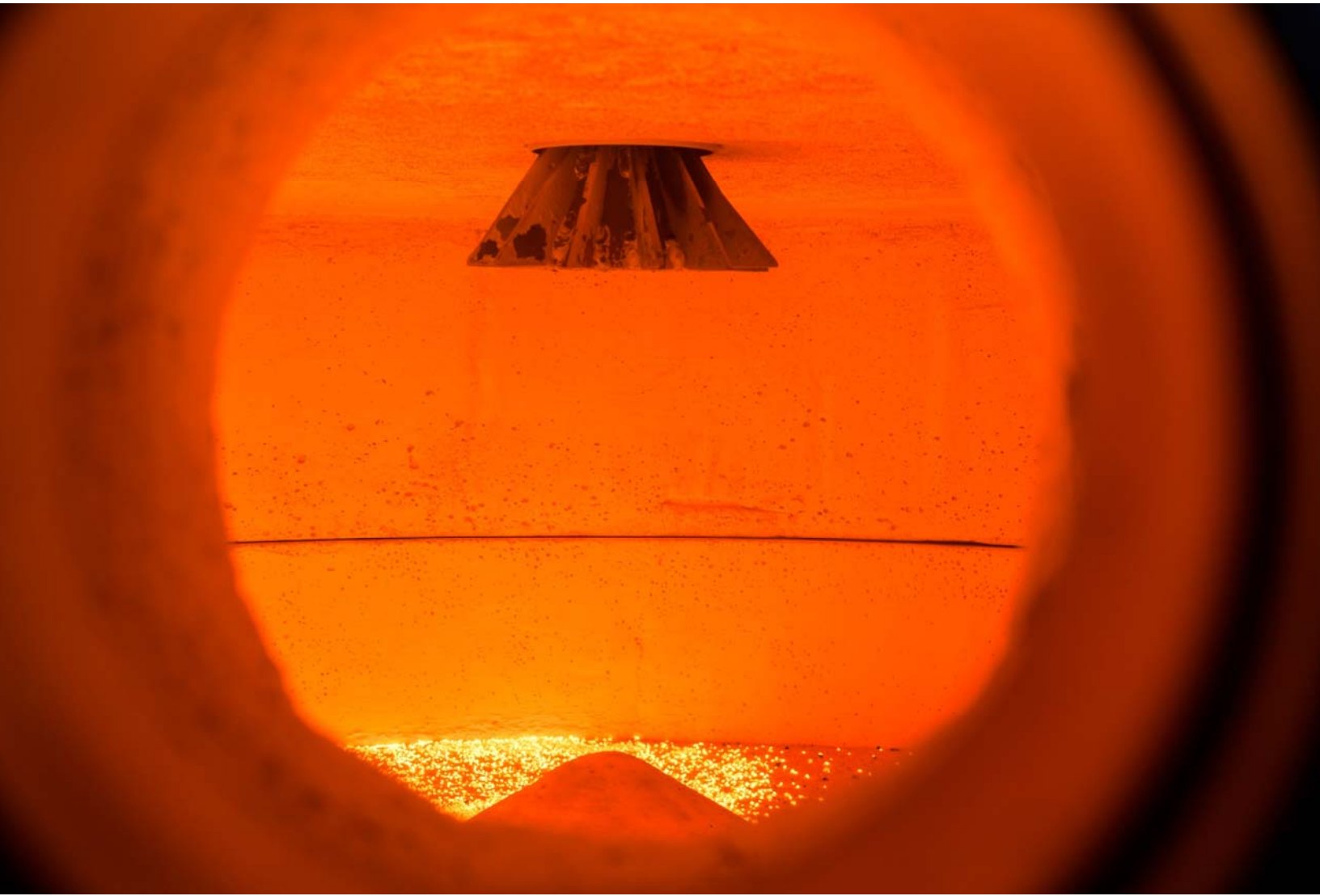
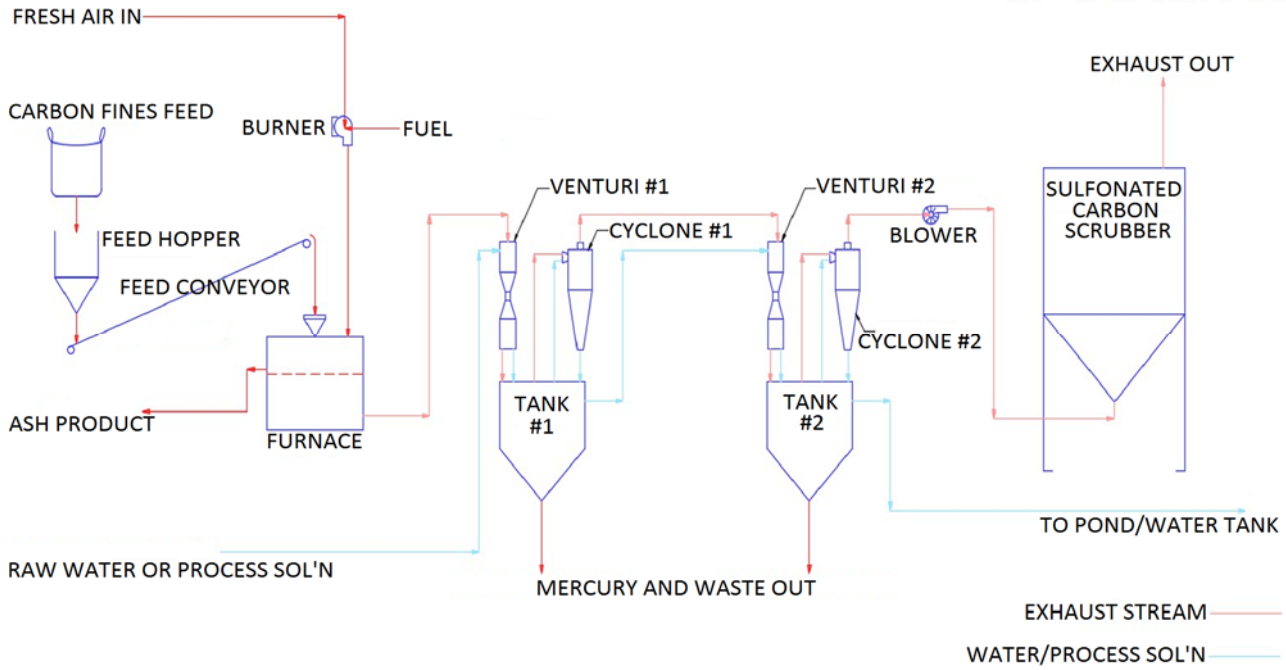
Kappes, Cassiday & Associates

KCA CARBON CONVERTER





High Performance Solution For Gold Recovery from Carbon Fines

The KCA Carbon Converter is a modular, self-contained unit for converting 300kg—500kg carbon fines into a fine dry ash for the recovery of previously trapped gold. Dirty, wet carbon fines can be fed directly into the roasting chamber where even feather light carbon ash is fully captured as a dry product. Environmental control is a key strength of the Carbon Converter; a three-stage system fully captures mercury to best attainable EPA-acceptable levels. With demonstrated 99% gold and silver recovery, the Carbon Converter is the definitive solution to on-site carbon fines.

Kappes, Cassiday & Associates (KCA) specializes in the development, engineering and implementation of extractive metallurgical processes for the mining industry, and for the past six years KCA has invested significant R&D efforts toward bringing the Carbon Converter to market. Through rigorous testing and product development, the KCA Carbon Converter has been shown to handle any variety of carbon fines material, eliminating your on-site carbon fines problem.

The KCA Carbon Converter combines the best technologies to effectively ash your carbon fines, allowing you to recover the precious metals locked within and significantly increase the revenue of your operation.

Here's how it works: Carbon fines are conveniently loaded into the feed hopper directly from super-sacks. An automated conveyor then transfers the material to the top of the furnace, where it is continuously and evenly distributed over a thin bed of silica sand. Hot air from an overhead flame is pulled down through the carbon that's now deposited on the sand "bed". The carbon combusts, excess water is evaporated, and the carbon reduces to a metal rich ash. Two interchangeable bottom sections of the furnace allow for semi-continuous operation, maximizing uptime. When the bed has accumulated a full load of ash, the operator is alerted to exchange bottom sections for the next ashing cycle. The semi-continuous batch system is easily operated by one person through a sophisticated PLC interface. The ash is then removed from the sand bed by the operator and either smelted directly or leached.

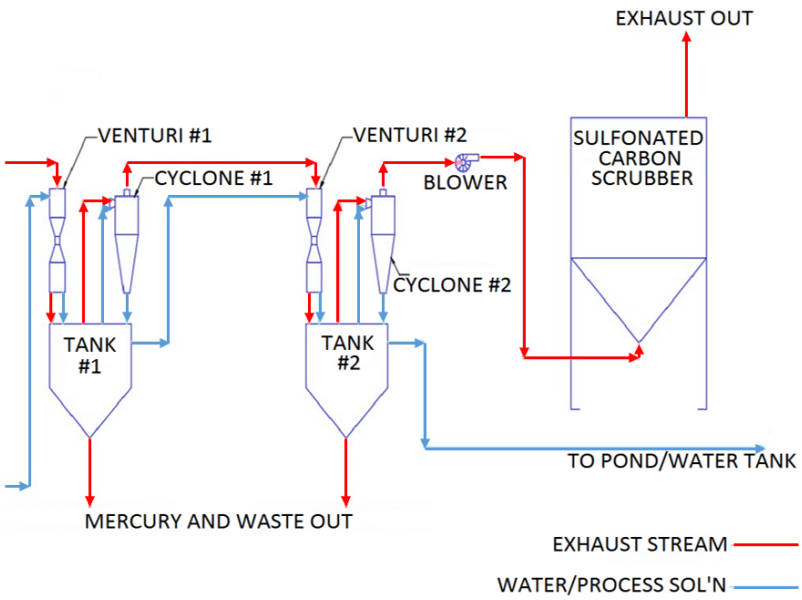
Created by Kappes, Cassiday & Associates, with over 40 years of experience in the global gold industry.

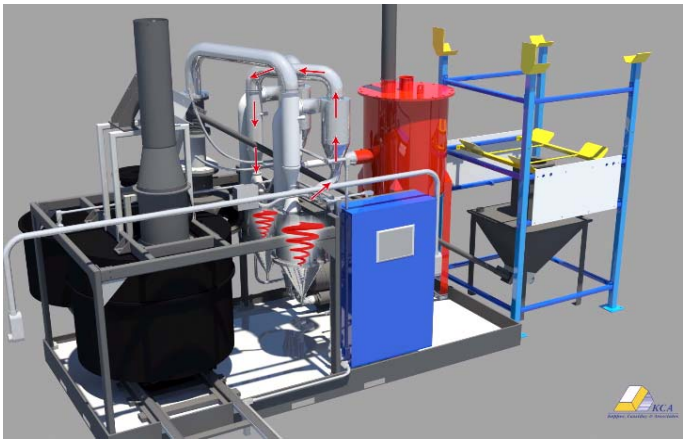
Environmental Control: Complete Mercury Removal

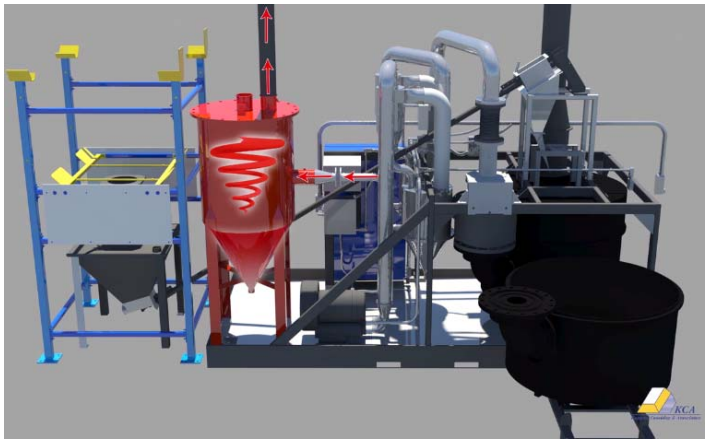
Within the Carbon Converter unit, KCA has designed a unique system for removing mercury and other volatiles that may be released during carbon ashing. The hot exhaust gas from the furnace flows through a series of two venturi/water scrubbers, using water at ambient temperature to remove volatiles including mercury. Mercury is collected in a conical sump below each scrubber from where it can be safely disposed. In most cases, coolant for this stage is process solution, flowing into the system and discharging back into the leaching process.

As a final polishing step, the cooled exhaust gas passes through a tank filled with sulfur-impregnated carbon to remove any trace amounts of mercury from the exhaust gas stream.

Once the ashing cycle is complete, the ash, which has been roasted at high temperature, has no mercury remaining. This design ensures that emissions meet emission standards of every US state and foreign country.





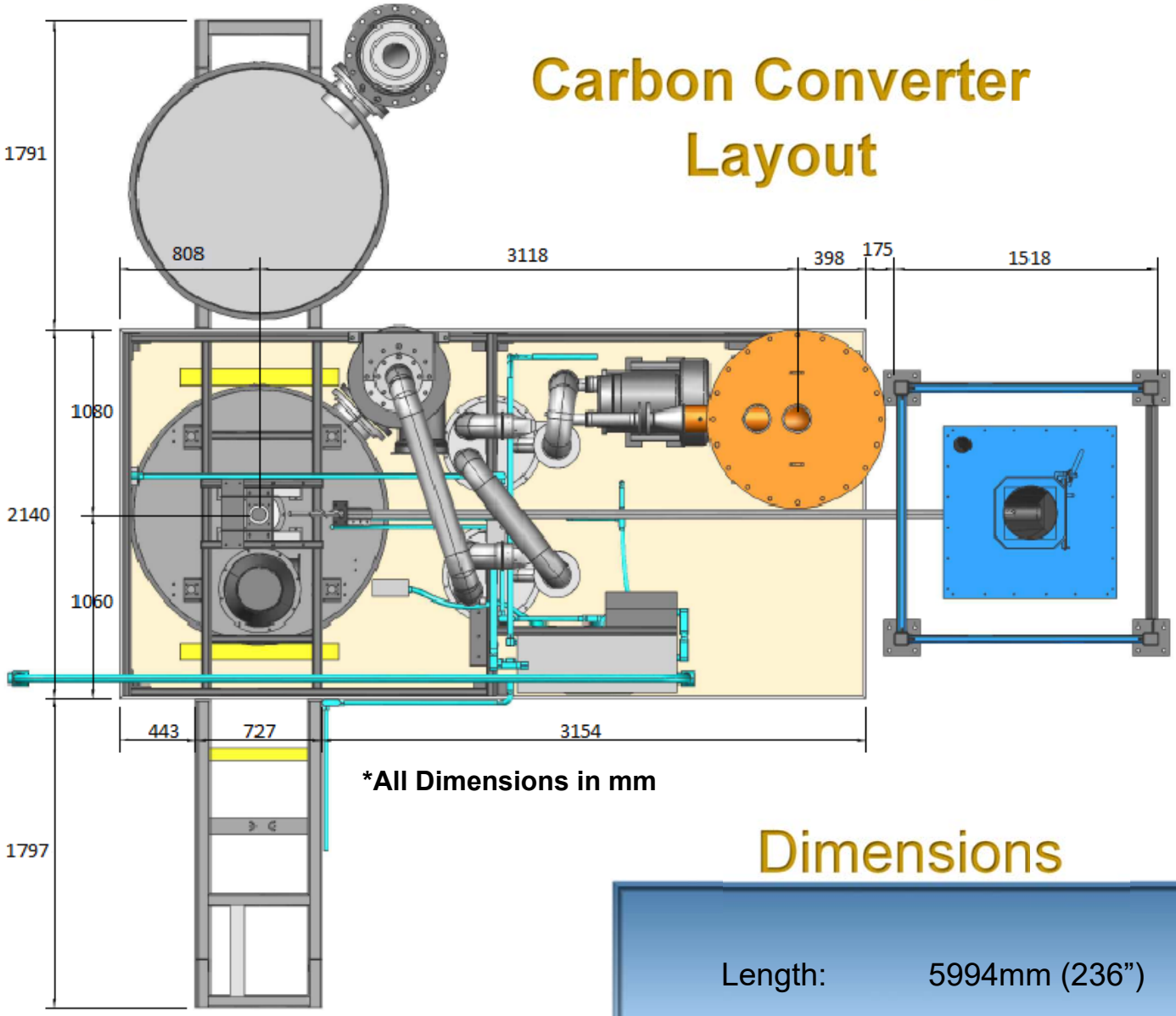


The KCA Carbon Converter: A sophisticated and well designed solution to your carbon fines problem.

A Sophisticated PLC Interface

Safety interlocks, automated valves and monitors all play an integral role in keeping personnel and equipment safe from harm as well as efficient. The Carbon Converter's PLC helps operators run the Carbon Converter with minimum downtime as well as track performance. By directly loading super-sacks on the Carbon Converter's platform, the PLC registers load cells reading the super-sack weight and plant throughput. High quality materials of construction ensure that the furnace will operate for an extended amount of time without major service or corrosion regardless of the impurities on the carbon. The entire apparatus is mounted on a containment base designed for easy cleaning after operation or in the event of a spill.

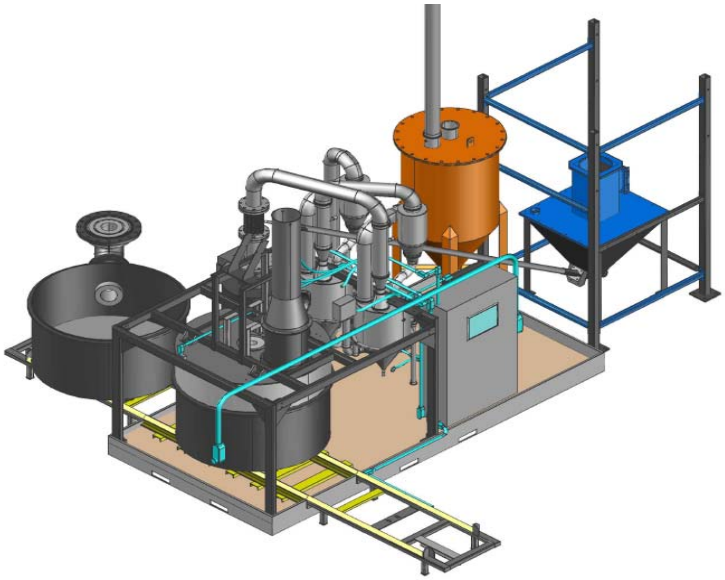
Carbon Converter Layout



*All Dimensions in mm

Dimensions

Length:	5994mm (236”)
Width:	5740mm (226”)
Height:	3200mm (126”)



The Carbon Converter conveniently ships in one 40-ft container or two 20-ft containers.

Sampling Services & Operational Expenses

During the opportunity analysis phase KCA offers test sample runs of carbon fines in a full-scale Carbon Converter unit at KCA in Reno, NV USA. Sampling of carbon fines requires a shipment of approximately 200kg of carbon fines from the proposed feedstock as well as scheduling with our facility. The results of the test burn include analytical analysis and anticipated OPEX (for the given sampled feed). By utilizing KCA's sampling services, prospective operations can better anticipate project economics and gold recovery when using the Carbon Converter.

Typical Example: Productivity and Cost per Unit

Description	Unit	Daily	Annual
Total Wet Feed Weight	kg	613	206,109
Total Dry Feed Weight	kg	423	142,215
Total Dry Carbon Feed	kg	368	123,727
Total Gold Recovered	gms	131	44,087
Total Fuel Cost	$US	25.59	8,598
Power Cost	$US	86.40	29,030
Silica Sand Cost[1]	$US	8.01	2,690
S-Impregnated Carbon Cost	$US	0.00	0
Ceramic Filter Tiles Cost	$US	4.64	1,558
Maintenance Labor Cost	$US	3.91	1,313
Maintenance Parts Cost[2]	$US	53.57	18,000
Operating Labor Cost	$US	40.00	13,440
Total Operating Cost	**$US**	**222**	**74,628**
Processing Cost (Wet Feed)	**$US/MT**	**362**	**362**

Note (1): 90% recycle of coarse silica sand.

Note (2): Maintenance parts package included in purchase price.

Description	Units	Value
Carbon Fines Feed Characteristics		
% Carbon (dry basis)		87%
% Sand / Gangue (dry basis)		13%
% Moisture		31%
Average Mercury Grade (dry basis)	mg/kg	0.00
Average Gold Grade (dry basis)	gms/MT	310
Consumables Costs		
Fuel Type		Propane
Fuel Cost	$US/L	0.53
Power Cost	$US/kWh	0.10
S-Impregnated Carbon Cost	$US/kg	17.73
Silica Sand Cost	$US/kg	0.44
Labor Cost (including burdens)	$US/hr	8.00
Site and Operating Conditions		
Altitude	meters	4,500
Operating Hours*	hrs/day	24
Operating Cycles*	cycles/day	2.0
Operating Days*	days/year	336
Operating Labor*	hrs/cycle	2.5
Heat Up Time*	hrs/cycle	1
Burn Out Time*	hrs/cycle	1
Burner BTU Input*	btu/hr	300,000

*Inputs by KCA

Field Services

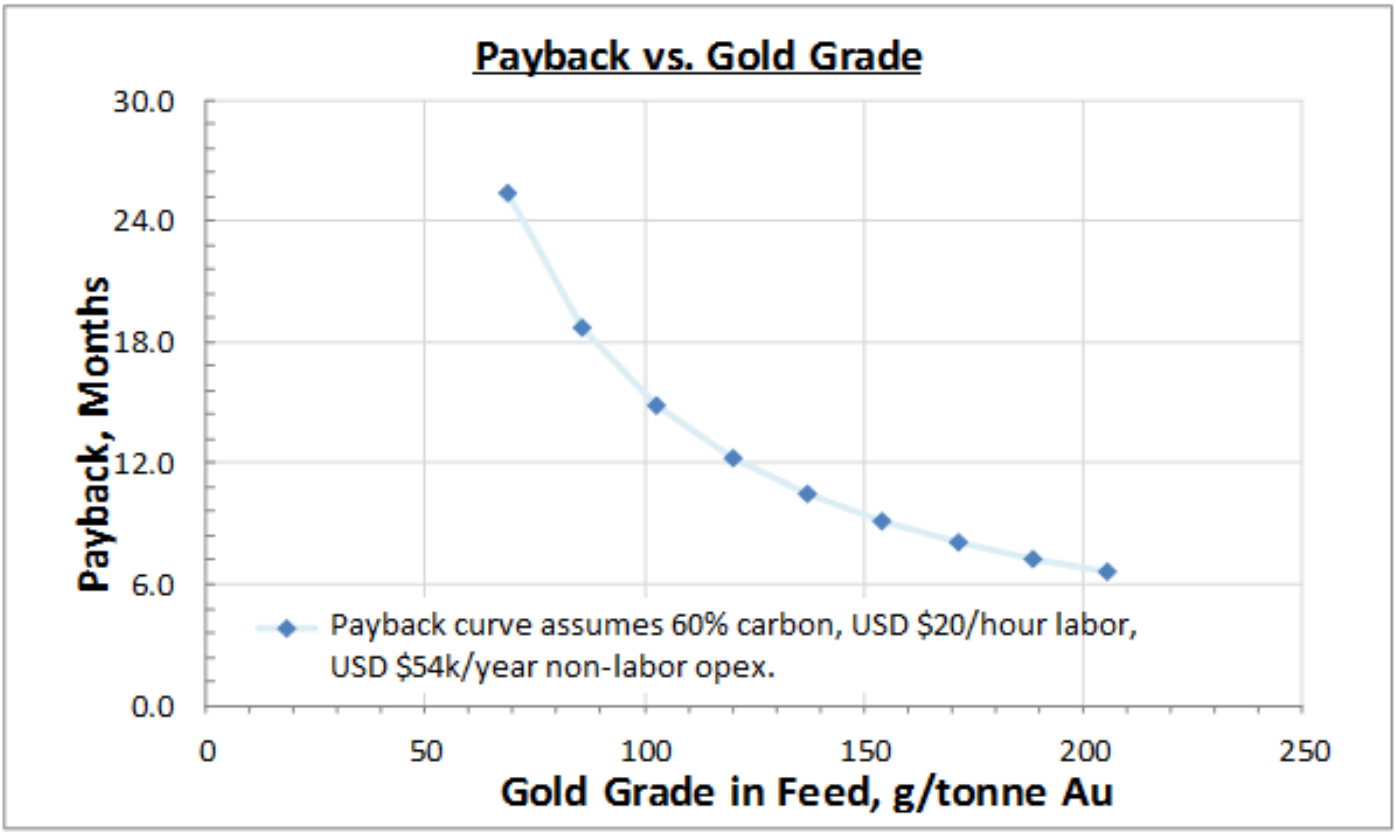
With the purchase of a Carbon Converter, KCA field engineers arrive on site for a pre-shipment site survey, commissioning, training, and start-up support of the unit.

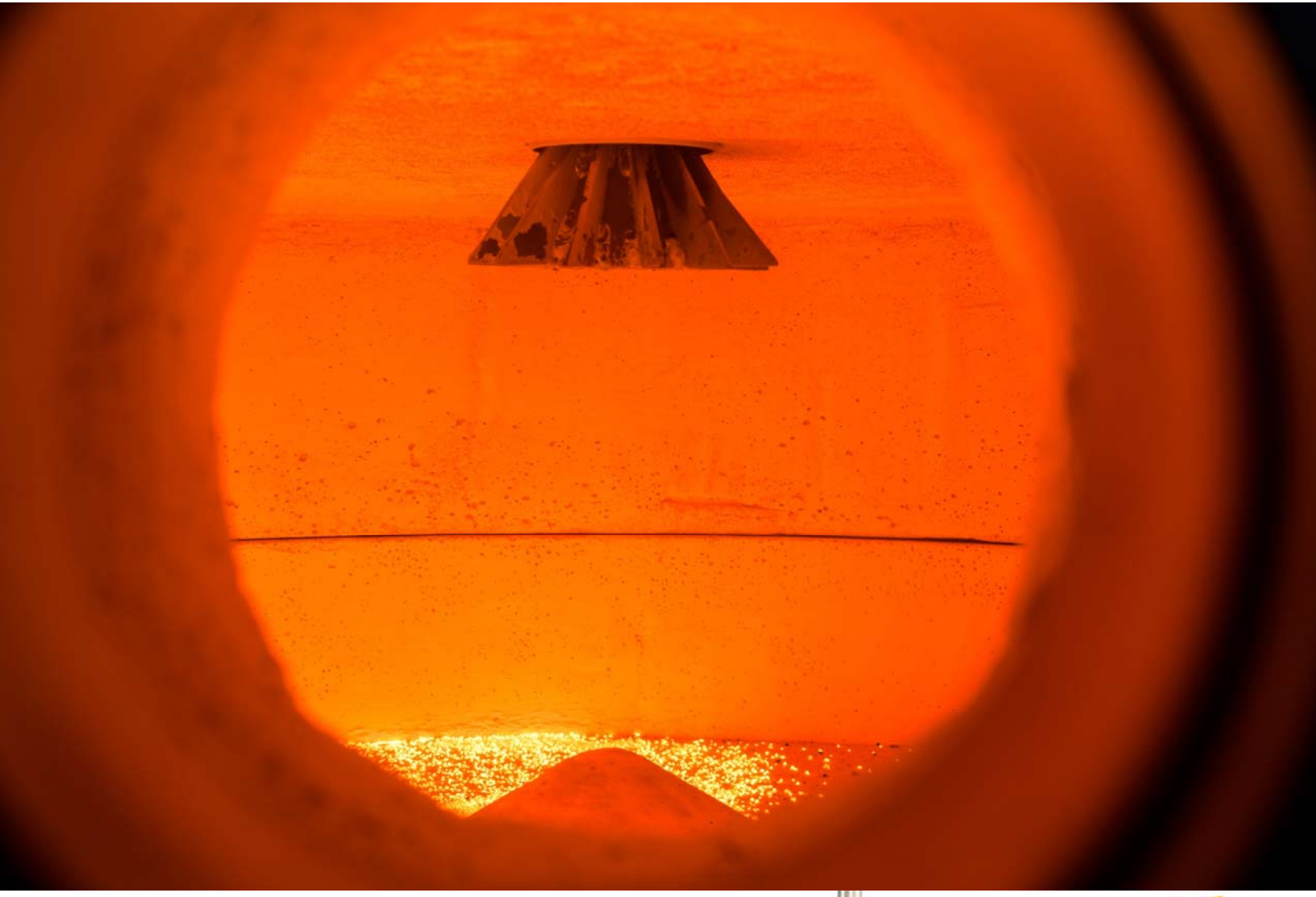
During the site survey a KCA engineer will help plan ideal placement, explain required utilities, and provide any information requested by the operation. Once the unit is on-site, KCA engineers will verify installation of the unit before beginning commissioning services. After commissioning, we provide training for operators and then start the unit and provide assistance through the production of smeltable ash, or gold in solution.

KCA supports every step of your project planning and deployment, ensuring performance and success.

Economics

At 200g gold per tonne of carbon fines, KCA expects a 7 month or quicker return on investment (ROI), assuming US operational costs. More than 90% of samples tested by KCA have shown a better than 6 month ROI.





For More Information, Contact:

Kappes, Cassiday & Associates

7950 Security Circle

Reno, Nevada 89506

Phone: (775) 972-7575

Email: kca@kcareno.com

Website: www.kcareno.com