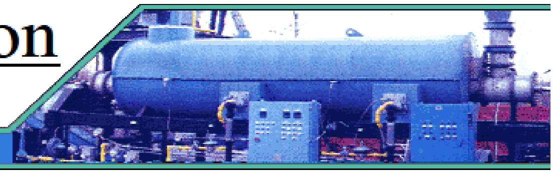

Requirement Number (R-728)
Document Identifier: (BPC-R-728-02)
BAA Number: (CTTSO/TSWG DAAD 05-01-0301)
Mission Area: Rapid Contaminated Carcass and Plant Disposal System

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Mission Area: (Rapid Contaminated Carcass and Plant Disposal System)
Requirement Number: (R-728)
Document Identifier: (BPC-R-728-02)
Proposed Title (Pyrolytic Carcass and Plant Disposal System)

Balboa Pacific Corporation
06/17/01
PROPRIETARY

BAA Requirement:

The Mobile system needs to be able to decontaminate and decompose 0.5 million pounds per 24 hour period of wet or dry animal and plant material that may contain some inorganic debris. The emissions, effluent, and residue from this process must be environmentally safe and suitable for disposal in commercial landfills or waste treatment systems. The system must be able to decontaminate viral, bacterial, spore-forming and prion diseases, and chemical agents. The system may run at a reduced capacity when decontaminating prions and chemical agents. The system must be air-mobile, and able to be towed on the highway. On arrival, the system must be mission capable within 24 hours. The system must be capable of continuous duty, at all elevations and in all environments, require minimal maintenance and must run on multi-fuels.

Description of Underlying Theory/Technology:

Pyrolytic Gasification is by no means new. The principles were first brought forth in 1958 at Bell Laboratories within the United States of America. Thereafter, a number of universities and organizations around the world started research and development (R&D) programs. The word 'pyrolysis', meaning chemical change brought about by heat is widely used, even by incineration technologies, which have tried to escape their roots in oxidation and combustion because of the problems prevalent with both. Gasification is a term being used to describe the chemical reaction and molecular break down or degradation of materials.

The first pyrolytic gasification systems were brick ovens using indirect heat / low oxygen that were made of firebrick. Waste was placed into the unit - the unit was sealed and heat applied. After the process of degradation was completed, the oven was opened and emptied to make room for the next batch. These systems were known as batch-by-batch systems. This format was first introduced commercially in the early 70's. They were limited by volume and, after some time in operation, were also found to have defects that related to the mortar that was used to bind the bricks together. During the late 70's and early 80's, R&D turned away from batch-by-batch systems, which at that time, had found some commercial success processing hospital waste and continual-flow systems, which were a form of rotating autoclave. This format was later refined into cone shaped retorts in order to direct the gas stream to a central point for evacuation. This refined cone design first showed up in England, then the US and Germany, followed by Japan, Canada, and the Netherlands.

It was during this time that manufacturers of incinerator systems started to run into environmental problems. As environmental laws worldwide became stricter, it became exceedingly difficult to get permitting. The price and installation of incinerators became extraordinarily expensive due to the air quality equipment that had to be added in order to pass air quality regulations. But, whereas, air quality issues could be handled with additional equipment, byproduct leachability could not. In most cases, the average incineration system was eight to ten times over limits set for low volatile metals, which are leachable and carcinogenic if ingested through drinking water.

It was also during this period that the National Aeronautics Space Administration (NASA) was completing their studies into the effects of zero gravity and zero oxygen environment, which were conducted at the end of the Apollo missions and were finished within the first few flights of the space shuttle. The information and technology derived from these studies showed that the oxygen molecule is a binding molecule, which is why incineration, that makes use of high oxygen, has such a high degree of low volatile metals, which are bound by the degree of oxygen content within the retort or firebox and are locked into their byproducts. The binding element of oxygen also causes the formation of dioxins, which is the combination of two oxygen molecules along with others within the gas stream. At this point, in the early to mid-80's, the first pilot and then commercial systems using direct gasification started to show up. These were in the form of Fixed Bed, Entrained Bed and Fluidized Bed Systems. These systems all had draw backs in the form of their byproducts, which were tars that were hazardous, or char and ash, such that the oxidation within the process had consolidated low volatile metals that were leachable. In some cases, the Entrained Bed Systems created a slag that contained leachable metals, but the major drawback was the operational costs. The Fixed Bed and Fluidized Bed Systems were still found to, at times, create smaller but traceable amounts of dioxins due to the continued use/presence of oxygen.

In the mid 80's, *Balboa Pacific Corporation* of the United States of America started testing their new design of an indirect pyrolytic gasification system. This system was patented in 1988. A 50 ton-per-day pilot plant was refined and constructed over a two-year period from 1993 to 1995, which was partially funded by Southern California Gas Company and private investors. The plant operated at California Steel for 18 months, during which time, several of the nation's environmental engineers such as Dames & Moore, Sandia Labs, and Pacific Environmental Services conducted exhaustive studies on the system's ability to process, on a continuous feed basis, a wide range of toxic and nontoxic, liquid and/or solid organic waste streams including chemical and biological agents. Studies and testing of emissions, leachate and byproducts were, in every case, determined to meet or exceed the environmental thresholds and guidelines set forth by the Environmental Protection Agency (EPA), the Air Quality Management District (AQMD) and the State of California Air Quality Control Board. As such, the efficacy of Balboa Pacific's proprietary thermal conversion technology of molecular decomposition through pyrolytic gasification was determined to be superior for waste treatment.

The Balboa Pyrolytic Gasification Process makes use of high tech patented ceramics and alloys, as well as patented digitized valving, combined with process secrets; thereby, producing an oxygen-free, high temperature environment within the retort of between 0.05% to a maximum 2.5% oxygen and upwards of 2250 degrees F, resulting in the destructive distillation of 99.999984% of any organic toxic or nontoxic feed-stock that is introduced through the system. And once high-density metals are removed through magnetic separation, the process produces an output of non-leachable byproducts.

Currently, and over the past eight years, a number of companies have experimented with pressurized retorts. Whereas this method can help to maintain an oxygen free environment, it also creates other problems such as how to maintain continuous throughput of waste material. To date, most have been unsuccessful. Pressurized retorts have, however, been used within ash-melting combustion systems. In many respects, these systems are much like blast furnaces. They operate at high oxygen / high heat and produce a byproduct of slag, which still needs special handling, and which to date, has no market value.

Also, the amount of energy needed to operate the system effectively is believed to offset potential returns, much the same as in Plasma Arch technology.

An independent investigation, resulting in a thorough evaluation of Balboa Pacific's proprietary continuous feed Pyrolytic Gasification process, determined that there is currently no conversion technology that can compare to their indirect Pyrolytic Gasification Systems. Most of the technologies discussed were pyrolytic gasification systems of direct heat formats such as: Fixed Bed, Entrained Bed and Fluidized Bed. Other technologies mentioned were rotary kiln low oxygen formats and organic wood digesters/gasifiers, none of which can handle the waste streams that the Balboa system can, such as, but not limited to: PCB's, chemical and biological agents, hazardous solids and liquids, computer industry waste, plastics, mining industry waste, municipal and petroleum sludge, municipal solid waste (MSW), hospital red-bag waste, illicit drugs and Treasury Department's out-of-circulation currency. Furthermore, many of the burgeoning technologies are just now coming into commercialization, with the exception of EDL/BSC which for the most part can only handle organic material and in a limited format.

It is for the reasons stated above that Balboa Pacific Corporation is confident that their conversion technology and proprietary application is superior within the waste management industry and, as such, can provide a system that will decontaminate viral, bacterial, spore-forming and prion pathogens such as found in the diseased animals with Bovine Spongiform Encephalopathy (Mad Cow Disease).

Description of Proposed Task and Associated Deliverables:

As set forth herein, the following is a brief description of the proposed tasks:

TASK 1: Balboa Pacific is proposing that their 2.5 ton-per-day demonstration unit be modified to provide a fully enclosed, vacuumed system that will process a surrogate waste stream material, which has comparable chemical composition and molecular structure, simulating the spore-forming and prion pathogen of Bovine Spongiform Encephalopathy (Mad Cow Disease). This surrogate material will also serve to validate the efficacy of Balboa Pacific's Pyrolytic Gasification conversion technology, as it would apply to other contaminated deceased animals, for example, Hoof & Mouth Disease and Anthrax. The modifications contemplated will unequivocally demonstrate the broad-spectrum application of the system. Qualified and technically knowledgeable third party scientists and technicians, of required disciplines, will witness the controlled demonstration and provide test results pursuant to criteria mutually established by both parties. Test results will be compiled in original form and published in the number of documents required and distributed directly to registered recipients.

TASK 2: Following sign-off and acceptance of TASK 1, Balboa will proceed with design engineering of a 50 ton-per-day transportable system that will be configured on two 40' flatbed trailers with a third 40' flatbed trailer serving as system support, which will provide auxiliary equipment, replacement parts and maintenance tools. The system will be designed for quick erection and upon destination arrival, will be mission-ready within 24 hours. Design engineering will include working plans and specifications for the production and manufacturing of both the transportable pyrolytic gasification system and customized trailers. Balboa's manufacturing arm, ALSTOM Power Air Preheater, located in Wellsville, New York are globally reputable fabricators and production contractors who will provide scheduling completion bonds.

Associated Deliverables:

Balboa Pacific will provide periodic progress reports and process documentation with inspections at intervals defined in the GANTT Chart attached hereto. This proposal contemplates an Own and Operate arrangement under contract with the US Government and/or its associated international alliances. Intellectual properties and proprietary information will, therefore, remain in the position of Offeror.

However, Balboa Pacific would be amenable to a licensing arrangement or a sell-and-operate relationship.

Planned Methodology to Transition to Production:

Completion of TASK 2 will assure application readiness with the ability to commence manufacturing and fabrication within 7 days from written notification. Upon manufactured component completion, the systems will be assembled by Balboa Pacific personnel and tested for functionality, thereby assuring destination performance. Each transportable three-trailer system will process 50 tons-per-day, therefore, in order to comply with the BAA requirements specifying the need for processing 0.5 million pounds per 24 hour period, it will be necessary to provide five complete systems.

5 x 50TPD systems = 250TPD x 2000PPT = 500,000PPD / 0.5MPD

Transitioning from what is generally referred to as "proof-of-Concept" to commercialization may be a formidable task for most Offerors who are still in the R&D mode, but Balboa Pacific Corporation is well beyond that point. Balboa's Pyrolytic Gasification conversion technology and system application is established and documented with full-scale systems having been produced and operated. As mentioned earlier, Balboa's proprietary technology and system application is the *Core Technology* approved in the world's first multiple-use applications in the Republic of the Philippines. This project will process 1,800 tons-per-day of waste material of all types except nuclear. The facility is designed to be a Zero Landfill project with all municipal and hazardous waste either being destroyed or recycled.

Balboa Pacific Corporation has strategic alliances with industry experts who have performed exceptionally in the past and with whom we have a working relationship on an as-needed basis. For the application contemplated herein, it has not been determined whether their contribution will be required, but if so, their availability as a subcontractor and willingness to participate is not an issue.

Issues of Specific Concern, as outlined by TSWG's Julia Vincenti and Contracting Officer, Shonn Moore

Issue: What would be the cost of a deliverable prototype of this system?

Response: As previously noted herein, if granted the opportunity, Offeror's performance under this assignment will, at completion, have the ability to commence the manufacturing of *Pyrolytic Carcass and Plant Disposal Systems* within 7 days of written notice. Contemplated *System* manufacturing will not be a prototype, but rather, a *System* that will be mission-ready within 24 hours of destination arrival and, subject to final design engineering, will cost approximately $5 million dollars. Total cost of each *Self Contained Transportable System* is substantially increased over that of a *Stationary System,* primarily due to the cost of mobile equipment. The three tractors and trailers alone, required for each *System*, will cost upwards of $1.5 million dollars. The connect/disconnect couplings required for 24-hour mission readiness and multi-fueled/self containment capability represent additional cost.

Also, equipment, such as a forklift, will be required for *carcass* handling. And due to the hazardous nature of the material handled by *System* operators, protective measures, following HAZMAT guidelines, will need to be employed.

Issue: What are the on-site logistics and utilities support requirements?

Response: Pursuant to the specifications set forth by the BAA guidelines, *the System must be multi-fuel capable,* it is assumed that the Mission Ready requirement means *Self Containment* under any circumstance – anywhere. As such, operational components must be self supporting as much as possible; this having been said, self supporting can not be for an indefinite period; therefore, when and where ever possible, natural gas, electricity, and water will prolong production performance.

Issue: Provide capacity, throughput, and emissions data for carcass disposal.

Response: It is unlikely that anyone has ever provided a transportable *System* that will decompose spore-forming prion pathogens; however, if anyone can, Balboa Pacific's Pyrolytic Gasification conversion technology will do just that. Otherwise, Plasma Arch technology will, most likely, accomplish the desired results, but it is not economically viable and it is certainly not transportable. The requirement for transportability imposes capacity constraints regardless of the *Systems'* core technology. Therefore, each *System's* maximum processing capacity is 50 tons-per-day (50TPD).

As such, it will require five *Systems* to comply with BAA requirement for processing 0.5 million pounds per 24 hour period. Throughout this dissertation, reference has been made regarding Balboa Pacific's Pyrolytic Gasification Systems as having met or exceeded the emissions and leachate threshold requirements of the EPA, AQMD and other regulatory agencies.

Issue: Describe the front-end mechanical reduction system design and production.

Response: Balboa Pacific's Pyrolytic Gasification Systems generally, with infrequent exception, require *material reduction / front-end handling* equipment; therefore, it is standard procedure to identify the specific composition, consistency and viscosity of the material to be processed. A Company that we often use as a technical consultant for front-end material handling is RRT Design and Construction - Enviro-Services and Constructors, Incorporated, located in Melville, New York. RRT is reputed as being the world's foremost authority in waste management's front-end handling equipment design, logistics and procedures. Their specific expertise coupled with Balboa Pacific's Pyrolytic Gasification Thermal Convertor and Thermal Oxidizer closed systems will unquestionably result in a transportable system that will be second to none, and concerns regarding the reformation of dioxins and furans can be put to rest.

Issue: What specific Government furnished material (GFM) or information (GFI) will be required?

Response: By the very nature of the potentially hazardous material to be processed, a *Transportable System* will require special permitting and licensing, not only to operate in varying locations and regulatory jurisdictions but to transport the three-trailer *Systems* on public highways. Federal assistance in acquiring the necessary permits and licenses will be expected.

Issue: Provide information on previous "System Validation" efforts.

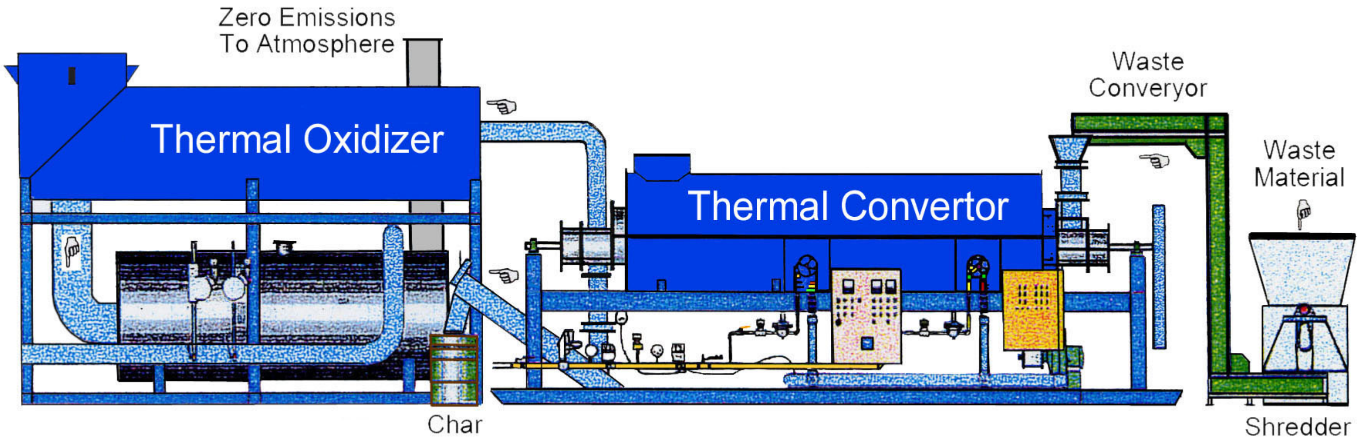
Response: As previously mentioned, several of the Nation's leading environmental engineers have performed exhaustive studies evaluating and validating the efficacy of Balboa Pacific's technology including emissions and leachate, as well as, regulatory compliance.

Issue: To what extent will the required contract submittals have on budget and schedule?

The requirement as set forth in paragraph 2.6 of the BAA package will have no effect on budget or schedule in that a necessary requirement of *Design Engineering* is thorough documentation of design elements, sequential events, benchmarks and progress (positive or negative). Report compilation, through Computer Aided Design and Drafting (CADD) is an integral part of the process, as such; report submissions will be little more than pressing the *print* button on the computer to generate proper reports.

Response: Transportable 50 TPD Pyrolytic Carcass & Plan Disposal System

Here is the approved submittal summary provided for reference and informational purposes only.



Each 50 TPD System requires 3 – 40 foot low-bed trailers.
(Off-loading unnecessary – Trailered modules are coupled for operation)

Proposed Tasks

Task 1:

- Modify Balboa's Pyrolytic Gasification system to accommodate front-end material handling in a fully enclosed vacuumed throughput system. Thus assuring the ability to process a broad variety of toxic and hazardous, liquid or solid material such as contaminated animal carcasses, plant material, chemical and biological agents.

Task 2:

- Following satisfactory completion and governmental acknowledgment of Task-1, detailed plans and specification will be prepared for the modification of Balboa's stationary system to accommodate a highway and air mobility, on-site quick assembly, 24-hour mission readiness, multi-fuel operational, fully enclosed, 50TPD Modular System. Completion of Task-2 will assure immediate crisis response, affording the ability to commence construction of 5–50TPD Transportable Systems sufficient to dispose of 0.5 million pounds per 24-hour period of throughput material.

Operational Capabilities:

- Pyrolytic Gasification, in an oxygen free environment (0.05 – 2.5%), is currently recognized within the industry as the only economically viable technology, which destroys disease-causing pathogens such as prions found in Bovine Spongiform Encephalopathy (BSE, aka Mad Cow Disease). Europe has found that the prion pathogen remains in the carcass ash even after incineration and as such, cannot be disposed of in landfills because of potential ground water contamination. Furthermore, the UK has passed legislation that will soon phase out incineration and landfills.
- Balboa's continuous feed Pyrolytic Gasification System is a developed proprietary technology, which is established, tested, evaluated, produced and demonstrated as a Waste Management System which can be economically operated.
- System operation and technology evaluation, developed over a period of 10 years, has been validated by the nation's leading environmental engineers such as Dames & Moore (URS), Sandia Labs and Pacific Environmental Services; and in every case, environmental thresholds met or exceeded EPA and AQMD guidelines and standards.
- Performance testing will validate Balboa Pacific's Pyrolytic Gasification Technology as having the ability to destroy viral, bacterial, spore forming and prion diseases, and chemical and biological

agents. This technology application is effective in the destruction of illicit drugs, out-of-circulation paper currency, toxic and hazardous material such as Agent Orange and Napalm and the remediation of polluted military and government installations. The DEA has also expressed interest in a System demonstration using actual substances to be destroyed. A joint agency relationship might be most cost effective.

ROM-Cost ($1,000,000) and Schedule (6-Months)

Tasks		Timeframe	Costs
Task – 1	System Design and Modifications	5 mos.	$835,000
Task – 2	Final Engineering & CADCAM Drawings	1 mo.	$165,000
	Total Timeframe and Costs	**6 mos.**	**$1,000,000**

Deliverables

Monthly Progress Reports during Task performance
Independent verification of each Task compliance and completion
Independent verification of crisis readiness capability
Manufacturer's commitment for accelerated System production
Completed mission ready System cost analysis

A Master Project Schedule - Task-Phased Budgetary Estimate and GANTT Chart

Here is a Task-Phased Budgetary Estimate followed by an easily understood schedule, which establishes start and stop points of each phase/task, establishing delivery dates, decision points and inspections.

Task-Phased Budgetary Estimate:

Budgeted Line Items	**Amount**	**Totals**
TASK 1: System Modification for Specific Application - $835,000		
1. Design - Transportable Closed Vacuum Throughput System (TCVTS)	250,000	
2. Modify existing 21 ton/day system for TCVTS demonstration	550,000	
3. Develop Acceptance Test Procedures (ATP)	10,000	
4. Government review of ATP	-0-	
5. ATP sign-off by both parties	-0-	
6. Perform functional/operational ATP w/government witness & emissions testing	25,000	
Total - TASK 1 Budgetary Estimate		**835,000**
TASK 2: Prepare Manufacturing Documents - $165,000		
50 TPD -TCVTS Design Documentation		
1. Mechanical connections	10,000	
2. Fuel lines connections	10,000	
3. Electrical cogeneration system for parasitic consumption and connections	10,000	
4. Electrical panels/computer systems and emissions monitoring	10,000	
5. Multi-fuel inputs	20,000	
6. Thermal Oxidizer-Pyrolytic Convertor disconnect couplings	15,000	
7. Pyrolytic Convertor-Waste Conveyor disconnect couplings	15,000	
Design Flatbed Trailer Assembly		
8. Material reduction shredders and conveyors	20,000	
9. Pyrolytic Convertor w/mechanical, electrical, and fuel lines	20,000	
10. Thermal Oxidizer w/mechanical, electrical, and fuel lines	10,000	
11. Identify support equipment, parts for, and layout of, servicing trailer	15,000	
Manufacturing Documentation of Modifications for System Production		
12. Prepare and Publish Operating & Service Manuals	10,000	
13. Establish manufacturing contracts for system readiness	-0-	
14. Sign-off successful completion – Task 2	-0-	
Total – TASK 2 Budgetary Estimate		**165,000**
Total – TASK 1 and TASK 2 (Assignment Completion)		**1,000,000**

NOTES:

1. From commencement notification, estimated manufacturing time for the first *Mission Ready System* is six-months. Subsequent *Systems* can be completed within a 90-day period, however, if multiple *Systems* are to be manufactured, completion schedules would vary depending upon the number of units to be manufactured.

2. A *contingency factor* has not been calculated in the above Task-Phase Budgetary Estimate; therefore, it is only prudent that provisions for unforeseen cost overruns be addressed in the Assignment Agreement/Contract.

GANTT CHART: Pyrolytic Carcass and Plant Disposal System

LINE ITEM DESCRIPTIONS	← MO-1 →				← MO-2 →				← MO-3 →				← MO-4 →				← MO-5 →				← MO-6 →			
TASK 1: System Modification or Specific Application																								
1	x	x	x	x	x																			
2				x	x	x	x	x	x	x	x	x	x	x										
3														x										
4															x									
5															x									
6																x								
TASK 2: Prepare Manufacturing Documents																								
Design Modifications for 50TPD Transportable System																								
1																	x							
2																	x							
3																	x							
4																	x							
5																	x							
6																		x						
7																		x						
Design Flatbed Trailer Assembly																								
8																			x	x				
9																				x	x			
10																					x	x		
11																					x	x		
Manufacturing Documentation of Modifications for System Production																								
12																							x	
13																							x	
14																								x
NOTE: Pending allocation shall be ¾ to Task 1 and ¼ to Task 2																								

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