
Ownership	Private	Government	Private	Government
Operation	Pb・Zn ISP process	Pb Blast Furnace	Cu Outokump Flushing Furnace	Pyrite treatment (Chloride vaporization process), (Producing raw material for steel industry) Recovery of Cu,Au,Ag etc.
Raw material	Pb & Zn Concentrate.;135 thousand ton/year Internal Wastes;44 thousand ton/year Zn Scrap;11 ton/year	Pb concentrate; 28 thousand ton/year Internal Wastes External Wastes;2 ～2.5 thousand ton/year Ratio: Conc.: Internal Waste:	Blister Cu from another Cu smelter (Ampellum smelter) Recyclable Cu scraps	Pyrite ash;160 thousand ton/year

	SOMTRA	S.S. ROMPLUMB S.A	RGB PHOENIX S.A.	S.C. UVCP S.A.
		External Wastes= 60%: 2～6%: 10～15%		
Product	Capacity Refined Pb; 38 thousand ton/year Refined Zn; 57 thousand ton/year	Capacity Pb bullion;20 thousand ton/year	Capacity Electrolysis Cu; 40 thousand ton/year	Iron oxide pellet;130 thousand ton/year Cement Cu; 50 ton/month Au & Ag Gypsum;50～60 ton/month
Internal Wastes	Blue powder Zn-Pb Dross Dust Pb electrolysis Slime Cu matte Cu-Pb Dross Slag	Dross Dust Slag	N/A	N/A

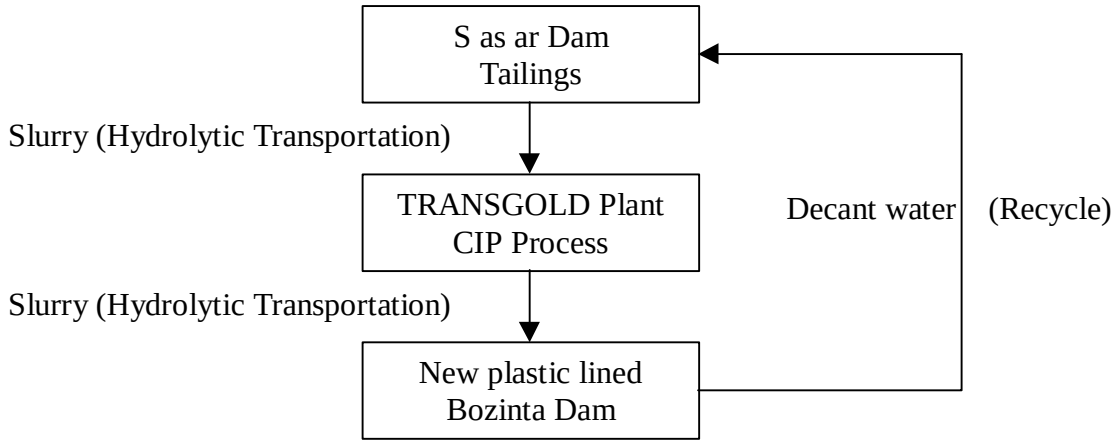
4.7 AURUL S.A (TRANSGOLD plant)

4.7.1 Outline of AURUL S.A

AURUL S.A is a joint stock company, owned 50% by Esmeralda Exploration Limited of Australia, 44.8% by REMIN (Compania National a Metalelor Pretiose si Neferoase) and others, and started to build a US$ 28.05 million treatment plant in 1997. The purpose of this plant is to extract precious metals from the tailings left behind from previous mining activity in the area. The previous tailings and other mining wastes are located 3 places around this plant. Central tailing dam; approximately 10 million ton, Au grade; 0.48 gm/t), S as ar Dam, approximately 4 million tons, Au grade; 0.60 gm/t, Old Calcines (Approximately 0.33 million tons, Au grade; 2.86gm/t.)

(1) TRANSGOLD Plant

TRANSGOLD plant has treated tailings in the Sarar Dam. The operation of the S as ar Dam treatment is almost finished. (capacity of the plant is 390 t/h). After precious metal extraction in the plant, the residue (new tailing) is transported to Bozinta Dam by hydrolytic transportation (6km).



Original tailings are transported in the form of slurry from an old gold and silver tailings dam(S as ar Dam), a few feet away from the plant, on the other side of the road. In the plant, remaining gold and silver is recovered by the CIP method (Carbon in Pulp). The residue is transported in the form of slurry again to another pond about 6 km away and stored in the pond. Since the CIP method uses cyanide to smelt gold and silver, the slurry of the above residue contains residual cyanide.

In this plant, chemicals such as sodium hypochlorite are added to the slurry to degrade cyanide by chemical oxidation during slurry transportation and by natural oxidation evaporation in the Bozinta Dam.

Melting of snow raised the water level of the pond in January 2000 and broke part of the embankment of the pond, causing the tailings in the pond and the pond water containing remaining cyanide to overflow. These tailings and pond water eventually flowed into the Danube from neighbouring streams through tributaries and contaminated the Danube in the Hungarian territory, causing a lot of fish to die. This accident involved EU, Rumania, Hungary, UNEP, and other organizations, which studied the measures to be taken and made the risk assessment of environmental pollution caused by the mine accident.

4.8 ALRO S.A.

4.8.1 Outline of ALRO S.A.

ALRO S.A. is the primary aluminium smelter. It is already privatized. The number of employees is 3,700 and annual turnover in 2001 was approximately 300 million US$(Profit; 56 million US$.) Main processes are as follows.

- Electrolysis of alumina(Production of aluminum)
- Production of anode of electrolysis of alumina
- Aluminium casting and production of aluminum alloy

Aluminum ingots are produced at the full capacity of 182 thousand tons per year (as of 2001). It is planned to produce 240 thousand tons in 2005 and 340 thousand tons in 2008. They are already ISO9002、ISO14001 certified. Table 4.8.1 shows the aluminium production in Romania.

Table 4.8.1 Aluminium Production in Romania

		Production (ton/year)					
		1995	1996	1997	1998	1999	2000
ALRO.	Al (primary)	141,500	140,872	162,987	174,038	174,452	178,979
NEFERAL.	Al (secondary)	3,009	2,901	1,554	1,047	146	38

(Source: Ministry of Industry and Resources)

4.8.2 Aluminium Primary Smelting

(1) Process

Purified alumina (Al_2O_3) is subjected to electrolysis to produce aluminium. Raw material, bauxite ($Al_2O_3 \cdot nH_2O$), imported from Guinea, Australia, etc., is purified by an affiliated company located in Tulcea. "Red mud" produced in the process of bauxite purification is dumped around Tulcea. Since "red mud" contains ferric oxide and titanium oxide, it can be utilized for the cement industry as the raw material.

- Anode; Paste Carbon
- Cathode; Steel pot-room is lined with refractory material and then coated with carbon material.
- Electrolyte: Cryolite(Na_3AIF_6)

Alumina electrolysis is performed at a temperature of 950°C to 960°C with cryolite electrolyte. For ALRO, calcium fluoride (CaF), which prevents the electrolyte from temperature decrease, is not added to the electrolyte. Since the anodes react to oxygen, which is generated through alumina electrolysis, and are consumed as CO_2, the anodes need to be periodically replaced with new ones. For ALRO, anodes are replaced at intervals of 28 days to 30 days. The cost of electric power equals about 30% of the total direct cost. Electricity for industrial use costs 30 cent per kWh, which is not lower (or is even higher) than in other European countries.

Six lines out of ten electrolytic lines, which were operating at the time of the revolution in 1989, have been modernized until now. In the newest line, feeding of alumina to each pot-room and temperature is automatically controlled. Operating data are managed by the host computer. The purity of electrolysis aluminum is 99% to 99.8% and the product is registered with LME.

(2) 3R Activity

- Aluminium recycling adhered to the bottom of the pot-room(electrolyser).
- They clean the pot-room once a year and half and recover aluminium containing residue.
- Recycling of consumed anode
- Recycling of electrolyte(Na3AIF6)
- Recycling of fluoride dust generated and scattered in the electrolysis operation
- Recycling of cokes powder in the carbon manufacturing factory

4.8.3 Aluminium Secondary Refining

(1) ALRO S.A.

Although a secondary aluminum smelting business license has been issued by the National Commission of the Ministry of Industry and Resources, secondary smelting is not done at present. The main business is aluminum primary smelting only.

Presently the company purchases secondary aluminum ingots from small-scale waste aluminum product recyclers, most of which are located in the Slatina area. These ingots are subject to dissolution and component adjusting, then processed into aluminum alloys or die-cast products for which high purity is not required. The consumption of secondary aluminum ingots stands at 2,000 tons to 3,000 tons per year.

In the secondary aluminum smelting process, waste aluminum scrap is mixed with flux such as NaCl and KCl, and melted at 1,000°C. In the upper part of the melting furnace floats dross waste, while in the lower part aluminium accumulates. Aluminum content in the dross is about 10%, which is disposed of by landfill. ALRO S.A. does not carry out primary and secondary aluminum recovery from dross by mechanical agitation.

(2) Small-Scale Waste Aluminum Product Recycler

Small-scale aluminum recyclers purchase waste aluminum die-cast products, waste aluminum cables, waste aluminum conductors, waste aluminum sashes, etc., from REMAT or other collection companies and melts it into ingots.

4.9 LAFARGE ROMCIM

4.9.1 Capacity of Clinker Production in Romanian Cement Industry

Nowadays, the cement industry is regarded as a waste recycling and disposal factory. The team was investigating the present situation and potential of cement industry in Romania as a waste recycle and disposal factory. In Romania, there are four cement product manufacturers with 9 plants. All the four companies have already been privatized. Total clinker production capacity is 11 million tons per year. Actual production in 2000 was approximately 6 million tons, and the rate of operation remained about 50%. On the other hand, Japanese cement manufacturers, with 36 plants, had a clinker producing capacity of 83 million tons per year as of April 2001, so the clinker producing capacity of Romania is one seventh that of Japan. The numbers of plants are below.

LAFARGE ROMCHIM ; 3 plants

HOLCHIM ; 3 plants

HEIDELBERGER ; 2plants

FIENI ; 1plant

Total clinker production capacity 11 million ton per year

4.9.2 Situation of Waste Recycling and Disposal of Cement Industry

LAFARGE ROMCHIM is carrying out tests and investigations for utilizing external waste, but has not started in a full scale. However they are interested in waste recycling and disposal and they are actually utilizing their internal wastes like waste belt conveyors and waste silica fiber LAFARGE ROMCHIM Medgidia Plant is using 140 thousand tons of petroleum coke per year as the fuel for its kiln burners, and therefore has an interest in cost reduction by substituting the petroleum coke with waste oil. An examination was made about the treatment of oily wastes in a waste oil pond in PETROMIDIA oil refinery located in Constanta. The amount of oily waste was 360 thousand ton and average calorific value was 2 ～4,000 kcal/kg. This oily waste was mixed with several other kinds of wastes and foreign articles. Removal of foreign article and mixing with another waste oils for calorific value adjustment is required. This project has not yet been realized, because the allocation of facilities between the LAFARGE ROMCHIM Medgidia Plant and refinery has not been settled.

A staff member of the company pointed out that waste oil that flows into illegal routes should be controlled properly, in order to start a full-scale waste treatment or recycling business. Meantime, SOTEM, which is an affiliate of HOLCHIM, constructed waste oil mixing equipment and started disposal of oily waste from the Vega refinery in July, 2002.

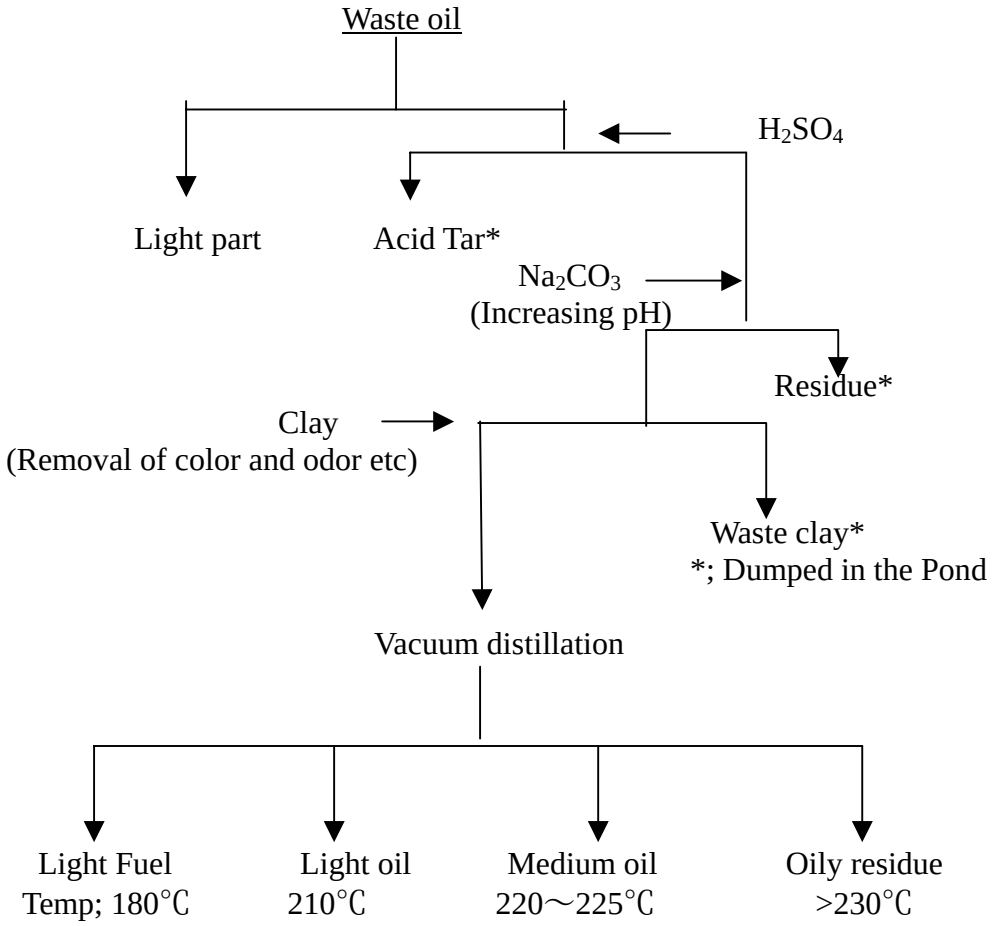
In short, the Romanian cement industry has not yet started a full-scale business of disposal and/or recycling of external waste. Among waste utilization, the industry is interested in alternative fuel by waste oils, waste tires, etc, especially oily waste which is being generated or has been generated in past from oil refineries. However, in order to develop this business, waste oil flowing through illegal routes should be properly controlled.

4.10 S.C. OILREG S.A

In Romania, lubricants have been recycled conventionally by “sulphuric acid treatment” plus “activated clay treatment.” The present status of S.C. OILREG S.A., which has been authorized by National Commission for Material Recycling, Ministry of Industry and Resources, is described below.

4.10.1 Process

S.C. OILREG S.A. is the one of the certified waste re-generators in Romania. In 1917, this company began operation of crude oil refining around Ruminic Sarat city. It changed to the waste oil regeneration business in 1952. The waste oil regeneration process used the traditional method of sulphuric acid purification and activated clay absorption. After purification, the light fuel, reclaimed engine oil and transformer oil were produced by vacuum distillation. The capacity of waste oil re-generation facility was 60 thousand tons per year.



Product

a) Light Fuel + Light part of chemical cleaning process

Light Fuel

b) Light oil + Medium oil (Mixing)→Base oil

Base oil +Additive→Reclaimed engine oil, transformer oil

c) Oily residue

Return to H_2SO_4 purification process. Or sold as liquid fuel

Figure 4.10.1 Flow of Waste Oil Reclamation in OILREG

4.10.2 Declining of Business

The volume of waste oil has decreased year after year since 1989, to only 900 tons in 2001. The average annual volume of waste oil reformed during the period from 1989 to 2001 was only 10 percent of the capacity.

Change of regeneration quantity of waste oils in S.C.OILREG S.A.

1989	1990	2001
72,000t/y	45,000t/y	900t/y

The reasons of this low rate of operation may include external and internal factors.

(1) External Factors

Collection and recycling of waste was well under control until 1989. After the revolution, people could freely sell wastes such as waste oil and dumped wastes of no monetary value. This reduced the flow of waste that went to recycling plants. Accordingly, REMAT became weak and many recyclers were shut down.

The lubricant oil market in Romania has little room for accepting reformed oil. Moreover producing reformed oil is costly for capital investment and ingredient adjustment.

(2) Internal Factors

Acid tar and waste clay cause problems. They are dumped in a pond excavated from the pebbly surface layer to the clay layer. The storage of waste acid tar and activated clay is now 150 thousand tons.

Because of the decline in business activity, it is difficult to purchase waste oil to be used as raw material.

In 1997 S.C.OILREG S.A. stopped the treatment of sulphuric acid purification and activated clay adsorption and vacuum distillation. The company discontinued the production of reformed engine oil and transformer oil. It now only produces reformed light fuel. Much equipment in the plant have not been used since 1997, and has deteriorated. It is judged that these facilities cannot be used unless additional investment is made. However the problems of acid tar and waste clay are remain unsolved.