

## **Kohan Corporation**

**SPP Recycle Tech International**

◆ **Dirty MSW**

◆ **Construction Waste**      **Mixed Waste Processing & Recovering Plant**

◆ **Industrial Waste**

◆ **Landfill Regeneration**

**Currently, separation of MSW into recyclable and general waste is done prior to waste collection. Thus, only select, clean items are recycled, while the bulk of recoverable material are disposed of as garbage in landfills or incinerators.**

**Landfill :**

**Can not be reused when facility full and very costly to maintain its environmental concern.**

**Incinerator :**

**Air pollution, poison burning ash and waste water cause environmental problem.**

**More over, the value that can be extracted from reusable material is lost.**

**This Plant, SPP-5 series, offer a new generation of technology and patterns to process the garbage with 「Water Process」 and 「Additional Convert Process」 to separate and recover almost everything of the garbage to be reusable items, and create outstanding economic benefits. This SPP-5 series are the final solution of garbage treatment.**

★ SPP-5 Series work for :

- Dirty Municipal Solid Waste
- Construction Waste
- Industrial Waste (paper mills, plastic manufacturer ... etc)
- Landfill regeneration

★ SPP-5 Series Process : No Pollution, No neighbor protesting, low cost, high recover economical benefits. Recycle all components of the garbage.



**Commodities after SPP-5 Series Process and Reuse :**

brick, ceramic, glass, residue	crushed for bedding material in road construction
sand	for sale
gravel	
ferrous metal	
aluminum	
paper	paper pulp
Plastic film (PE, PP)	Convert to recycle plastic beads or plastic pallets
rubber, leather, sponge, fabric, wood, heavier plastic ( pvc, pc, opp....)	convert to RDF - 5
styrofoam	convert to PS
food scrape, yard waste	convert to organic fertilizer



## Waste Process Facilities comparison

Facilities Compare	Landfill	Incinerator	General Recycle Process Center	SPP-5 Series Plant
<b>Contamination</b>	marsh gas, odor smell, dirty water	Dioxin, ash	odor smell	nearly 0
<b>Neighbor's protest</b>	strong	strong	maybe	no
<b>Incoming waste (none poison)</b>	OK	Inflammable items	Only clean & select recyclable items	1) Dirty MSW 2) Construction waste 3) Food scrap 4) Waste from paper mills & plastic factories all ok
<b>Waste reduced</b>	0	70%	—	Over 95%
<b>Recovered &amp; Converted</b>	Gas to electric power	Waste to energy	Classified recyclable items	sand, gravel, metal, organic fertilizer, PS, paper pulp, RDF-5, plastic beads.
<b>Economic benefits</b>  (based on 500Tons / day Dirty MSW)	0	0	0	Organic fertilizer US\$106,022 RDF-5 316,680 Ferrous metal 715,000 Paper pulp 4,875,000 Plastic film 2,340,000  ————— US\$8,257,302 / year ★USA MSW components ★Not including saving of landfill or incinerator fees

**PRODUCT BROCHURE**



KOHAN  
Corporation  
U.S.A.

HUAN CHU  
Environmental  
Technologies  
Company  
TAIWAN



**SPP-5 Series**

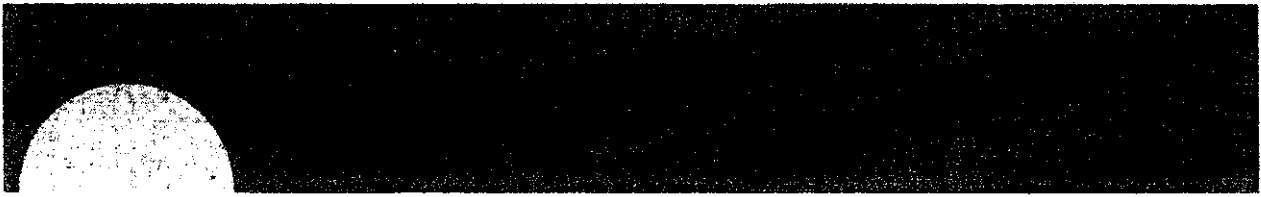
PE-PP  
FILM

PAPER PULP



**A NEW GENERATION OF  
MIXED WASTE PROCESSING**

*TURNING DIRTY MSW INTO RECYCLABLE COMMODITIES*

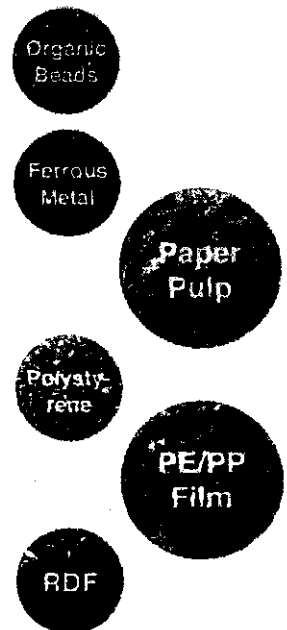


# Reclaim MSW & Realize Profit

*SPP-5 Series Progressively Recovers Municipal Solid Waste as Recyclable Commodities*

The **SPP-5 Series Closed Loop Recycling Plant** is a high technology Mixed Waste Processing system that recovers and converts up to 500 tons of Municipal Solid Waste (MSW) per day into recyclable materials.

The plant is divided into two operational phases to process mixed waste: 1) the Pre-Process uses automated mesh and magnetic separators to recover organic materials and scrap metals; and 2) the Main Process uses an automated water processing system to recover Paper Pulp, Plastic Film, Polystyrene and Refuse Derived Fuel (RDF).



## Municipal Solid Waste (MSW)

Currently, separation of MSW into recyclables and general waste is done prior to waste collection. Thus, only select, clean items are recycled, while the bulk of recoverable materials are disposed of as garbage in landfills or incinerators.

This method of waste management is detrimental to the environment and costly in terms of transportation and usage fees to incinerators and landfills. Moreover, the value that can be extracted from reusable materials is lost as general waste.

According to an EPA report,<sup>1</sup> the production rate of MSW in 2001 was 2 kg per person per day, with a recycling rate of only 40%. This generates an excess of 1 kg of MSW per person per day being sent to landfills or incinerators. The bulk of this MSW can be recovered and recycled with the SPP-5 Series Mixed Waste Processing Plant.

### Municipal Solid Waste

Composition of dirty MSW varies from country to country, and even city to city, but is generally composed of:

Paper	Plastic products
Fabric	Plastic bags
Rubber	Glass
Leather	Sand & Rocks
Wood	Yard Trimmings
Styrofoam	Food Scraps
Metals	Water
Ceramics	Other

<sup>1</sup> EPA, *Municipal Solid Waste in the United States: 2001 Facts and Figures* (2001)

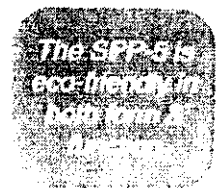




## Mixed Waste Processing

The SPP-5 Series is a fully automated plant that uses a perpetual water processing system to sanitize, separate, recover and reclaim the bulk of dirty MSW into reusable materials.

In the SPP-5 Series, circulating water is treated and cycled back into the system in a closed loop. Water and electricity usages are low, while emissions output is negligible.



Water Treatment System

Panel & Control

Conveyors

Filter Conveyor

Bale Break Machine

Mesh Separators (3)

Wind Blow Separators (2)

Shredders (2)

Grinders (4)

Mixer

Wash & Sedimenter

PE/PP Film Dehydrators (6)

PVC/PC Dehydrator

Dryers (3)

Pulp Dehydrator

Setting Machines (3)

Magnetic Separator

Specific Gravity Separator

Sonic Grinder

Plastic Film Separator

Eliminates contamination  
& separates from  
paper products

Recovers styrofoam

Recovers light plastic  
& converts heavy plas-  
tic into RDF

Paper waste is separated from non-paper products (such as staple pins, plastic laminate, tape) and processed into mixed paper pulp. Organic waste is recovered and processed into dehydrated organic beads. Styrofoam products and ferrous metals are recovered as recyclable polystyrene and scrap metal. Plastic waste is recovered and separated into light plastic (PE, PP) and heavy plastic (PVC, PET, OPP). Light plastic is further processed into plastic film, while heavy plastic is processed into refuse derived fuel (RDF).

With the SPP-5 Series, the environmental and economic impact of MSW disposal is considerably less than traditional methods, since only a fraction of the incoming waste is ultimately transported and disposed of through incineration or landfills.

Reduces land-  
fill & incinerator  
usage

## Plant Layout & Machinery

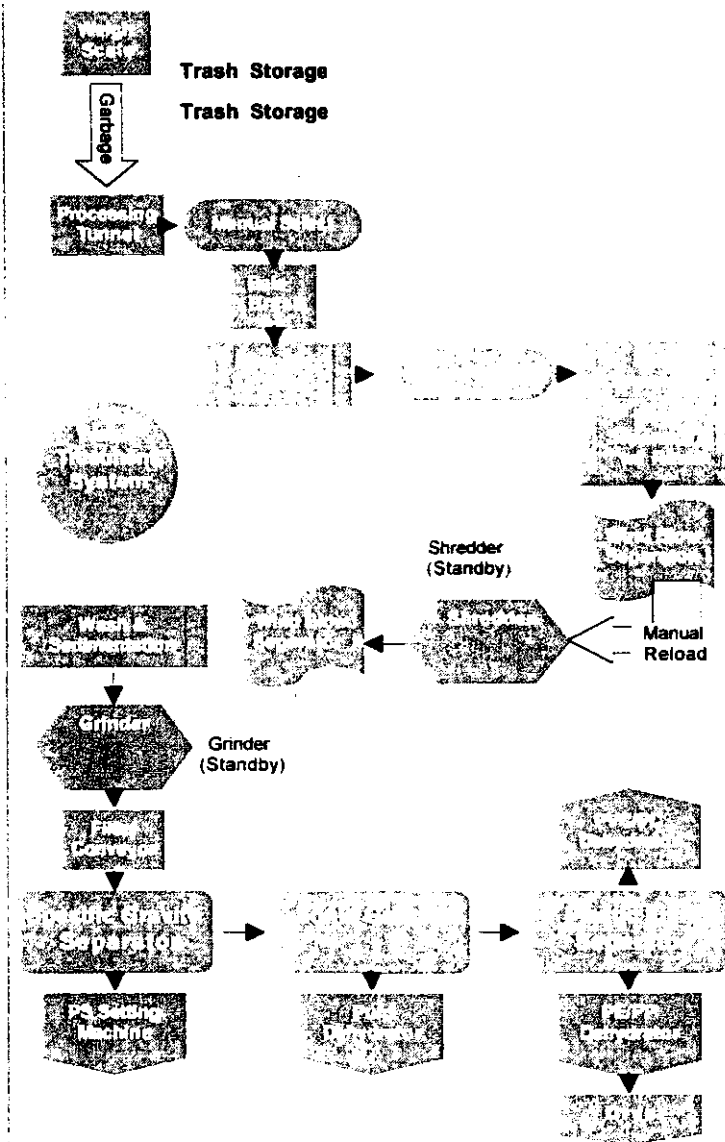
All machinery for the SPP-5 Series is manufactured in Taiwan and can be custom designed to meet customer specifications.

Approximately 10,000 m<sup>2</sup> is needed to accommodate the equipment layout. Voltage usage is 1500 KWH. An initial 500 m<sup>3</sup> of water is required to fill the water processing system, with a subsequent daily water usage of 150 m<sup>3</sup> to replenish circulating levels.

### Not included with the SPP-5:

- Building, kitchen, toilet and other structural facilities
- Power & water supply lines
- Dozers, stacking & packing machines, shaver machines, land scale
- Negative pressure chamber

## Plant Layout



# Machinery

## Mesh Separator

50-70 tons/hr capacity  
 Double Screen (1800 mm diameter  
 x 6100 mm length; 50-130 mm  
 changeable mesh; 0-5 degree an-  
 gle tilt)  
 10 HP Motor (2 qty)  
 2 HP Motor (5 qty)  
 Automatic Rolling Lubricant Sys.  
 Conveyers

## Specific Gravity Separator

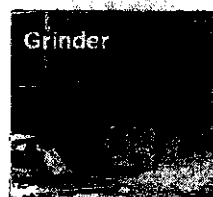
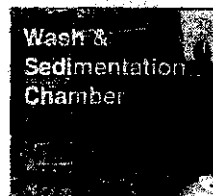
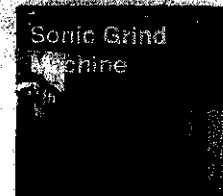
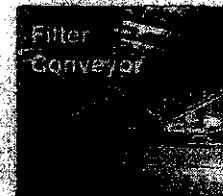
Anti-rust Chamber (6 qty)  
 Supporter (6 qty)  
 2 HP Motor (6 qty)  
 7.5 HP Blower  
 Over-flow Pipe (6 qty)  
 Air-Exhaust Valve (6 qty)  
 Sedimentation Chamber (6 qty)  
 Water Circulator (6 qty)  
 Spread & Separator (12 qty)  
 Washer (12 qty)

## Sonic Grinder

Anti-rust Chamber (6 qty)  
 Supporter (6 qty)  
 10 HP Motor (6 qty)  
 10 HP Circular Motor  
 Blower  
 Over-flow Valve (6 qty)  
 Sonic Grinding System (6 qty)  
 Timer & Auto-controller

## Plastic Film Separator

Anti-rust Chamber  
 Supporter (6 qty)  
 5 HP Circular Motor (3 qty)  
 2 HP Motor  
 5 HP Blower (2 qty)  
 Over-flow Valve  
 Spreader (6 qty)  
 Collector  
 Separator





## How it Works

### Pre-Processing

Incoming waste is immediately unloaded into the Processing Tunnel in order to contain odors. There are also two Trash Storage Rooms, each with a 500-ton capacity, to accommodate temporary shutdown of the SPP-5 Series for maintenance, repair or other reasons.

The SPP-5 is designed to process curbside MSW. It cannot process household electronics, bulky waste, construction waste, or industrial waste. A Manual Separation Station is incorporated to remove these items prior to the main process.

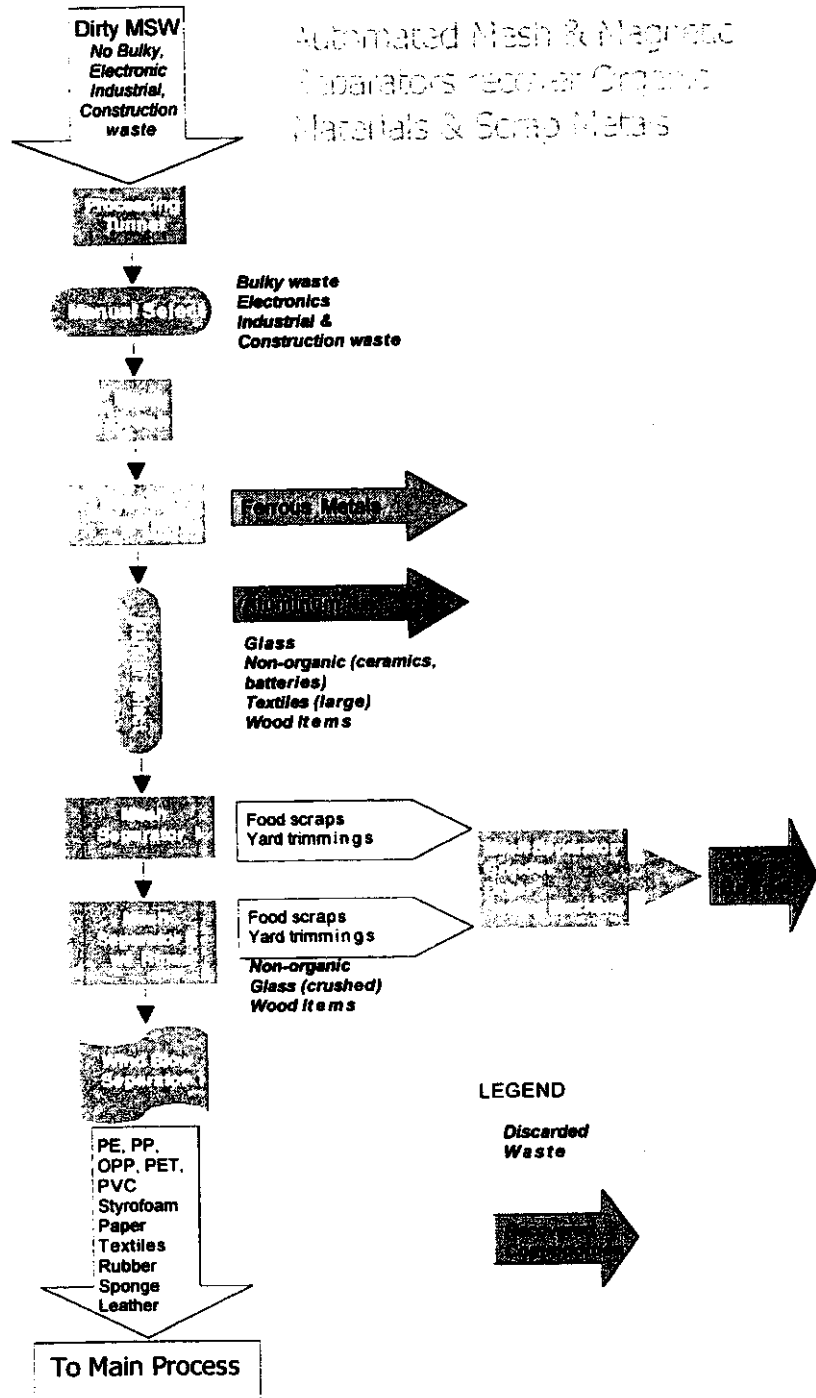
The Pre-Treatment process is confined within a negative pressure chamber to reduce odors. Air is forced upward and funneled through a heating element to dissipate volatile odors.

A Magnetic Separator recovers ferrous metals for resell as scrap metal.

Organic (i.e., decomposable) waste is separated out through the Mesh Separator I and through another Mesh Separator II. It is removed

## Pre-Processing

Automated Mesh & Magnetic Separators recover Organic Materials & Scrap Metals

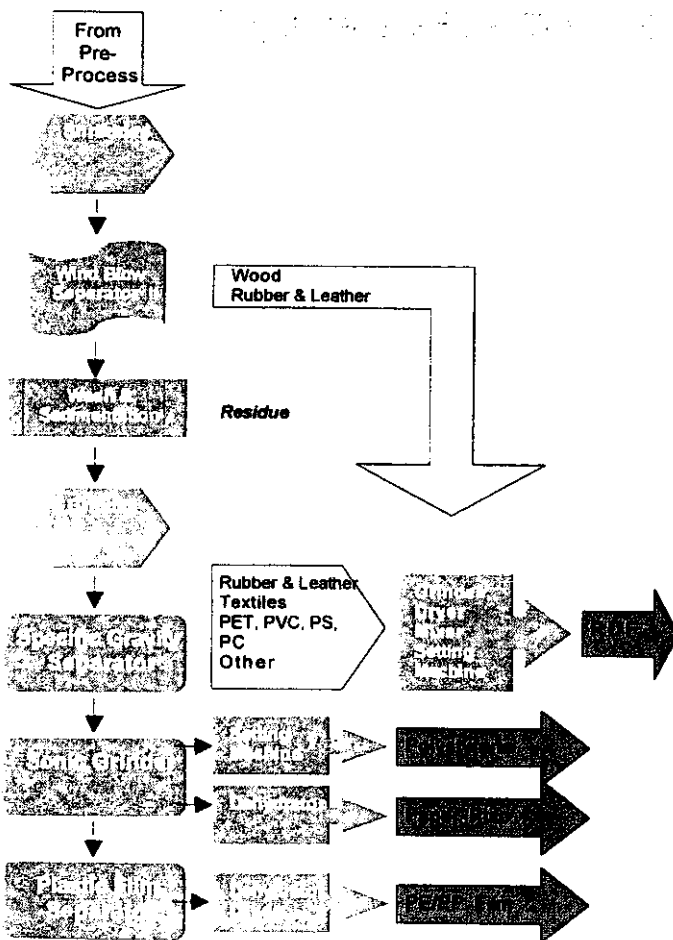


from the process stream, and then uniformly ground, dried and formed into organic beads that are 1/4 the original weight, thereby containing odors and greatly reducing transportation cost and usage fees to landfills or incinerators. Alternatively, the organic beads can be used as fertilizer or conditioned soil.

The Mesh Separator II has a rinse system to sanitize the remaining waste in the process stream prior to Main Processing.

## Main Processing

Waste enters the main processing system through the Mesh Separator II. The waste is then processed through a Shredder, a Grinder, and a Plastic Film Separator.



## Main Processing

The Main Process is self-contained and fully automated.

Incoming waste is processed through a Shredder and a Grinder to break down the waste into uniform consistency.

The Wash & Sedimentation Chamber removes unrecoverable sedimentation such as sand, rocks, glass, wire, nails, etc..

The Specific Gravity Separator separates out remaining rubber, leather, textiles and heavy plastics from the processing stream.

The Sonic Grinder recovers paper pulp and lightweight Styrofoam.

The Plastic Film Separator recovers PE and PP film.

## Economic Benefits

### *What the SPP-5 Series Means to Your Bottom Line*

The economic benefits of the SPP-5 Series are outstanding. The technology literally transforms the bulk of unwanted, valueless materials (i.e., garbage) into sellable commodities on the recycling market, while drastically reducing transportation costs and usage fees to incinerators and landfills for the remaining unrecoverable MSW.

*With increasing public support of Green Business Practices, an investment in the SPP-5 Series serves as a positive Public Relations campaign for the Waste Management Industry.*

### **MSW Composition**

Paper & Paperboard	28.0%
Glass	6.3%
Metal (Ferrous)	5.6%
Metal (Aluminum)	1.5%
Plastic	14.9%
Rubber & Leather	3.3%
Textiles	5.2%
Wood	7.4%
Food Scraps	15.8%
Yard Trimmings	7.5%
Other	4.5%

**EPA, Municipal Solid Waste in the United States:  
2001 Facts and Figures**

### **Producing commodities for the recycling marketplace**

The exact components and percent composition of MSW varies by country, city, and even season. The SPP-5 Series can be customized to meet the processing specifications of a region's non-industrial MSW composition.

The cost-benefit analysis in the following sections is based on the average US composition of MSW after existing recycling programs in 2001. The composition does not include construction and demolition debris and industrial wastes. The analysis is for one SPP-5 Series plant operating at the maximum processing capacity of 500 tons of MSW per day.

Organic Beads

### Organic Beads

The maximum recovery rate for yard trimmings and food scraps is 23.3%. The recovered organic material is dried and compacted into organic beads with a final weight of ¼ the original. At maximum processing capacity of 500 tons a day, 5 days per week for 52 weeks per year, 7,573 tons of organic beads can be processed per year.

RDF

### Refuse Derived Fuel (RDF)

The recovery rate of leather, textiles and wood is 15.9%, while the recovery of heavy plastic (PVC, PET) is 1.5%. The total combined rate of 17.4% can be processed into 22,620 tons of RDF per year.

Ferrous Metal

### Recycled Ferrous Metal

The minimum recovery rate for ferrous metal is 90% of the total ferrous metal composition (5.6%) of MSW. Therefore, a total 5.0% can be recovered, yielding 6,500 tons per year. At a market price of US \$110/ton, the recoverable value extracted is US \$715,000 per year.

Paper Pulp

### Recycled Paper Pulp

The minimum recovery rate of paper and paperboard is 90% of the total paper and paperboard composition (28%) of MSW. Therefore, 25% can be minimally recovered, yielding 32,500 tons of paper pulp per year. At a market price of US \$150/ton, the gross recoverable value extracted is US \$4,875,000 per year.

PE/PP Film

### Recycled Plastic Film (PE, PP)

The minimum recovery rate for plastic is 90% of the plastic composition (14.9%) of MSW. Therefore, 13.5% of plastic, including heavy plastic, can be minimally recovered. Light weight plastic comprises 12.0% (i.e., 13.5% - 1.5% heavy plastic) of total recovered plastic, yielding 15,600 tons of plastic film per year. At a market price of US \$150/ton, the gross recoverable value extracted is US \$2,340,000 per year.

#### Approximate Composition of Unrecoverable MSW:

- 6.3% Glass Products
- 2.2% Non-Organics
- 2.0% Other
- 4.5% Process Residue

### Unrecoverable Waste

After the recycling process, 15% of MSW is unrecoverable, requiring traditional waste disposal via landfill or incineration. Alternatively, these unrecoverable materials can be crushed and compacted for use as bedding material in road construction.

## Waste Disposal Cost Savings

With an estimated landfill usage cost at US \$50/ton and an estimated recoverable rate of MSW at 85%, your predicted savings from decreased landfill usage is \$5,525,000 per year.

### Estimated Waste Disposal Savings

$$(130,000 \text{ tons/yr}) \times (85\%) \times (\$50/\text{ton}) = \$5,525,000 \text{ per year}$$

Recycled Commodity	MSW processed (tons/yr)	% Recovered	MSW Recovered (tons/yr)	Commodity Price (\$)	TOTAL Value recovered
Organic Beads	130,000	23.3%	7,573*	N/A	N/A
RDF	130,000	17.4%	22,620	N/A	N/A
Ferrous Metal	130,000	5.0%	6,500	110	\$715,000
Paper Pulp	130,000	25.0%	32,500	150	\$4,875,000
Plastic Film	130,000	12.0%	15,600	150	\$2,340,000

\* Calculation factors in 0.25 reduced weight

## Gross Profit

Total annual economic benefit of the SPP-5 Series Mixed Waste Processing Plant is as follows:

Organic Beads	N/A
RDF	N/A
Ferrous Metal	\$715,000
Paper Pulp	\$4,875,000
Plastic Film	\$2,340,000
Waste Disposal Savings	\$5,525,000
<b>TOTAL Gross Profit</b>	<b>\$13,455,000</b>

## Net Profit Before Tax

### Operational Cost

The estimated cost for standard operation of the SPP-5 Series Plant in the US is as follows:

Line Item	Monthly	Yearly
<b>LABOR</b> (640 manpower hrs/day) x (\$15/hr) x (22 days)	\$211,200	\$2,534,400
<b>ELECTRICITY</b> (\$0.077/KWH) x (1500 KWH) x (24hr) x (22 days)	\$60,984	\$731,808
<b>WATER</b> (\$3.53/m <sup>3</sup> ) x (150 m <sup>3</sup> /day) x (22 days)	\$11,649	\$139,788
<b>CHEMICALS &amp; MAINTENANCE</b>	\$25,000	\$300,000
<b>DEPRECIATION</b>	\$50,000	\$600,000
<b>TOTAL Operational Cost</b>	<b>\$358,833</b>	<b>\$4,305,996</b>

Labor costs are estimated based on the manpower needed to operate one shift of the pre-process and three shifts of the main process (i.e., having the main process operate 24 hrs/day) for 5 days per week.

Electric usage is estimated from total electric requirements of all machinery. Water usage is estimated from the daily amount needed to replace water lost during processing and water treatment (i.e., 150 tons/day of water). Chemical costs are for additives used for sanitation, etc. Maintenance includes cost to replace filters, sharpen or replace knives, and clean machinery. Standard depreciation costs are calculated for a 15-year period.

Annual Net Profit Before Tax is:

<b>Gross Profit</b>	<b>\$13,455,000</b>
<b>Less Operational Cost</b>	<b>(\$4,305,996)</b>
<b>TOTAL Before Tax Annual Profit</b>	<b>\$9,149,004</b>