PROJECT SUMMARY REPORT ON DEMONSTRATION OF THERMAL WASTE CONVERSION SYSTEM AT CALIFORNIA STEEL INDUSTRIES, INC.

Submitted to:
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BALBOA/PACIFIC CORP.

CONTINUOUS PYROLITIC CONVERSION SYSTEM

1.0 EXECUTIVE SUMMARY

The reduction or elimination of hazardous waste streams is one of the most critical challenges facing the metals industry and threatens their continued existence in southern California. Many metals processing companies are actively seeking economically and environmentally sound alternatives to landfill disposal of their waste stream. Traditional landfill disposal methods have an everlasting liability effect since any potential contamination risk remains with the producer.

California Steel Industries (CSI) of Fontana, California, which operates a steel processing plant, along with Balboa Pacific Corp., a company which produces hazardous waste processing equipment, with sponsorship of the Southern California Gas Company, have come together to demonstrate the ability of Balboa's Bal Pac 2000 system in effectively processing rolling mill waste, and other waste, in both liquid and solid forms produced by CSI's Fontana facility.

The waste was processed by Balboa, and sent to West Coast Analytical Services, an independent laboratory, to evaluate the by-product from the conversion system. Based on the results, CSI expressed an interest in demonstrating the system at their Fontana headquarters. Before the system was transported to their location it was modified so that it would be capable to handle both liquid and solid waste so that it would better handle the various waste streams CSI produced.

The objective of the on-site demonstration was threefold: 1) to process CSI's hazardous waste from the rolling mill into a non-toxic reusable product, 2) to verify that the emissions produced by this system meets the EPA/SCAQMD standards, and 3) to offer CSI a cost-effective option to their waste disposal problem. This project was originally designed for a 30 day test program, but was extended to accommodate design modifications to the material handling system and to accommodate CSI's request for processing of additional waste streams. The modifications included the addition of a shaker to reduce the large waste particles, additional safety equipment, and modification to the feed system and the after burner.

Balboa processed different waste streams, but concentrated mainly on the waste generated from the rolling mill (known as the Black Sea). Test results indicated that the system was most effective when the Black Sea was mixed with 20% of tallow sludge (API) creating a partially liquified product which was easier to manage through the material handling system. Balboa processed a total of approximately 70 tons of waste product during the demonstration which resulted in a benign by-product and emissions well under those specified by the SCAQMD.

The completion of this test program has caused CSI to desire continued processing of their waste streams by the Bal Pac 2000 and Balboa Pacific's personnel.

This report identifies Balboa's waste eradication method, the industry need for this technology, the systems operating parameters, the continued association with CSI including the cost of the extended operating expenses, and various test results which are provided for your consideration in the appendix.

*See Appendix for tallow sludge composition.

2.0 ABSTRACT

2.1 MISSION

Balboa Pacific is a public company located in Santa Fe Springs, California. The company's primary business is the development of environmentally sound waste processing systems and mineral resource technologies. Balboa's equipment and systems have been successfully marketed for over fifteen years. These include water treatment, soil remediation, thermal conversion. air pollution and heat recovery systems. Balboa also manufactures boilers, afterburners, and furnaces.

2.2 PROCESS

Balboa/Pacific's Pyrolytic Converter System (Bal Pac 2000) is a variable waste, thermal disintegrator which can combust a wide range of materials, including tires, tree and yard cuttings. municipal solid and liquid waste, hospital waste, wood. plastic and industrial wastes. The unit is a continuous feed system and it is a pyrolytic, or gasification process. Combustible waste is subjected to high temperature radiant heat resulting in the generation of flammable gasses. The gasses are then exposed to an open flame and combusted. This process provides for the ultimate destruction of a variety of waste material. The process involves the thermal oxidation of autogenous material in a sub-stoichiometric environment to induce pyrolysis. Volatile organic compounds (VOC's) that escape through the destruction process are channelled through a high temperature gas train located in the upper section of the retort and before cooling can take place are piped to the high temperature after-burner (2200°F). This temperature is required for the complete destruction of poly chlorinated biphenals (P.C.B.'s), furans and dioxins.

In the operational mode, the shredded waste is continuously fed into a pit, an enclosed conveyor moves the material to a unique feed system that consists of a two (2) chamber airlock. The material is dropped into the first chamber, vacuum is induced in the second chamber and then fed into the retort.

The extremely low amount of particulate that is entrained in the off-gas waste stream is due in part to the low velocity of the gas velocity as it exits the primary retort, as a result filtration of particulates is usually not required.

The residual ash and inorganic material is dropped out at the extreme end of the retort through another two (2) chamber air-lock, this residual material will vary between three percent (3%)and five percent (5%) carbon, and is non-toxic.

Non-organics that are a part of the feed stock are thoroughly rendered non-toxic as they proceed through the retort at the high temperatures required.

This process can be acheived on both solid and liquid waste by-products, individually or as a blended product.

*Patent information is located in the appendix.

2.2 ENVOIRONMENTAL SAFETY

Emissions resulting from the decomposition of waste by the Bal Pac 2000 thermal conversion system meet all the standards set by the United States Environmental Protection Agency. There is no smoke, odor, or soot. A report on air emission from a sample taken and analyzed by an independent lab is enclosed for your reference. Every Bal Pac 2000 is equipped with automatic and manual emergency shut down systems. Fire extinguishers, nitrogen, and CO2 gasses are located on the system for emergency purposes. Each Bal Pac 2000 operator is thoroughly familiar with all safety procedures. Safety procedures check lists are located prominently on all Bal Pac 2000 units.

2.3 PRODUCT EFFECTIVENESS

Balboa Pacific has developed the Bal Pac 2000. a solid waste disposal system which reduces toxic substances to sterile ash and hit exhaust gasses. The Bal Pac 2000 is not an incinerator. Rather than burning the waste, the system thermally degrades organic materials at temperatures in excess of 1200 degrees Fahrenheit. .The ash produced is primarily carbon and stabilized (oxidized) metals. The hot gasses produced may be used for a variety of applications including co-generation. Test results included in this report are the by-product composition of processed material, talow sludge composition (API) after processing through the system. and exhaust emission of the Bal Pac 2000 while processing the products. See Appendix.

3.0 PROJECT DESCRIPTION

3.1 INTRODUCTION

Today we find ourselves in an industry which has evolved steadily during the 1980's. This industry is commonly referred to either as "Toxic Waste Management" or "Environmental Management", the latter label being attached to most of the major firms currently active in the industry. In structural terms, the industry has come into being as a result of regulatory legislation and enforcement activities at both the Federal and State levels. A pure definition or segmentation of the industry is complicated by the fact that it involves companies offering a broad range of products and services to the generators, users, transporters, and regulators of toxic and hazardous waste material. Beyond the increased regulatory intervention, increasing publicity relating to hazardous waste sites has initiated substantial technological improvements necessary for the detection of toxic waste substances, even in minute quantities, and in the analysis of the various molecular structures associated with the detected waste. Unfortunately, the industry lagged in its focus on the actual cleanup of contaminated sites where the toxic and hazardous materials have been improperly discharged, manufactured, used or stored.

It is expected that during the 1990's there will be increasing regulatory intervention and virtually all manufacturers will have a greater demand for the goods and services of the Environmental Management industry. Industry observers are projecting annual growth rates of between 25% to 35% during the next three to five years and a shift away from the detection emphasis of the 1980's to an eradication/elimination concentration during the next decade. It is this specific evolution and emergence of the industry which we seek to direct our energies and which could provide significant potential to the gas industry for customer retention and land growth.

The majority of technological advancements in this area apply solely to the detection and measurements of toxins as opposed to their successful treatment and elimination. The latter has become even more imminent as the industries' access to dumping sites diminishes. For example, at the present time, there are only two (2) certified dumping sites in the State of California for toxic waste. These sites are presently reaching their practical capacity and are coming under increased public scrutiny and control of transportation to dump sites. Thus, most future toxic waste will have to be transported out of state or disposed of offshore. Also, additional restrictions are being placed on the types of toxins that are being accepted at these sites, and legislation is mandating reductions in surface transportability of toxins to dump sites. The increased public awareness of the toxic problem and of the past problems associated with dump sites and transportation, coupled with the ongoing liability to the originator of the toxic waste, have contributed to a growing need for onsite treatment solutions.

This has prompted California Steel Industries and Balboa Pacific with sponsorship from the Southern California Gas Company to demonstrate the use of the Bal Pac 2000 system to effectively process rolling mill waste in both liquid and solid forms.

3.2 PROJECT SUMMARY

Balboa's plan for this project was to process environmental waste which has been produced by California Steel through the pyrolytic convertor. This system was designed to render this waste (and all other waste) non-toxic as they are processed through the system. These hazardous materials are ultimately destroyed at elevated temperatures around 2200°F.

The goal of this project is to prove that Balboa's pyrolytic convertor can process one (1) ton of hazardous waste per hour and convert the by-products of this process into a reusable product which is completely free from toxic waste. Also, this project's goal is to prove that this process of waste destruction, can be done while emitting exhaust emission, which meet EPA/SCAQMD standards with, respect to nitrogen oxide, carbon monoxide, carbon dioxide, sulfur trioxide and other particulates which these agencies measure in regard to pollution.

The benefits of this project to CSI was to eliminate their generation of hazardous waste and the transportation of this waste for disposal. This environmentally safe and economical on-site destruction of hazardous materials is a far superior option for CSI than transportation of their waste to dump sites.

4.0 REGULATORY ISSUES AND PERMITTING

4.1 SCAQMD

The Bal Pac 2000 System meets and exceeds these to South Coast Air Quality Management District (SCAQMD).

- SCAQMD Best Available Control Technology (BACT)
- Guideline 95.5-2 for equipment or process of non-infectious waste using an incinerator operating at greater than 750 lbs./hr.

SCAQMD Rule 1146.1 requires that all existing boilers with a rated heat input of less than or equal to and less than 5 MMBTU/Hr. comply with emission limits for NOX and CO or limit fuel usage.
*See Appendix for details

4.2 REGULATORY ISSUES

Balboa Pacific has obtained the necessary permits to install and operate the Bal Pac 2000. An extension has been granted for the permit to construct through October 1994. Air emissions tests revealed no toxic emissions and all other emissions within SCAQMD limits with a slight overage of NOX emissions. Since those tests. Bal Pac 2000 system has been modified to bring the NOX emissions to comply with SCAQMD Rules. Balboa Pacific will also provide any additional air pollution control equipment (i.e. dust collector, scrubber) necessary to comply with the SCAQMD regulations.

A permanent test permit to process waste at CSI will be obtained through the SCAQMD.

5.0 EQUIPMENT PERFORMANCE SPECIFICATIONS

System Production:
Combined Waste Material:2400 lb./Hr. (1.2 tons)
24 Hrs./day
6 days/week,
Total Processed/Week345,600 lbs./week
172.8 tons/week

Estimated Energy Required:3 million BTU/Hr.
Fuel:Natural Gas
72 million cft/week

Electrical:480 volts w/40 amp
draw, 100 amp service
Cost:$144.00/week

System Size:Actual size of this pyrolytic unit is 30' x 8' x 10' height

Personnel Requirement: The unit requirement is one operator and one loader operator (with a front end loader). There is three shifts per day and a total of six on-site personnel, not including supervision.

PHOTOGRAPHS

See Appendix

6.0 SPECIFIC ENGINEERING OBJECTIVES

6.1 Phase I - (Preliminary Analysis)

- Produce non-toxic by-product
- Process CSI's waste within SCAQMD's air emission levels
- Solve CSI's hazardous waste challenge and completely eliminate the accumulation of the "Black Sea" Waste

6.2 Phase II - (On-site Demonstration)

- Evaluate the feasibility of the BAL PAC 2000 in processing other potential waste streams at CSI
- Evaluate the processing capacities (tons/Hr.)
- Evaluate processing timetables for eradication
- Investigate possibilities of additional processing systems
- Investigate utilization of the recapture of waste heat
- Investigate the by-product aftermarket

7.0 BENEFITS

7.1 California Steel Industries

Balboa can resolve CSI's waste disposal problem, relieving them of the liability of transporting and disposing of it at a class 1 landfill.

Bal Pac 2000 is designed to convert CSI waste into a non-toxic by-product which can be sold as a valuable aggregate to the cement industry.

Should CSI expand their facility to produce iron ores, the by-product can be recharged directly into the furnace and create a closed-loop system and have no waste from their strip mill.

7.2 Emissions Results:

Current processing of California Steel's waste streams were done while emitting exhaust gases well below SCAQMD specifications.

8.0 Specific Advantages of Bal Pac 2000

The Bal Pac 2000 provides an environmentally safe and economically sound, on-site elimination of hazardous materials as a superior alternative to transportation of waste to dump sites.

The Bal Pac dual feed system will give CSI the option of blending liquid and solid products, gaining greater flexibility and providing them the option of processing more tonnage per hour through the system.

BALBOA PACIFIC
COST ANALYSIS

CALIFORNIA STEEL INDUSTRIES, INC.
OUR OPERATING COST

	COST/MO.	80% EFFICIENCY	100% EFFICIENCY
6 days per week/24 hours running =	144 hours		
@ 80% efficiency = .96 tons/hr. =	593.4 tons/mo.		
@ 100% efficiency = 1.2 tons/hr. =	743.04 tons/mo.		
G & A @ 5%	$6.538.72	$10.99 T	$8.80 T
OVERHEAD			
Natural Gas			
Saw Dust			
Diesel Fuel			
Safety Equipment & Supplies			
TOTAL	$8.792.00	$14.79 T	$11.83 T
DIRECT LABOR & BENEFITS			
Operators (3)			
Supervisors (3)			
Technician (1)			
Helpers (3)			
#10 total @ 3 shifts/day			
TOTAL	$53,860.00	$90.61 T	$72.49 T
INSURANCE			
Commercial liability			
Vehicle insurance			
Workmans Comp			
TOTAL	$13,531.00	$22.78 T	$18.21 T
EMISSIONS TESTING			
Equipment (daily)			
Lab testing (monthly)			
TOTAL	$433.00	$.73 T	$.58 T
AMORTIZATION	$27,781.00	$46.74 T	$37.39 T

	COST/MO.	80% EFFICIENCY	100% EFFICIENCY
RENTAL EQUIPMENT			
Front end loader			
25 ton dump truck			
Screening plant (Shaker)			
Work truck			
TOTAL	$7,900.00	$13.29 T	$10.63 T
FUEL @ $10/hour	$5,944.32	$10.00 T	$8.00 T
MAINTENANCE			
Mechanic			
Anticipated cost of repairs			
TOTAL	$10,000	$16.82 T	$13.46 T
SUB-TOTAL/TON		**$226.75 T**	**$181.39 T**
PROFIT@ 12%	$27,781.94	$46.73 T	$37.39 T
GRAND TOTAL PER TON		**$273.48 T**	**$218.78 T**

Balboa Pacific has calculated the processing of CSI's "Black Sea" and tallow sludge, with the system operating at 80% efficiency and also at 100% efficiency. As the project continues, it is possible that efficiencies may exceed 100%; also Balboa will investigate the processing of other waste streams at CSI. The cost analysis will be determined as each waste stream has been processed. The re-evaluation of all cost can be done once the benchmark for all waste streams has been set.

APPENDIX

- Photographs of the System
- SCAQMD BACT 95.5-2
- Rule 1146.1 Overview
- SCAQMD Permit
- Test Results of CSI's Material
- By Product Analysis
- Tallow Sludge Analysis
- Patent
- Test Results Done by West Coast

Balboa Pacific Corporation
"Practical Environmental Solutions"

REPORT : BAL-PAC 2000
PROCESS CAPABILITY STUDY

BACKGROUND:

Balboa Pacific is located in Santa Fe Springs, CA and has been an R & D company for twenty years. In October of 1991, the company became a public entity and began to commercialize the products it had been developing. Balboa's operating philosophy is to provide equipment that works effectively and reliably while reducing the cost of clean operations by recycling effluents, or using waste heat effectively.

A Bal-Pac 2000 Thermal Conversion Unit (see exhibit A & B) was installed at California Steel Industries (CSI) in March 1994. Balboa's Bal-Pac initially was placed to process previously generated "Black Sea" sludges, mixtures of mineral oils, animal fats, and Ferrous wastes. The question at the outset was whether these sludges could be thermally decomposed and blended with saleable mill scale by-products.

During this three month shake down period, Balboa made several mechanical alterations to adapt the system to the processing characteristics of the "Black Sea" wastes. In this period, a trouble-free method for processing this material was developed. Additionally, substantial quantities of the bioclarifier float (animal fat) product also was mixed with the " Black Sea" sludge and successfully processed. Balboa monitored stack emissions, and did not measure any emissions that would preclude obtaining a permit from SCAQMD.

To accomplish trouble-free processing of the "Black Sea" wastes, Balboa screened the material to eliminate trash that jammed augers and added sawdust to overcome the extremely sticky characteristics of the "Black Sea" and tallow materials. Without the sawdust, a build-up, bake-on cycle developed that eventually stopped the retort from operating properly.

In January 1995, California Steel contracted Balboa to test our ability to thermally decompose a somewhat different set of wastes from those in the "Black Sea." This more recent assignment was to process sump sludges presently being generated. Specifically, Balboa processed:

(1) T 1 float - WWTP

(2) T 1 bottoms - WWTP

(3) Number 15 sludge bed solids

(4) Number 15 under-flow solids

(5) 95' and 115' bioclarifier float

(6) miscellaneous sump sludges (Hot Strip Skimmed Oil).

PROCESSING:

Through the period 1 February - 7 March, various combinations of the foregoing sludges were processed to optimize operability, thru-put rates, and the heat generated for producing steam, in order to maximize boiler size.

The filter cakes generated at CSI waste treatment plant were eliminated from the tests because they contain high levels of moisture and have a fairly low BTU value. Processing these filter cakes would not contribute significantly to processing blends of the other sludges.

Sludges 1 through 4 are extremely viscous materials, rather like axle grease in texture and viscosity. The solid residue after thermal decomposition is approximately 30% dry solid, much of which is Ferrous. Sludges 1 through 4 are also very "sticky" and tend to bake on any surface they touch.

Sludge #5 (mostly animal fat) is similar to #3 and #4 but its specific gravity is much lower and there is less solid residue. Sludge # 5 has a higher BTU value than 1 through 4. Dewatering of these sludges within the clarifiers is apparent. This will allow for easy loading and unloading of the material.

Sludge #6 is a very heavy oil on the order of 140 weight gear oil in viscosity and appearance. These sludges have a very high BTU value and thus produce rather slight amounts of non-volatile, solid residue.

Balboa discovered that all the sludges could be processed successfully with the addition of sawdust's efforts to process the variety of sludges individually or as blends, as an additive to neutralize the tendency of the sludges to "stick." Experiments with filter cake, sand, mill scale, and ash residue from processed material, proved ineffective. All such additives did not inhibit the tendency of the screw and retort to clog and ultimately jam.

The addition of sufficient quantities of sawdust to sludges 1 through 6, processing separately or in a mix of approximately equal measures, eliminated the clogging problem. A blend with sawdust, mixing with the sludges provides a reasonably consistent 13,000 BTU per pound product of which approximately 20% remains in the non-volatile ash. Appendix C outlines the volumes processed in somewhat more detail.

In general, every 10 pounds per minute fed into the Bal-Pac yields 3 pounds per minute of dry ash which is a mixture primarily of Fe and sawdust ash. Appendix A, attached to this report, provides an analysis of the ash recovered from the variety of wastes processed at California Steel. For a summary comparing the materials processed, see Appendix D.

The Bal Pac operated daily from 7 March through 21 March with no maintenance or repair. It was disassembled on 21 March for inspection. The inspection demonstrated that the unit had remained clean and indicated that virtually continuous operation was practical.

CAPACITY:

A Bal Pac the size of that employed to prove feasibility at California Steel Industries conceivably can keep up with the present production of #15 Sludge and sump sludges. The Bal Pac during the tests could process about 600 pounds/hour of a waste and sawdust mix. The optimum mix was approximately 160 pounds of sawdust to approximately 660 pounds of blended wastes.

Now that we have a better understanding of the character of the wastes, we can construct a system that will process substantially higher quantities on a daily basis. We feel that the existing machine can be modified to increase the efficiency as well as the capacity. The modifications that we recommend on the present machine, or on any future machine are: a remote programmable logic controller (PLC), an internal heat valve, a new retort and screw.

RESULTS AIR EMISSIONS TEST:

Three days of the demonstration were devoted to independent laboratory emissions testing. The results from the tests conducted through this period indicate that all emissions are within the limits required by SCAQMD for approval of permits to construct and to operate at California Steel. During the test the waste material was added at varying ratios to encompass the complete waste spectrum for emission monitoring. For a summary of the report on the air emissions tests, see Appendix B. The complete report is submitted as a separate enclosure.

UTILITY AND OTHER COST OF OPERATIONS:

At present processing rates, the combined cost for gas and electricity is less than one penny/pound (9/10 of 1 cent/pound) and the cost for saw dust is just slightly more than 1/2 cent/pound processed (6/10 of 1 cent) Balboa found that the cost of sawdust is somewhat variable. Purchasing in quantity may result in further reducing the cost for saw dust.

The Bal Pac 2000 used 504KW/day during the trial period. Estimating a cost of $.05 per KW, the cost of electricity during operation is $1.05/hr or $25.20/day. The unit burned an average of 1,838.9 cubic feet of natural gas per hour through the test period. At $.25/therm, the cost to burn natural gas is $4.60/hour or $ 110.40/day.

OTHER CONSIDERATIONS:

A Bal Pac unit can be used to power a waste-heat boiler. The BTU content of the blend is 13,000 BTU/pound. Although about 20% of this value will be in the ash, nearly 10,400 BTU/pound will be available to power a waste heat boiler.

The residual ash with moderate Fe content, can be mixed with the blend California is marketing to the cement industry.

SUMMARY:

The successful Pyrolytic Conversion of California Steel's oil sludges has proved the Bal Pac 2000 technology. This pilot test study has enabled Balboa Pacific engineers to recommend design options that will minimize operation, labor. maintenance and handling of materials.

During the trial and pretrial period the Bal Pac unit was shut down and restarted over 50 times without a single equipment failure. We did find, as mentioned earlier the adhesive properties of this material started to foul the retort feed screw. However, this problem was recognized and resolved with the addition of minor amounts of saw dust (wood chips). The use of the "cheap" wood chips dramatically reduced maintenance and added BTU value. In fact, standard BTU conversion calculations to steam showed a cost benefit. The wood chips are easily purchased from numerous suppliers.

Because of the modular construction, the system lends itself to installation within small areas.

IN REVIEW, THE BAL PAC 2000 DEMONSTRATION PROVED THAT:

1. It can operate continuously with acceptable maintenance.
2. Solid and liquid waste streams of varying ratios are amenable to pyrolytic conversion.
3. All air emissions were below maximum acceptable limits.
4. Exceptional waste heat for steam conversion can be generated.
5. Solid waste residues are recyclable to Mill Scale Blending.

APPENDIX A				
Balboa Pacific Record of Ash Residues from California Steel Test Processing				
Lab Number	**Date of Test**	**Nature of Mat'l Before Process**	**Nature of Mat'l After Process**	
2020	2-7-95	Oil Discharge, liquid	Carbon Black Magnetite Silica, Stable Mat'l Pcs of Steel	87.00% 3.00% 6.00% 3.80%
2021	2-8-95	Oil + Mill scale, heavy oil	Granular Carbon Sm pieces of steel non ferrous	85.00% 8.00% 6.80%
2022	2-22-95	WWTP Black Filter Cake: Lumpy & Wet, 40% Moisture	Carbon & Magnetite pcs of steel, to 10mm Silica/non FE	85.00% 10.00% 4.90%
2023	2-24-95	Red Filter Cake mixed with green oil & sawdust: 3 BBL Red Filter Cake, 1 BBL Green oil, 3 bags sawdust	very fine carbon & Magnetite pcs of steel Silica/non FE	88.00% 5.30% 6.00%
2024	2-27-95	mixture: 1 scoop #15, 3 scoop white WWTP perlite, filter cake, 3 bags sawdust, 50% moisture	fine grain carbon & Magnetite pcs of steel Silica/non FE	88.00% 10.00% 7.90%
2025	2-28-95	mixture: 1.5 BBL Discharge Ash, 1 scoop #15 U/F	Dry Carbon Black + Magnetite steel non/FE stable	86.00% 7.30% 6.50%
2026	3-13-95	mixed mat'l & sawdust	carbon & coal magnetite steel non/FE stable	75.00% 11.00% 6.00% 7.20%
2027	3-14-95	mixed mat'l & sawdust	carbon & coal magnetite steel silica/stable	82.00% 7.30% 8.00% <2.50%

TABLE 1

California Steel
Balboa Pacific Pyrolysis Unit
Oxidizer Exhaust
Particulate/Gases Emissions

Date:	3/9/95	3/10/95	3/13/95
Test Number:	1	2	3
Sample Number:	BP-3	BP-6	BP-8
Flue Gas			
Temperature, °F	1248	1215	1200
Velocity, ft/sec	10.7	9.9	9.9
Static Pressure, in. H_2O	-0.01	-0.01	-0.01
Duct Dimension, in.	42	42	42
Duct Area, sq. ft.	9.62	9.62	9.62
Flow Rate, ACFM	6,170	5,740	5,730
Flow Rate, DSCFM	1,710	1,620	1,620
Moisture, % v/v	7.1	7.0	8.4
Particulate Matter (M5.1)			
Sample Start	15:16	12:29	12:20
Sample Stop	16:33	14:21	13:36
Sampling Time, min.	72	72	72
Sample Volume, DSCF	42.2	39.0	44.8
Isokinetic Rate, %	103.3	101.0	115.9
Collection, grams			
Filter	0.1224	0.1320	0.1250
Impingers	0.1277	0.1378	0.0954
Total	0.2501	0.2698	0.2204
Concentration, grains/DSCF	0.0469	0.0547	0.0329
Emission Rate, lbs/hr	0.69	0.76	0.46
Total Hydrocarbons (M25.1)			
Sample Start	12:35	09:45	09:40
Sample Stop	14:47	11:55	11:50
Sampling Time, min.	120	120	120
Concentration, %			
Carbon Dioxide	2.9	4.1	3.3
Oxygen	16.6	15.2	16.3

TABLE 1 (cont'd)

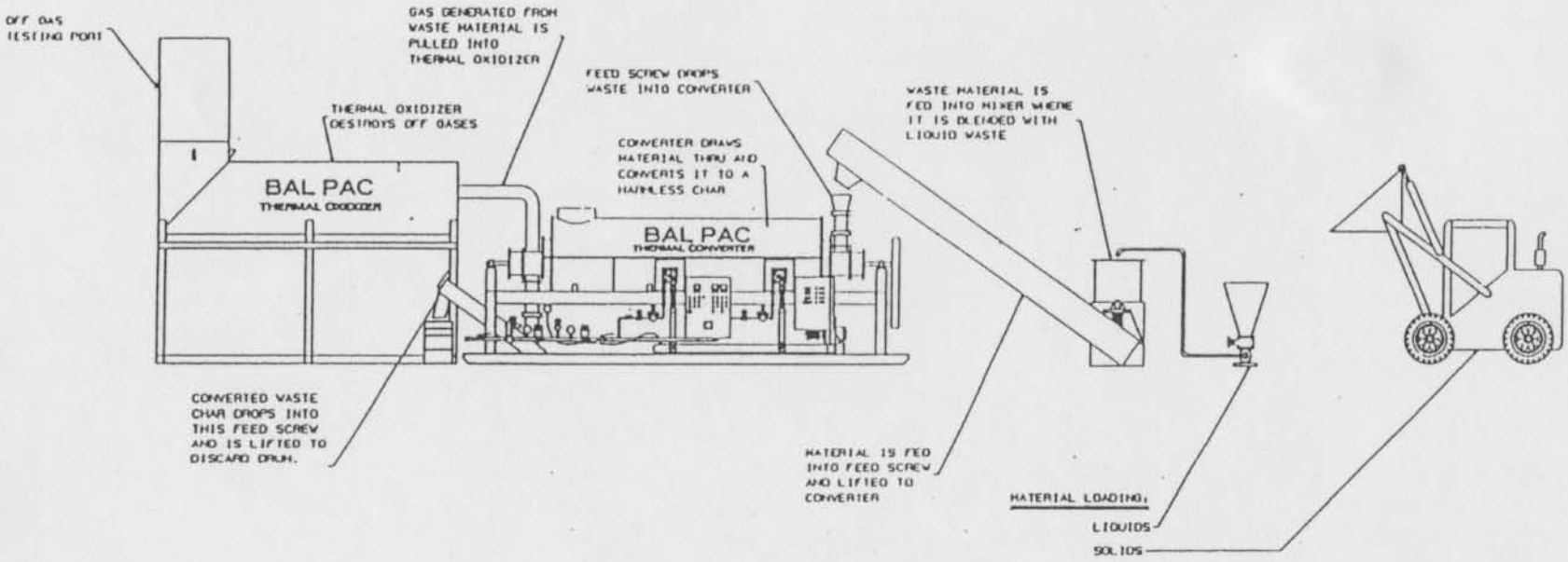
California Steel
Balboa Pacific Pyrolysis Unit
Oxidizer Exhaust
Particulate/Gases Emissions

Total Hydrocarbons (cont'd)			
Concentration, ppmv			
Carbon Monoxide	14	23	<1
Methane	<1	<1	<1
Nonmethane HC (as C_1)	115	113	48
Emission Rate, lbs/hr			
Carbon Monoxide	0.10	0.16	<0.01
Nonmethane HC (as C_1)	0.37	0.34	0.15
Nitrogen Oxides (M7.1)			
Concentration, %			
Carbon Dioxide	4.0	3.9	4.1
Oxygen	15.1	15.1	14.8
Concentration, ppmv			
Nitrogen Oxides	57	56	60
Emission Rate, lbs/hr			
Nitrogen Oxides (as NO_2)	0.70	0.89	0.96

Table 2

California Steel
Balboa Pacific Pyrolysis Unit
Oxidizer Exhaust
Metals Emissions

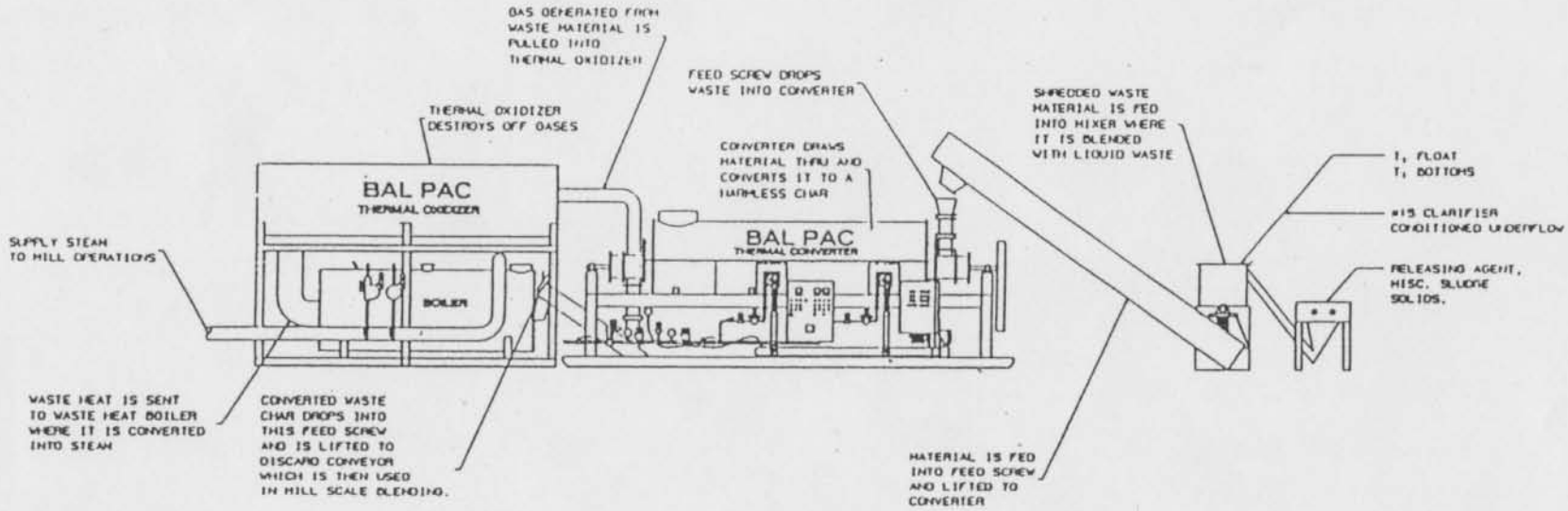
Date:	3/9/95	3/10/95	3/13/95
Test Number:	1	2	3
Sample Number:	BP-1	BP-5	BP-7
Flue Gas			
Temperature, °F	1272	1234	1238
Velocity, ft/sec	10.7	9.8	9.9
Static Pressure, in. H_2O	-0.01	-0.01	-0.01
Duct Dimension, in.	42	42	42
Duct Area, sq. ft.	9.62	9.62	9.62
Flow Rate, ACFM	6,170	5,670	5,680
Flow Rate, DSCFM	1,700	1,570	1,670
Moisture, % v/v	6.9	7.6	8.8
Metals (M12.1m)			
Sample Start	12:25	09:49	09:40
Sample Stop	14:50	12:10	11:50
Sampling Time, min.	120	120	120
Sample Volume, DSCF	66.9	64.5	75.5
Isokinetic Rate, %	96.5	100.6	111.3
Concentration, mg/m^3			
Copper	0.080	0.092	0.079
Chromium	0.044	0.038	0.033
Lead	0.034	0.031	0.030
Zinc	0.131	0.158	0.117
Manganese	0.296	0.297	0.234
Nickel	0.062	0.061	0.050
Cadmium	0.014	0.011	0.012
Emission Rate, mg/hr			
Copper	230	250	220
Chromium	130	100	94
Lead	97	83	85
Zinc	380	420	330
Manganese	860	790	660
Nickel	180	160	140
Cadmium	40	29	34



FIELD DEMONSTRATION UNIT

BALBOA PACIFIC CORP.
BAL PAC
MSW SYSTEM
2-2195

EXHIBIT B



PROPOSED UNIT

EXHIBIT C

BALDWIN PACIFIC CORP.
BAL PAC
HSW SYSTEM
2-2193

Sample BP2009

INTER-OFFICE MEMO

July 11, 1994

To: William Walker

Re: Analytical report on California Steel rolling mill waste-before and after treatment.

1. Material before treatment:

Description: This material has more hydrocarbons and oil than previous samples. Dark color.

RESULTS OF ANALYSIS

Magnetite and iron	55 %
Animal fat and hydrocarbons	40 %
Non-ferrous material	4.5%

2. Material after treatment:

Magnetite	82 %
Metallic iron	8.5%
Carbon black	9.0%
Non-ferrous material & silica	0.4%

In this material there is a 50% weight reduction as the result of treatment.

Respectfully submitted,

Dr. Shapoor Hamid

Sh. Hamid

INTER-OFFICE MEMO

July 7, 1994

To: William Walker
Executive Vice president

Re: Analytical report on California Steel rolling mill waste before and after treatment with Bal-Pac 2000 Systems.

Sample no. BP2007

I - Material before treatment

Description: Black color sludge consist of mainly magnetite (Fe304), Iron, oil, animal fat and other hydrocarbons.

Results of analysis:

Magnetite and Iron	73.5%
Oil and other hydrocarbons	19.8%
Non-ferrous material & minerals	6.6%

II - Material after treatment:

Description: High iron black sands (Magnetite) with small pieces (-1/16") of free iron and carbon black.

Results of analysis:

Magnetite	85.6%
Pieces of metallic iron	9.4%
Carbon black	4.8%

All other impurities including traces of metals (Pb, Cu, Cr, Zn, Mn) are <0.1

There is about 20% weight reduction because of the treatment. Material after processing with Bal-Pac 2000 Systems weighs 20% less than the material before treatment.

Chemical composition of the material after treatment is very stable, and the product can be used in various industries.

Dr. Shapoor Hamid

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INTER-OFFICE MEMO

July 8, 1994

To: William Walker

Re: Analytical report on California Steel rolling mill waste before and after.

SAMPLE NO. BP 2008

Sample weighs 100 grams

1. Material before treatment:
   Description: Black color sludge consist of magnetite, oil, animal fat and pieces of metallic iron.

RESULTS OF ANALYSIS:

Magnetite and iron	75 %
oil and other hydrocarbons	20 %
Non ferrous material & minerals	4.9%

2. Material after treatment:
   Carbon black.

RESULTS OF ANALYSIS:

Magnetite	88.5%
Pieces of iron	7.6%
Carbon black	3.8%
Other metals and impurities	< 0.1%

Weight of the material after treatment was 80 grams.

20% of weight reduction for this type of material is consistent.

Respectfully submitted

Dr. Shapoor Hamid

Dr. Hamid

INTER-OFFICE MEMO

July 13, 1994

To: William Walker

Re: Analytical report on California Steel rolling mill waste.

SAMPLE NO. BP 2010 (TALLOW)

Sample weighs 200 gram.

1. Material before treatment:

Description: Dark brown almost black color very sticky, almost gel type material consist of mainly animal fat, complex hydrocarbons, oil and magnetite with metallic iron.

RESULTS OF ANALYSIS:

Animal fat, complex hydrocarbons and oil	87.5%
Magnetite and iron	10.5%
Non-ferrous material	2.0%

2. Material after treatment:

Ash weighs 13.6 gram. There is a 93.2% weight reduction on this material.

RESULT OF ANALYSIS:

In 13.6 grams material we have:

Magnetite and iron	10.9 gram or 80.1%
Carbon black	1.5 gram or 11.0%
Non-ferrous material	1.1 gram or 8.4%
All other impurities and trace metals	< 0.1%

Respectfully submitted,

Dr. Shapoor Hamid

Sh. Hamid

INTER-OFFICE MEMO

July 15, 1994

To: William Walker
Executive Vice President

Re: Analytical report on California Steel rolling mill waste, before and after treatment with Bal Pac 200 Systems

SAMPLE NO. BP 2011

Sample weighs 200 grams.

1. Material before treatment:

Description: Black color, sticky material.

RESULTS OF ANALYSIS:

Animal fat, hydrocarbons and oil	72 %
Magnetite and iron	20.6%
Non-ferrous	7.2%

2. Material after treatment:

Description: Black color sands with small pieces of metals, iron and powder of carbon black.

RESULTS OF ANALYSIS:

Magnetite	91.0%
Metallic iron	2.6%
Carbon black	5.8%
Silica	0.5%

Weight of material after treatment is 7.5 grams, in other words, there is a 60.25 gram weight reduction.

Respectfully submitted,

Dr. Shapoor Hamid

Sh. Hamid