Introduction

We have carried out the following 4 pilot projects:

Pilot Project 1: Promotion of heavy metal recycling using existing smelting facility

Pilot Project 2: Improvement of hazardous waste treatment in metal plating and surface treatment

Pilot Project 3: Promotion of voluntary actions and pro-active waste management within chemical and petro-chemical industries

Pilot Project 4: Strengthening hazardous waste management capacity

Pilot Projects 1, 2 and 3 focused on practical application of best available technology in hazardous waste management at factory level. A component of Pilot Project 3 aimed at awareness raising for "Responsible Care" in the chemical and petro-chemical industry.

Pilot Project 4 focused on introduction of improved hazardous waste information and inspection system by working with major stakeholders and developing and diffusing the following guidance note and formats:

1) Guidance note for identification and classification of hazardous waste
2) Guidance note and format for company waste management plan
3) Format for inventory of contaminated sites, and suggested method for prioritisation of contaminated sites
4) Guidance note for waste inspection by EPA / NEG

The Study Team has carried out the pilot projects with the following activities and procedures:

a) Identification of opportunities and technology and relevant fields where effective improvements can be expected in connection with hazardous waste management. The following criteria were used for identification and selection of opportunities and technologies:

   - Useful for Romania
   - Effective for improvement of hazardous waste management, and bringing about economic benefits
   - Low implementation / operational costs
   - High applicability and replicability

b) Designing, manufacturing, installation, operation, monitoring and evaluation of the pilot projects

c) Awareness-raising and dissemination of the pilot projects to Romania through seminars.

We have designed the pilot projects in such a way that the pilot projects activities will be largely carried out by Romanian consultants and engineers so that pilot projects themselves could be replicated by Romanian people in future. The Study Team believes that the Team has achieved a substantial technology transfer to the Romanian consultants and engineers and participating companies through the pilot projects.

In order to disseminate the result of pilot projects and awareness rising, we held seminars from June 24, 2003 to July 1, 2003. The following table shows the total number of participants to each seminar. In total nearly 500 persons participated in the seminar. Of the 42 county EPAs, 38 EPA sent representatives to the seminars.

Number of Seminar Participants (excluding seminar presentators)

	TOTAL	EPIs	Enterprises	Other
Seminar 1 (6/24)	**56**	15	32	9
Seminar 2 (6/25)	**89**	-	38	51
Seminar 3 (6/26)	**86**	5	53	28
Seminar 4&5 (6/28)	**167**	55	63	49
Seminar 6 (7/1)	**40**	6	28	6
Seminar 7 (7/1)	**48**	1	16	31
Total	**486**	82	230	174

In the seminars, we have presented results of the pilot projects as well as Hazardous Waste Management Strategy and Action Plan. Seminar handouts we delivered to the seminar participants include reports on the pilot projects (Volumes 6 – 9) containing pilot projects results, guidance notes, manuals and formats in addition to Volume 1 (Strategy and Action Plan). We have delivered both in hard copy (Book) and electronic files (CD Rom). We have also produced and delivered posters (2 kinds) and leaflets (2 kinds) to the seminar audience.

We believe the seminars ware successful and effective. However, it remains to be seen how Romanian people will actually replicate the technology and good practices disseminated through these seminars, leaflets and posters.

The following table summarises the objectives, participants, facilities installed in connection with the pilot projects described in this report.

Pilot Projects Objectives, Participants and Equipment Installed

Project Objective	Participants (Signer of Agreement)	Other Participants	Facilities Installed	Facility cost
1) Promotion of heavy metal recycling using existing smelting facility	Sometra S.A. Romplum Phoenix	Copsa Mica municipality EPI Sibiu EPI Baia Mare	Briquette machine (recipient is Sometra)	US$ 60,000
2) Improvement of hazardous waste treatment in metal plating and surface treatment	Direct Auto Timpuri Noi SA	EPI Arges EPI Bucharest	Zinc plating lines of cleaner production type	US$ 72,000
3) Promotion of voluntary actions and pro-active waste management within chemical and petro-chemical industries	FEPACHIM FEA S.A. AMCO Koyo	5 FEPACHIM Member Firms which participate in making "Company Voluntary Environment Management Plan": Petromidia S.A. (refinery) SC Uzinele Sodice Govora S.A (soda, ammonia) Azo-Mures (fertilizer) Sicomed S.A. (pharmaceutical) PoliColor	Closed solvent degreasing and recovery systems (Recipients are b, c & d)	US$ 76,000
4) Strengthening hazardous waste management capacity	EPI Arges	Companies which participate in making enterprise waste management plan: Dacia (automobile manufacturer) Arpechim (refinery) Presate Dacia (car spare parts manufacturer) Ana Imep (electric motors) Direct Auto Rom (car spare parts)	Analytical equipment for hazardous waste for Arges EPI	US$ 38,000
TOTAL COST ($US)				246,000

1. Pilot Project 1 - Promotion of Heavy Metal Recycling Using an Existing Smelting Facility

Heavy metal waste represents one of the most serious hazardous waste categories. The JICA waste generation study reveals that non-ferrous metal containing HW amounts to approximately 600 thousand tons annually in Romania. Yet such waste has the highest economic value in terms of recoverable material. Current recycling activities in this field is limited to waste batteries. A non-ferrous smelter is a most versatile heavy metal processing facility, which can be used for recycling purposes, without the need for high-cost investment in a dedicated facility. In Japan, many non-ferrous smelting facilities accept hazardous industrial wastes to recover heavy metals, on an economic basis. This practice can provide the most extensive recycling mechanism for heavy metal waste. Especially, lead-zinc smelting can provide the most versatile treatment capability. Recycled heavy metal and waste is not limited to lead from batteries, but also zinc from furnace dust, etc.

On the other hand, non-ferrous metal smelting facilities normally have a negative image as a polluting industry. In Romania, Copsa Mica and Baia Mare were known to be the most polluted towns in the country. The facilities themselves have to improve their waste minimization and internal recycling practices.

1.1 Outline of the Pilot Project

1.1.1 Objectives

Objectives are:

- To support three Romanian non-ferrous smelters in terms of internal HW management and minimization.
- To indicate ways in which the three Romanian non-ferrous smelters can accept hazardous waste from external sources and recover valuable heavy metals contained in it.

Methodology, Activities and Outputs

(1) Investigation for Internal Waste Minimization in the Three Smelters

This component of the pilot project was carried out by a highly experienced Japanese non-ferrous smelting engineer with support of local consultants.

Recommended measures to minimize internal waste are as follows:

1) SC.ROMPLUMB S.A.
   - Utilization of blast furnace slag
2) RBG PHOENIX S.A.
   - Improvement of management method of historical sludge generated flue gas washing process of sulphuric acid plant
3) SOMETRA S.A.
   - Preliminary economic evaluation of sulphuric acid production (Improvement of flue gas from ISP Furnace)

- Minimization of Zinc-Lead dross generation
- Minimization of blue powder generation (Blue powder is generated in the zinc condenser exhaust gas cleaning process. It is the largest waste in quantity in SOMETRA S.A.)
- Minimization of dust generation
  (Improvement of handling of powder materials)
- Treatment and utilization of ISP slag

Planned outputs of this component are:

- Technical recommendations of above items for three smelters

(2) Market and Waste Collection Study

Utilizing the ISP smelter as a model case, the amount and composition of external wastes will be investigated and samples are taken. Based on these data and operating data of the smelter, the possibility and direction of external HW recycling by using non-ferrous metal smelting facilities will be studied.

Planned outputs of this component are:

- Report regarding evaluation and possibility of external waste recycling by using non-ferrous smelting facilities.

(3) Provision of Briquette Machine for Preparation of HW Recycling in the Non-Ferrous Metal Smelting Process

In order to promote external waste recycling, mixing and briquetting of wastes would be necessary. The component of this project is to provide the briquette machine for testing waste samples in terms of suitability for recovering non-ferrous metals.

Planned outputs of this component are:

- Test scale briquette machine
- Report of briquette test of external waste samples

(4) Participants in Project

In addition to the JICA Study team the participants in this pilot project were:

- SOMETRA S.A.
- S.C. LOMPLUMB S.A.
- RGB PHOENIX S.A.
- Institute for Nonferrous and Rare metals (IMNR S.A.)

1.2 Evaluation of the Pilot Project

1.2.1 Technical Recommendation in Terms of 3 R in the Non-Ferrous Smelters

Technical recommendations for three smelters are summarized following table.

(1) S.C. ROMPLUMB S.A.

Slag is generally inert glass substance. There are several slag utilization applications introduced by Japanese engineer. However, social barrier and cost competitiveness exists for the further utilization of the slag. If official organization cooperates with non-ferrous metal smelting companies for technology development and authorization of slag utilization, it can step forward further.

(2) RBG PHOENIX S.A.

RBG PHOENIX S.A. has improved the condition of storage of arsenic containing sludge. Market of arsenic has been shrinking all over the world, because of its toxicity. Arsenic is the typical recycling-hard metal. Arsenic is usually produced by-product of base-metal such as copper. Non-ferrous metal smelters have difficulty in treating arsenic and arsenic containing wastes generated from the smelters.

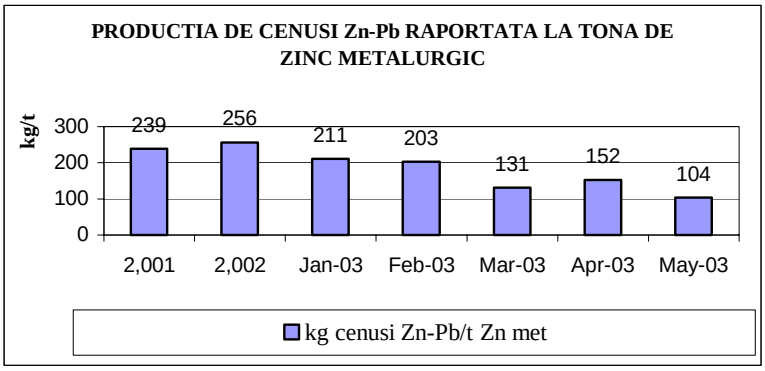
(3) S.C. SOMETRA S.A.

SOMETRA smelter has conducted some of the recommendations.

Pb-Zn Dross Reduction

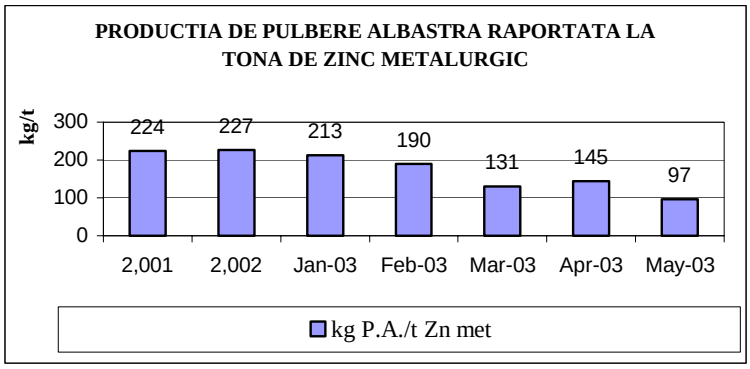
Reduction of Pb-Zn dross in SOMETRA smelter is shown in following figure. Compare to Fy 2001 and 2002, Pb-Zn dross generation has decreased dramatically. Average unit generation amount of Pb-Zn dross among ISP smelters is approximately 150 (kg/1 ton of produced Zn).

SOMETRA has achieved lower unit generation of Pb-Zn dross than world ISP smelters average.



Blue Powder Reduction

Blue powder also has decreased remarkably. Average unit generation amount of Pb-Zn dross among ISP smelters is approximately 155 (kg/1 ton of produced Zn). The study team would greatly appreciate that SOMETRA seriously had taken the recommendations and achieve substantial results.



Reduction of Pb-Cu Dross, Improvement of Powder Product Handling

SOMETRA have implemented some of the recommendation step by step and is observing the result of the recommendation. However, some of the recommendation requires budgetary measures. They considered and prepared for the implementation of the recommendations.

Sulphuric Acid Production

This may be the biggest problem for SOMETRA regarding environmental protection. It has to say that forecast of sulphuric acid business is uncertain because of the cheap price and oversupply. However it can be certainly said that the measures for SO_2 emission is essential to keep on smelting business on this place. Total cost of sulphuric acid plant construction would be 32 million US$. SOMETRA is looking for an available low rate fund like soft loan. The details are as follows.

- Modification of sintering machine; 1.5 million US$.
- Dry electrostatic precipitator, gas cooler; 3.5 million US$,
- Sulphuric acid plant main (6,600Nm^3/h x 6%SO_2); 24 million US$
- Cooling water facility; 1 million US$
- Waste acid treatment plant; 2 million US$.

Recommendation of 3 R in the non-ferrous metal smelters

	Issues	Recommendation	Cost (Million US$)	Remarks
S.C. ROMPLUMB S.A.	Slag management & utilization	Slag management Check the elution in compliance with EU standards Slag utilization Raw material for steel and cement Substitute material for sand blasting Construction material Filling of caisson	—	Amount of generation in 2001;Approximately 30,000 ton Slag is inert glass substance. There are several utilization applications shown in left column. However social barrier and cost competitiveness exists for utilization. If official organization cooperates with non-ferrous metal smelters for technology development and so on, it can be step forward.
RBG PHOENIX S.A.	Wastewater treatment sludge storage	Check the elution in compliance with EU standards Improvement of storage facility Reduction of sludge generation in case of re-start of the smelting process Introduction of heavy metals fixing by roasting the sludge	—	It is not generated yet.(Historical wastes),Storage quantity;Approximately 4,000 Roof, wall and pit of storage pond 1st stage neutralization pH;3 (1st stage; Gypsum, 2nd stage; Sludge) **Roasting condition;>900°C,>10 min**
S.C. SOMETRA S.A.	Reduction of Zn-Pb dross	Improvement of ISF operation Check below items Cokes strength Charging height of ISF Proper size of sinter lump	—	Amount of generation in 2001;12,200 ton
	Reduction of blue powder	Proper rotor immersion depth Flow gas modification	0.4	Amount of generation in 2001;11,343 ton
	Reduction of Pb-Cu dross	Shortening the de-copperization time Elemental sulpher copperization Treatment of speiss	0.1	Amount of generation in 2000;6,100 ton
	Improvement of powder product handling	Mixing of dxry and wet powder Moisture content adjustment improvement	1.5	
	Slag management & utilization	See S.C.ROMPLUMB S.A.	—	
	SO_2 emission improvement (Sulphric acid production)	Cosntruction of sulphuric acid plant	32	Rough estimation of initial cost;32 Mill.US$ Modification of sintering machine;1.5 Dry electric precipitator;3.5 Sulphuric acid plant;24 Cooling facility;1 Waste acid treatment;2

1.2.2 Possibility of External Waste Recycling by Using Existing Non-Ferrous Smelters

In terms of zinc, the amount of waste of high zinc content is not so big. One reason of this fact may be that dust is not captured and scattered. The amount of HW may increase as legal enforcement becomes stringent unless cleaner production technology prevails. Amount of waste acid batteries is quite large. Presently, medium and small recyclers are recycling lead grids and pastes from acid batteries. It may be not effective to be dispersed in small scale. In many cases, their operation seems not to be good. It is good for non-ferrous metal smelters to enter the recycling business.

If collection and transportation system exists, relatively the high-grade wastes can be recycled under the business condition. The problem is the low grade wastes which contain low content of usable component. Followings are the barriers for recycling of low-grade wastes like electro-plating sludge.

- High content of water → Needs to dry the sludge → High cost
- Generation amount of each factory is very small. → Collection and transportation of the sludge takes a great deal of time.
- Fluctuation of metal content by generator and by lot

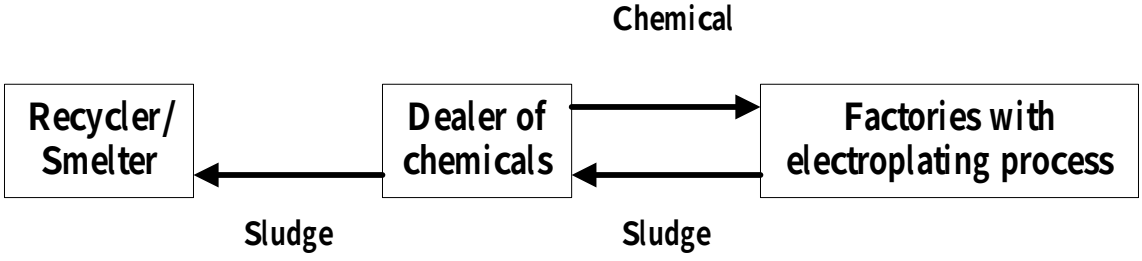
  Difficulty of constant operation of recycler and smelter

  Needs to analyze, blend and harmonize the composition
- Shortage of awareness of natural resources crisis

From the point of environmental conservation view, promotion of recycling of such low grade HM wastes like sludge is important. For this purpose, collection system should be established and awareness raising and cooperation with generators, collectors, recyclers and non-ferrous smelters is necessary.

Following figure illustrates the collection and reverse distribution system that was successful in Japan. Factory with electroplating process needs chemicals for electroplating. When dealer of the chemicals delivers the chemicals, they collect sludge in reverse distribution way. Then sludge store to some extent, recycler or smelter collect the sludge. REMAT companies can be put in this system. Role of non-ferrous smelter is important for recycling of the low-grade waste, e.g. sludge, dust.

Collection and Reverse Distribution System



1.2.3 Briquette Test

SOMETRA has conducted briquette test under normal temperature condition called "Cold Briquette Test". Produced briquette shows quite good hardness for ISP furnace. SOMETRA together with IMNR continue to conduct "Hot Briquette Test" which is more suitable for wastes recycling. The progress and result of above test may refer to the other smelters.

1.3 Summary of Documents Produced

The following reports were submitted: See report volume 6 in detail.

(1) Technical Recommendations in Terms of HW Management for Three Non-Ferrous Smelters by Japanese Expert

(2) Research Report by IMNR S.A. Including the Following Items:

- Present situation of operation and HW management of three smelters
- Heavy metal containing HW market and collection survey
- Factories that generate heavy metal containing HWs through manufacturing process.
- Factories that generate heavy metal containing HWs through equipment dismantling
- Lead acid battery etc

(3) Briquette Test

1.4 Future Development of the Pilot Project 1

(1) Low-Grade Wastes Recycling System

Technically, some kind of low-grade non-ferrous metal wastes can be recycled by blending them with raw materials, internal wastes and/or external wastes in the non-ferrous metal smelters. However, following items should be examined to promote the recycling of low-grade non-ferrous metal wastes.

- Reverse logistics system
- Awareness raising of generators
- Incentives of wastes recycling for non-ferrous smelters
- Fostering of mediator, blender or collector
- Intermediate storage

(2) Potential Recyclable Non-Ferrous Metal Wastes

Following table shows an example of electric arc furnace dust analysis in Japan.

Electric arc furnace is commonly used in the waste iron recycling. Because steel materials are galvanized electroplated in many cases, the dust from waste iron recycling process contains more than 20 % of zinc. Since composition of electric arc furnace is not so complex and amount of this dust is large, this dust is one of the big sources for secondary zinc. As mentioned before, this dust may be not captured and scattered in Romania at this moment. It is desirable that market study of these potential recyclable wastes should be carried out.

An Example of Electric Arc Furnace Dust Analysis in Japan

Element	Content (%)	Element	Content (%)
Zn	22.5	Fe	32.0
C	3.6	Cr	0.36
Cu	0.2	Pb	2.2
Ca	2.6	Cl	3.1
Cd	0.02	F	0.25
Si	1.6	O	24.9

(3) Sustainability of Non-Ferrous Smelting Industry

Without primary source (concentrates), non-ferrous metal smelter cannot continue the operation. This means they cannot recycle external wastes in the smelter. In order to promote HM containing wastes by using existing non-ferrous smelting facilities, their sustainability is important. In this sense, promotion and revitalization of non-ferrous metal industry in Romania is also necessary.

2. Pilot Project 2 - Improvement of Hazardous Waste Management in Plating and Surface Treatment Processes

The Study Team from the Japan International Cooperation Agency (JICA) has undertaken a study to develop a Master Plan for Hazardous Wastes Management in Romania. As part of the JICA Study a Factory Survey found that metal-finishing wastes contributed a significant portion of the hazardous waste generated in Romania and that significant issues existed in the management of these hazardous wastes.

The JICA study includes a practical pilot project component to identify, raise awareness of and address issues faced by metal finishing companies in improving their waste management.

Pilot Project 2 was developed to:

- Support the development and implementation of the Strategy and Action Plan for Hazardous Waste Management proposed for Romania in the JICA Study and
- To demonstrate best practice waste management for Romanian metal plating companies.

2.1 Outline of Pilot Project 2

2.1.1 Objectives

Specific objectives of PP2 are to:

- Promote improved hazardous waste management in industries with plating and surface treatment processes
- Demonstrate examples of an integrated approach to hazardous waste management in this sector
- Develop enhanced local capability for promotion of waste avoidance and waste minimisation and environmentally sound integrated hazardous waste management.

2.1.2 Development of PP2

It is evident that to achieve the objectives, representatives from all parties with a role in developing and promoting best waste management practice for metal finishers in Romania must be involved.

Participants involved both in the development and implementation of PP2 include two metal finishing companies together with their local pollution control authorities, local water companies receiving and treating industrial wastewater, local consultants and local suppliers of plating equipment and chemicals who also offer technical support to metal finishing companies.

2.1.3 Selection of PP2 Participating Enterprises

Several metal finishing enterprises were visited and interviewed for participation in PP2. Two enterprises, Direct Auto Rom and Timpuri Noi, were selected to participate.

Direct Auto Rom

Direct Auto Rom, located in Pitest is a private company founded in 2000 with 86 employees and their main activities include:

- Production and distribution of spare parts for cars
- Merchant supplier of building materials
- Merchant supplier of plumbing and heating supplies
- Contractor constructing civil and industrial railways.

Production of spare parts includes metal plating. DAR operates a single barrel / rack plating zinc plating line.

Selection of Direct Auto Rom for participation was based upon the following,

- DAR currently pays a high cost to dispose of their process wastewater untreated in tankers for off site incineration and are actively seeking an alternative waste disposal route.
- The tanker disposal route is unacceptable to the local EPI who are keen to support DAR and other metal finishers in developing acceptable waste management practices.
- DAR is typical of many Romanian metal finishers in that it is a small enterprise and does not have a connection to sewer to dispose of wastewater.
- DAR recognises that providing treatment on site would increase the number of wastewater disposal options available to it. These include the option chosen for the pilot project of disposing of treated effluent by tanker to the local sewage treatment works.
- DAR recognises that improving the plating processes to minimise waste will reduce the capital and running costs of wastewater treatment.
- DAR recognises that on site treatment and reduced wastewater volumes will improve negotiations with the Water Company for disposing of the wastewater into the sewerage system in the future.
- DAR is keen to support the demonstration of best practice to improve its product quality and to support its business marketing.
- DAR has demonstrated a strong desire to improve its operations and support the implementation of best practice with its own contribution in effort and financial support.

Timpuri Noi

Timpuri Noi was founded in 1874 in Bucharest and specialised in iron casting. The company was nationalized, becoming a state enterprise in 1948 specialising in the design and manufacture of diesel engines, diesel pumps, diesel generators, compressors and vibrating plates. Timpuri Noi was reorganised as a Joint Stock company in 1990 and is currently moving towards privatisation and is taking steps to reach this goal by separating the enterprise into individual profit centres. Metal finishing will be one of these centres.

The Timpuri Noi metal finishing shop has five plating lines, all of which are in very poor condition. There has been no expenditure on maintenance of the building plant and equipment for many years. Poor maintenance is evident from the absence of local extract

ventilation to plating baths due to corrosion / deterioration beyond repair and inadequate lighting levels due to lamps not being replaced and light fittings deteriorating beyond repair.

The TN wastewater treatment plant and equipment, like the plating shop, is in very poor condition due to neglect and lack of maintenance. The treatment plant, which is of a standard design for metal finishing plants, cannot operate as designed because much of the equipment is inoperable and beyond repair. TN reports compliance with wastewater discharge consent standards is achieved through dilution by operating processes at low throughput and continuous high flow rate rinses.

The plating shop management team produced hand written records for production management and quality control activities. New computers have recently been purchased to network production, quality and cost management systems.

Selection of TN for participation was based upon the following:

- TN is typical of many former state enterprises in Romania that have suffered from lack of investment. TN recognises the opportunity for the JICA PP2 to assist it in moving forward with improvements to its metal finishing facilities and progress towards privatisation.
- An opportunity exists for the JICA PP2 to achieve the project objectives at TN by supporting it in setting up a Zinc plating line to replace the cadmium plating and in doing so incorporate best practice. The importance of this is demonstrated by the following
- TN's main plating activity for the past 3 years has been Cadmium plating The EC have imposed restrictions on the use of cadmium plating
- All TN's plating lines are in very poor condition and there is a need to upgrade a plating line for zinc plating to support a customer change from cadmium plating to zinc plating.
- An opportunity exists to incorporate and demonstrate the benefits of best plating practice on the new zinc plating line to encourage investment from inside or outside the business to upgrade the other plating lines in the future
- An opportunity exists to upgrade the treatment facility to significantly reduce the release of metals to the environment by upgrading the wastewater treatment facility to remove metals rather than diluting their concentration.
- An opportunity exists to utilise TN's new computers to manage and optimise metal plating processes and wastes. TN could generate performance indicators and benchmarks for resource use and waste generation for comparison with international standards.
- TN recognises that improving plating processes will reduce metal finishing costs and reduce the capital and running cost of wastewater treatment.
- TN is keen to support the demonstration of best practice to improve their product quality and to support their business marketing.
- TN has demonstrated a strong desire to improve their operations and support the implementation of best practice with significant contributions in effort.

2.1.4 Activities

The work involved in PP2 at the participating enterprises focuses on supporting the enterprises with improving their metal plating processes and wastewater treatment facilities to demonstrate best waste management practice for metal finishing companies in Romania.

The work and activities of Pilot Project 2 will make all the interest groups aware of:

- The issues facing metal plating companies in establishing waste management best practice
- The drivers and barriers to plating companies implementing best practice
- Industry best practice with regards water, energy and chemical use
- Industry best practice with regards the management of all wastes associated with plating processes.
- Industry best practice with regards reducing the volume of wastewater to reduce the capital and running cost of wastewater treatment plants.
- Industry best practice with regards reducing chemical use and the volume of sludge generated at treatment plants
- Industry best practice for the treatment of plating company wastewater and disposal of sludge.

2.1.5 Outputs

The Planned Outputs for PP2 Are As Follows

- Inputs into the Master Plan for Hazardous Waste Management arising from issues identified during the development and implementation of PP2.
- A data base of reference material for cleaner production, wastewater treatment and waste management for the metal finishing industry.
- Case study examples of best waste management practice at two Romanian enterprises
- Demonstration of benefits to metal plating enterprises improving their waste management practices for example:
  - Improved operating conditions at DAR by eliminating high operative contact manual perchlorethylene degreasing of components in drums with alkali degreasing as part of a modified barrel plating line / process
  - Improved operating conditions at TN by the installation of local extract ventilation to plating baths
  - Reduced water, chemicals , energy use
  - Reduced wastewater volumes
  - Reduced chemical use and the volume of sludge generated at treatment plants.
- National Workshop for the dissemination of results.

All of these outputs and results have been realised.

2.2 Evaluation of the Pilot Project

2.2.1 Stimulated Investment in IPPC

PP2 Activities covered the whole hierarchy of Waste Management, including Avoidance (by changing raw materials) and Minimisation (solvent use and metal finishing wastes / waste waters, control of emissions, consideration of recycling (of treated waste waters), and proper treatment of waste/wastewater and environmentally sound disposal.

It should be appreciated that the JICA project made available relatively small economic support for these pilot projects and that the participating enterprises themselves invested both time and money, this was a deliberate aim of this pilot project to show that low-cost improvements ARE replicable in the Romanian context to both private and state sectors and that both can be stimulated into investing in appropriate technologies and techniques.

Indeed, Timpuri Noi has prepared plans to move their remaining metal finishing activities into the "new" workshop alongside the new Zinc plating line and to upgrade the waste / wastewater treatment system.

It is true however that additional project funds and additional consultant time could have leveraged further benefits, particularly at Timpuri Noi to redevelop the other three existing plating lines and the existing waste and wastewater treatment system (this activity has yet to be undertaken by Timpuri Noi).

2.2.2 Integrated Systematic Approach

PP2 demonstrated the benefits of a truly integrated approach to solving hazardous waste management problems. The systematic approach incorporated EU Best Practice in terms of metal finishing and treatment of wastes and wastewaters. This IPPC (Integrated Pollution Prevention and Control) approach included:

- Use of more "environmentally friendly", less hazardous, metal finishing chemicals
- Reduction of chemicals consumption
- Design and operation of the new metal finishing lines and degreasing systems to EU Best Practice, resulting in reduced quantities of more concentrated waste waters, and massive reductions in solvent consumption
- More efficient treatment of wastewaters facilitated by above technologies / techniques
- Treatment of waste and wastewater treatment plant sludge by stabilisation to result in a non-hazardous waste for final disposal.

The latter has demonstrated that it is not necessary to stockpile hazardous metal hydroxide sludges / filter cakes from metal finishing wastewater treatment.

2.2.3 Environmental Improvements

The pilot project has resulted in major environmental improvements including reduced emissions, compliance with strict wastewater standards, non-hazardous wastes for disposal.

But, in addition to these environmental improvements, the **working environment** has been greatly improved in terms of safety and health impacts which will result in happier, healthier, employees.

2.2.4 Product Improvements

Improved process technologies and process control lead to improved, more consistent, product quality and higher production efficiency which in turn lead to increased profits.

Such improvements are also important steps in moving to implementation of full Environmental Management Programmes, ISO9000 and ISO14000.

2.2.5 Improved Competitive Advantage

The productivity improvements achieved by low-cost investments result in increased profit which lead to a competitive advantage which is further improved by quality improvements achieved. Companies involved now have metal finishing lines they can be proud to show customers giving these customers added confidence in the service provided again helping to increase competitive advantage.

2.2.6 Compliance

With original systems in use DAR could not obtain an environmental authorisation, the latter was obtained during the project. DAR and Timpuri Noi are now able to operate these metal finishing processes and wastewater systems in compliance with Romanian legislation and standards.

2.2.7 All Stakeholders Have Benefited

The Pilot Project has involved all key stakeholders, including industry, regulators, equipment suppliers, chemical suppliers and local consultants all of whom have benefited from an improved understanding of the potential and scope of an integrated approach to waste avoidance and minimisation, treatment and disposal.

Indeed, pilot project 2 demonstrated that capabilities exist in Romania to achieve considerable improvements with foreign technical assistance catalyzing the process; indeed these pilot project activities have enhanced these local capabilities.

2.2.8 Next Steps

The avoidance and minimisation improvements made are impressive but the data collected indicates that further improvements, by optimisation of process operation, are achievable. Such improvements are no-cost (or very low cost) and are ways of further increasing profit.

The success of PP2 can be further leveraged by replication. As emphasised, the PP2 and PP3 activities have been low cost and have resulted in increased productivity / profit, many enterprises can benefit from these improvements. Nevertheless, replication is often poor following such projects.

Dissemination of information by EPIs, Ministries, Suppliers, Consultants, NGOs etc. is one of the keys to further replication and the project team has prepared leaflets and posters to initiate this (hard copies and electronic copies for additional printing as required).

Consideration could be given to use of economic incentives to further stimulate replication. This is reflected in the Hazardous Waste Management Plan proposed by the main project activities.

A further programme of similar pilot projects would greatly assist replication, and demonstrate application of the same principles within other industrial processes / sectors. Such activities would benefit from similar technical support to that which has been provided during this project; particularly to demonstrate that the methodology applied is applicable to other industrial activities and processes.

2.3 Summary of Documents Produced

PP2 has produced the following documentary outputs:

- ***Metal Finishing Best Practice Guide (Volume 7)***. This has been prepared based on international experience and on the results of PP2. It should be of benefit to all Romanian companies operating metal finishing processes.
- ***Dissemination Leaflet***. This leaflet has been prepared by the team to assist the EPIs in dissemination of results and promotion of similar avoidance, minimisation and waste treatment / disposal programmes.
- ***Awareness-Raising Poster***. This poster is intended for use by the Ministry of Environment and EPIs to raise awareness of the benefits of PP2-type activities.
- ***PP2 Video.*** Again, this has been produced for awareness raising and to promote PP2-type activities by other enterprises.

3. Pilot Project 3 - Promotion of Voluntary Environmental Management Activity by the Chemical Industry and Demonstration of Solvent Reduction in Degreasing Facility

The hazardous waste generation surveys (by both visiting and questionnaire) conducted by JICA Study Team have identified chemical industry as one of the important sector in terms of hazardous waste generation. Chemical sector in Romania has long history and are one of the well developed industrial sectors having various sub-sector such as refinery, organic chemical, pharmaceutical, fertiliser, etc.. However many of the factories are equipped with old technology and process which generates large quantities of hazardous waste. It is obvious that good management practice alone can not solve the waste problem. Modernisation and cleaner production facilities are essential for sustainable, long-term activities of the chemical industry in Romania. Privatisation of the industry is on-going, but not all industry can successfully attract the private investor for privatisation. Under such condition, simple enforcement approach by EPIs may not be very effective.

Globally, chemical industry initiated and are implementing self-regulating activity (industry practice code) called "Responsible Care", the activity for environment, safety and health. Responsible Care activity include not only in-factory practice, but also chemical management through supply chain, or product stewardship. In Romania, FEPACHIM (Federation of Petrochemical and Chemical Industry) , under technical support from CEFIC (European Chemical Industry Council), are trying to promote Responsible Care activity in Romania. This project will assist FEPACHIM and chemical industry to initiate the preliminary activity of Responsible Care.

3.1 Outline of the Pilot Project

3.1.1 Objectives

The overall objective is to promote voluntary environmental management focusing on hazardous waste in chemical industry through Responsible Care initiation.

Specific objectives were:

- Formulation of voluntary environmental management plan and report focusing on hazardous waste by five participating chemical factories.
- Promotion of Responsible Care initiation in Romania through FEPACHIM.
- Implementation of demonstration project for reduction of chlorinated solvent consumption at degreasing process of manufacturing industry, as part of Responsible Care activity.

3.1.2 Methodology, Activities and Outputs

(1) Environmental Management Plan and Report Focusing on Hazardous Waste

This component of the pilot project was carried out by the participating factories with support of local consultants. Material balance study of each factories was carried out to identify all the important emission, not only waste but also air and waste water discharge. Best Available Technology reference document was delivered whenever available for

specific sector. Based upon the data, plan and reports were formulated. As an essential part of the report, commitment of the management for environmental protection are included.

Planned outputs of this component are:

- Environmental management report by the five chemical companies.

(2) Promotion of Responsible Care Initiation by FEPACHIM

FEPACHIM with support of local consultant review the overall situation of chemical sector in Romania. The review will be the basis for future strategy for chemical sector in Romania. With participating factories, FEPACHIM initiated the preparation to form Responsible Care council in Romania to apply for the membership of International Responsible Care Council.

Planned outputs of this component are:

- Responsible Care preparatory report by FEPACHIM.
- Chemical sector review paper

(3) Demonstration Project of Reduction of Chlorinated Solvent

Chlorinated solvent is the chemical used in degreasing unit in various industries. Waste containing chlorinated solvent is one of the difficult to treat hazardous waste. In Japan, they are most frequently detected pollutant chemicals in the groundwater. The component of the project will implement demonstration of solvent reduction in three factories.

Planned outputs of this component are:

- Newly fabricated closed-type vapour degreasing unit and distillation unit
- Modified and improved degreasing units in two factories.
- Chlorinated solvent management manual (including field test report)

3.1.3 Participants in Project

In addition to the JICA Study team the participants in this pilot project were:

- FEPACHIM (Federation of Romanian Petrochemical and Chemical Industry)
- Companies participating in voluntary management activity
  Rompetrol - Petromidia S.A. (refinery)
  Uzinele Sodice Govora S.A. (Soda ash)
  Azo-Mures (fertilizer)
  Policolor S.A. (paint)
  Sicomed S.A. (pharmaceutical)
- Companies participating in solvent reduction demonstration
  FEA S.A.
  KOYO S.A.
  AMCO S.A.

3.2 Evaluation of the Pilot Project

Overall activities were successfully carried out as originally planed though some components had delay in implementation.

3.2.1 Environmental Management Plan and Promotion of Responsible Care Initiation by FEPACHIM

As for Responsible Care components, five chemical companies noted above expressed quite strong commitment for the environment management activities. The environmental management reports prepared by the companies showed good achievement in quantifying their environmental load and process responsible for such load based on mass balance study. Such assessment will serve as an initial base to start integrated environmental protection activities.

It should be noted that the most of the studies under this component were carried out by the companies themselves with the assistance of local consultant at minimum input of international expert.

FEPACHIM took important initiative for the formal creation of Responsible Care council in the country in consultation with International Council of Responsible Care. The group of five companies as noted above serve as a core for such initial activities. The seminar held in June 26 for Responsible Care as a part of the pilot project have successfully gained good industrial as well as public recognition. The seminar was attended by an international guest from TACM (Turkish Association of Chemical Manufacturers) who is a core member of CEFIC (European Council of Chemical Industry) Responsible Care program. Support form TACM and CEFIC was expressed. In the seminar questionnaire distributed to 52 industrial companies from chemical sector participated in the seminar, their response is quite positive. First question regarding usefulness of the Responsible Care program, 49 companies feel “it is useful”. Second question regarding their willingness to consider participation to Responsible Care program, all 52 companies replied “they will”.

Representative of Ministry of Industry and Resources also participated in the seminar and expressed their support to the program. It strongly recommended to continue and to expand the Responsible Care program in Chemical sector in Romania. Government support for the initial period is suggested until the program and council becomes self-sustainable by its membership contribution.

3.2.2 Demonstration Project of Reduction of Chlorinated Solvent

(1) Fabrication of New Unit and Improvement of Existing Units.

As for the demonstration of the chlorinated solvent reduction, newly fabricated closed-type vapour degreasing unit and distillation unit was installed successfully at FEA facory. The unit was designed, engineered and fabricated totally by the Romanian consultants and manufacturing company. Input from the international consultants was kept minimum.

Detail of the new unit is explained in the technical report of the pilot project (output document). In short, the unit is closed-type unit with automatic rid and parts loading system. The piping to the solvent distillation unit was included. Vapour loss to the environment is kept minimum during the rid opening operation. Quantifying the saving of the solvent requires further monitoring activity, but initial operation promises the significant saving. In addition to the solvent reduction, improvement of degreasing effect and working condition of the room

were recognized. Now the company is considering the elimination of subsequent cleaning process which was necessary with the old unit.

Improvement of the existing degreasing facility at AMCO and KOYO has been successfully implemented. Improvement included adjustment and modification of ventilation system inside the unit for the prevention of turbulence of solvent vapour, of cooling coil, etc. Measurement of vapour concentration and ventilation flow rate indicated possible reduction of solvent loss through ventilation over 90% from the existing operating condition. Monitoring of solvent consumption at AMCO support such estimation as 85% reduction was observed.

Saving of the solvent consumption means saving of cost to the company. In terms of recovery of the investment, newly fabricated units may recover within 3 to 5 years of operation, while improvement of the existing unit may recover within few months to few years depending on the operational condition.

(2) Dissemination and Replication

This component of the PP3 demonstrated the feasibility of solvent reduction in Romania. It is economical and can be implemented within the Romanian technical resources. However assuming the automatic dissemination of the result and replication at various factories may be over optimistic. As many technical assistance projects showed, the most difficult part is the dissemination phase.

PP3, together with PP2, organized the dissemination seminars inviting various industrial groups at Cluji-Napoca and at Bucharest. Posters and leaflets were produced and distributed to seminar participants and EPIs for dissemination of PP2 and PP3. These activities were just the beginning of the dissemination and continued efforts by the ministry, local EPIs and local private consultant/engineers are absolute requirement.

(3) Remaining Problem

Focus on the chlorinated solvent under this pilot project is mainly because of their potential environmental impact and difficulty of the waste treatment. Such main issues are not yet addressed under the project. Regardless of the reduction in consumption, any degreasing unit ultimately generate sludge waste containing the chlorinated solvents. For the time being, until proper treatment system becomes available in the country, proper storage of such waste is important. Such storage requirement is described in the other volume of the report under “Chlorinated solvent study”.

In terms of environmental impact, soil and groundwater contamination by the chlorinated solvent may be already very serious and extensive at this moment, taking the current handling practice into account. Yet no monitoring data is available and there is no measure for this problem. It is highly recommended to initiate the investigation and monitoring of groundwater to understand the magnitude of the problem and to consider the subsequent counter measure.

3.3 Summary of Documents Produced

Document produced by the PP3 are as follows.

Responsible Care Component

- Responsible Care preparatory report by FEPACHIM.
- Chemical sector review paper by FEPACHIM
- Companies voluntary environmental management report
  Rompetrol - Petromidia S.A. (refinery)
  Uzinele Sodice Govora S.A. (Soda ash)
  Azo-Mures (fertilizer)
  Policolor S.A. (paint)
  Sicomed S.A. (pharmaceutical)

Solvent Reduction Demonstration Component

- Technical report of solvent reduction
  FEA S.A.
  KOYO S.A.
  AMCO S.A.

Management manual of vapour degreasing (Translation of UK document to Romanian)

4. Pilot Project 4 - Strengthening an EPI Capacity in Hazardous Waste Monitoring

The JICA Study Project visit surveys and questionnaire surveys have indicated:

- Wide ranging capability within enterprises to understand the recently implemented waste management legislation in Romania (including the identification and classification of hazardous waste), and
- Good waste management practice is generally lacking for a variety of reasons.

The new IPPC legislation requires a better waste management by industry, especially of hazardous wastes. Consequently more knowledge will be required on the part of both the EPIs and enterprises. This project will assist both EPIs and enterprises to better understand and implement better practices.

The general objective of this pilot project is achieve outputs that will support the JICA Study proposed strategy and action plan for hazardous waste management in Romania.

4.1 Outline of the Pilot Project

4.1.1 Objectives

Specific objectives of this pilot project are to strengthen an EPI capacity in hazardous waste management activities including waste monitoring, inspection, assessment of company annual waste report, and enforcement and development of an information system on contaminated sites. Also, improved capacity in the application of good waste management practice (eg in accord with IPPC), and better capacity to develop the HWM component of County level WMPs.

Specific objectives were also identified:

- Improved capacity of EPI staff for development of both enterprise and county level waste management plans.
- Improved capacity of EPIs in factory inspection and evaluation and enforcement of good hazardous waste management practice
- Improved capacity of EPI staff for authorisation, permitting and approval of economic activities and enterprises
- Increased awareness of enterprises concerning good hazardous waste management practices and ability to develop company waste management plans
- Improved information system for contaminated sites.

4.1.2 Methodology, Activities and Outputs

(1) Hazardous Waste Management

This component of the pilot project was based upon a number of visits to each factory, observations at each factory, discussions with factory management, review of documents, and discussions with representatives of EPI departments - monitoring, waste, permitting and Environmental Guard.

Planned outputs of this pilot project are:

- Guidance note to improve waste identification and classification
- Guidance note for formulation of Company waste management plan
- Guidance note to improve waste function inspection capacity
- National Workshop for dissemination of outputs

(2) Contaminated Sites' Management

This component of the pilot project was based on discussion meetings with representatives of EPI, review of documents, and field visits and observation. The objectives of the project are to establish and show the appropriate procedure for making an inventory of contaminated sites and prepare a database.

Planned output of this pilot project includes:

- Format data sheet for description of contaminated sites in view of inventory
- Inventory of contaminated sites in the form of descriptive fiches
- Guidance document for scoring and ranking of contaminated sites according to the risk level potential
- National Workshop for dissemination of outputs

(3) Provision of Laboratory Equipment

The criteria for selection of equipment was related to the available budget and an application that would support the needs of Pitesti EPI to improve hazardous waste and/or contaminated sites' monitoring. The following equipment was selected and provided for EPI Arges.

- Digester
- Petroleum products analyser – OCMA 310
- Portable VOC analyser

According to EPI Arges, they have the following plan of use of the laboratory equipment provided by JICA:

Table 4.1.1 EPI Arges's Plan of Use of Laboratory Equipment Provided by JICA

No.	Company /location	Investigated area	Env. Media	Analyser								
				Digester			OCMA 310			Portable VOC analyser		
				metals	No sampling points/ measurements	frecquency	Petroleum sample	No sampling points/ measurements	frecquency	VOC	No of samples	frecquency
1.	Arpechim Pitesti	Old storage area for biological sludges	Water				x	6	2/year			
			Air							x	12	1/month
			Soil	x	10/20	1/year	x	20	1/year			
		Tri-azynic storage area	Water				x	12	2/year			
			Air							x	12	1/month
			Soil		4/8		x	8	1/year			
		New storage area for biological sludges	Water				x	6	2/year			
			Air							x	12	1/month
			Soil		8/16							
		Petroleum sludges storage area(lake 5 Dambovnic)	Water				x	4	2/year			
			Air							x	12	2/year
			Soil	x	8/16	1/year	x	16	1/year			
2.	Automobile Dacia /Mioveni	Unloading – stograge area for heavy oil – thermal treatments	Water				x	4	2/year			
			Air							x	12	2/year
			Soil	x	8/16	1/year	x	12	1/year			
		Central storage area – thermal treatment	Water				x	4	2/year			
			Air							x	6	2\year
			Soil	x	6/12	1/year	x	12	1/year			
		Lagoon area	Water				x	4	2/year			
			Air							x	6	2/year
			Soil	x	6/12	1/year						
3.	City Hall Mioveni	Piscani Area	Water				x	4	2/year			
			Air									
			Soil	x	8/12	1/year						
4.	Rail yard CFR	Heating plant + Oil storage	Water				x	4	2/year			
			Air							x	10	2/year

No.	Company /location	Investigated area	Env. Media	Analyser								
				Digester			OCMA 310			Portable VOC analyser		
				metals	No sampling points/ measurements	frecquency	Petroleum sample	No sampling points/ measurements	frecquency	VOC	No of samples	frecquency
			Soil		4/8		x	8	1/year			
5.	Aro Campulung	Electroplating sludges reservoir	Water									
			Air									
			Soil	x	8/16	1/year						
6.	IPEE Curtea de Arges	Electroplating sludges storage	Water									
			Air									
			Soil	x	8/16	1/year						
7.	MTT Poiana Lacului	Surrounding land to sanitary landfill	Water				x	4	2\year			
			Air							x	12	4/year
			Soil				x	6	2/year			
		Valea Lipia Area	Water				x	2	2/year			
			Air							x	12	4/year
			Soil				x	6	1/year			
8.	Schele: Pitesti, Gaiesti, Ciurasti	Polluted soil with petroleum products	Water				x	10	1/year			
			Air							x	34	1/trim
			Soil				x	12	1/year			
9.	Pitesti Albota Campulung C.de Arges, Costesti Topoloveni	Mixture waste storage areas	Water									
			Air							x	10	1/year
			Soil	x	As necessary	1\year						
Sample Total					**212**			**164**			**150**	

4.1.3 Participants in Project

In addition to the JICA Study team the participants in this pilot project were:

- EPI Pitesti
- ICIM consultants
- Enterprises in Arges (Dacia, Arpechim, Presate Daci, Ana Imep, Direct Auto Rom)

EPI Pitesti was selected on the following criteria:

- Arges is an `industrial' county and has many enterprises generating metal finishing wastes who agreed to receive `foreign' consultants
- Pitesti is readily accessible from Bucuresti which facilitated factory visits, meetings and discussions
- EPI Pitesti was one of the EPIs having a County level waste plan that included a well defined chapter on industrial waste management

The enterprises were selected on the basis of representing small, medium and large enterprises and their willingness to be involved and accept foreign consultants on their site.

4.2 Evaluation of the Pilot Project

The evaluation of the pilot project results was made with regard to **specific items** such as activities performed and documents produced**,** as well as **general benefits**.

The specific evaluation of PP4 is made in respect of:

the influence produced by PP4 activities on the knowledge and capability of the participants in the project

- the usefulness of elaborated documents
- the quality and outputs of seminars organized for the dissemination of experience accumulated and project results, and
- pointing out the benefits obtained for :
  - hazardous waste management
  - contaminated site management
  - monitoring by using laboratory equipment.

4.2.1 Evaluation of PP4 Considering Hazardous Waste Management

The effects/influence of PP4 activities and documents on the participants in the project – EPI Pitesti, Environmental Guard, and the 5 industrial enterprises - may be summarized as follows:

EPI Pitesti

- Increased understanding of principles of waste management included in the European legislation

- Increased capability to explain and sustain subjects related to applying good practices in waste management
- Increased awareness of the need to implement new, modern techniques into the current practices of economic entities
- Improved work outputs related to waste problems in different EPI's departments: permitting/ authorization, inspection (now Environmental Guard), monitoring and waste department. As examples:
  - improvement of authorization documents (annexes 4 and 5)
  - improvement of inspection practices by using the checklist of questions on waste management
  - completion of inspection report concerning waste management issues
  - use of the guide for hazardous waste identification and classification
  - use of the guide for elaboration of waste management plans by enterprises .
- The above mentioned documents, as well as the working together during the PP4 has enlarged and improved the dialogue of EPI with economic entities; this also enabled the EPI to share new information on waste management with companies.
- The visits organized to the chosen 5 companies, involving the JICA team, ICIM specialists and EPI personnel provided an example of survey and control focussed on waste management and its environmental implications.

Economic Entities

- Improved understanding of their problems and potential solutions in waste management
- Increased awareness of the need to comply with the regulations and rules of good practices in production and environment protection
- Learning to use the guide for hazardous waste identification and classification
- Experiencing the elaboration of more comprehensive waste management plans in accord with future IPPC requirements
- All enterprises have shown willingness to act in order to change the existing situation and make progress in waste management and environmental protection planning.

4.2.2 Evaluation of PP4 Considering the Contaminated Sites Issue

The problem of hazardous waste contaminated sites was not considered in detail till now at local level. There is still no official definition in the Romanian legislation and consequently no organized activities are planned and performed for such contaminated sites. In this context, the results of PP4 are very useful and important because they provide an example on how to manage locally this difficult problem.

By defining categories of contamination and identifying contamination sources, PP4 has led to the elaboration of the first inventory of contaminated sites in Arges county. All identified sites have been characterized by using two types of questionnaires for collecting field data. A database on contaminated sites at county level has been elaborated based on collected information.

In order to promote future actions for remediation, priority criteria for classifying contaminated sites have been produced. Applying these criteria, a list of prioritized contaminated sites has been obtained. This list will be used for planning remediation or - at least - to propose measures for limiting contamination, as well as for establishing responsible

authorities and financing sources.

4.2.3 Evaluation of the PP4 Considering the Provision of Laboratory Equipment

The provision of 3 new laboratory devices has enabled EPI Pitesti to substantially enlarge its analytical monitoring program (see section 4.1.2 item 3) and Table 4.1.1). This enlargement was oriented on emissions from hazardous waste deposits and contaminated sites, respectively by analysing leachate samples, groundwater samples, from monitoring wells and soil samples from contaminated sites' surface.

The new devices have many advantages:

- They are very efficient (example: duration of a mineral digestion – 20 minutes instead of 2 days) and facilitate the analysis of a large number of samples; this fact will ensure the survey of the pollution / contamination and its evolution
- The results obtained could be unloaded directly into a PC and recorded anytime
- They can function continuously for many hours, assuring a large productivity
- They are very sensitive and the results obtained are reliable
- The device for determining VOC – MINI RAE 2000 Analyzer – is portable and can be used in field inspection.

All above-mentioned advantages will assure an improved environmental monitoring activity in Arges county, especially in relation to hazardous waste.

4.2.4 Dissemination of PP4 Results Through Seminars

The above presented benefits have been specifically underlined during Seminars organized for dissemination of the PP4 results held in Pitesti and Bucharest.

The seminar organized in Pitesti (18 March 2003) was used to disseminate results of both pilot projects - PP2 and PP4 - at local level to administrative authorities, industrial entities and other institutions including mass media means (newspapers, local TV).

The seminar agenda related to PP4 has included the following items:

- Opening speeches addressed by the Arges Couny Prefect and Pitesti city Mayor
- Opening speeches addressed by representatives of Ministry of Environment and JICA study team
- Presentation of PP4 objectives and results:
  - Justification and objectives of PP4 (ICIM consultant)
  - General presentation of Arges county and its waste problems (Chief inspector of EPI Pitesti)
  - Improvement of activities in Waste Department by PP4 (Waste Office responsible person within Pitesti EPI)
  - Improvement of waste and contaminated sites monitoring activities by PP4 (Monitoring Department of EPI Pitesti)
  - Improvement of economic entities environmental authorization process

by PP4 (Authorization Department of EPI Pitesti)
- Improvement of Inspection activities by PP4 (Environmental Guard)
- Results of PP4 related to Arges county contaminated sites inventory, characterization and prioritization (Biodiversity Department)
- Presentation of the guide for identification and classification of hazardous waste upon the new European list of waste (ICIM consultant)

The seminar ended by visiting the Pitesti EPI laboratories where the JICA provided equipment has been located.

The audience comprised representatives of the above-nominated "actors" was interested in all presented items. The 5 companies included in the project, as well as EPI Pitesti representatives, have especially expressed their gratitude and satisfaction for participating in the project and their willingness in continuing and enlarging application of knowledge obtained.

The seminar organized in Bucharest (30 June 2003) was used to disseminate PP4 results at national scale, having as participants representatives from all 42 EPI-s, economic entities and professional associations, central and local authorities, in total 173 persons (out of which 54 specialists from 39 EPI-s). The items presented have been almost similar as in Pitesti seminar except the laboratory visits.

All participants in Bucharest seminar have received the study volume no 9, containing the description of the PP4 results, copies of the slides and other dissemination materials – leaflets, posters. The participants have been asked to indicate if they want to receive the CD Rom-s showing the JICA project activities and documents.

The evaluation papers filled in by the participants in both seminars have shown that the seminars have been successful and reached their purposes.

The conclusions of seminars have underlined the **general benefits** of PP4 as shown below.

General Benefits

The PP4 has facilitated a general better understanding of the need to integrate the waste management problem with production technologies, quality of products and environmental protection. It has demonstrated that environmental benefits can also lead to business benefits too.

JICA project PP4 has been a ”great catalyst” for activating people and energies for the improvement of waste management activities, both in EPI and industrial companies of Arges county. The team spirit and enthusiasm of all participants, including foreign and local consultants, has enabled the appearance - in relatively short time – of substantial good results consisting in new working documents, new capabilities and expertise. These achievements have been made possible especially due to the Japanese technical and financial support that was offered into a critical moment of the process of adapting Romanian practices to the internationally accepted ones.

4.3 Summary of Documents Produced

4.3.1 Documents Produced as Planned Outputs (Included in Vol 9 of JICA Report)

- Guidance note to improve hazardous waste identification and classification
- Guidance note for elaboration of companies' waste management plan
- Documents for improving inspection capacity on waste issues:
  - Checklist of questions for inspecting the management of waste
  - Proposals for improving the waste chapter within the Inspection Report
  - Proposals for updating the Inspection Manual
- Methodology to make the contaminated sites inventory
- Questionnaire models to collect information on contaminated sites in relation to the risks they pose to the human health and environment
- Prioritization criteria and method to elaborate priority lists of contaminated sites
- Structure of a database on contaminated sites

4.3.2 Other Documents Produced

- Recommendations for improving authorization documents (annexes 4 and 5 on waste and hazardous substances management)
- Improved versions of waste management plans of the companies included in the project
- Video (on CD-R) of PP4.