Acme Coke
11236 S. Torrence Ave.
Chicago IL 60617

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Baker Petrolite BP Plant Proposal
Dated: September 1998

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ACME STEEL
CHICAGO, ILLINOIS

BY-PRODUCTS AREA PROPOSAL

SEPTEMBER 29, 1998

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Baker Petrolite
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Mr. Richard "Dick" O'Hearn
Acme Steel Company
11236 South Torrence
Chicago, IL. 60617

Dear Dick,

Baker Petrolite is pleased to offer our proposal for the by-products area. Our philosophy in treating any system is to approach the system with a team effort. Baker Petrolite established the S/CAT Team, Steel/Coke Applications Technology Team, to insure that the correct technology was being applied.

The S/CAT TEAM involved on the Acme Steel project consists of Jack McEwen, Bob Larkins, Carol Raabe, and Mike Nicholson. Baker Petrolite, among all specialty chemical companies, has the most extensive and proficient coke plant by-products expertise and experience.

We anticipate that we have covered the bid request adequately and look forward to presenting this information personally.

Sincerely,

Bob

Bob Larkins
Acount Manager

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PRIMARY COOLERS

Plate and Frames:

Inlet Water Temperature	160° F (71°C)
Outlet Water Temperature	98.6° F (37°C)
Flow	3600 GPM (By Flowmeter)
Blowdown	85 to 150 gpm, Avg. = 105 gpm
Gas Flow	12 - 15 MMCF/D

The Primary Coolers are currently experiencing tar and naphthalene fouling. The contaminant source is the liquor that is bypassing the decanters and adds significant tar to the recirculating spray water. This excessive contaminant loading creates an environment for fouling the exchanger surfaces and spray nozzles with tar and solids. This reduces the primary cooler efficiency. These factors lead to naphthalene fouling and tar carry-over in the gas. This condition requires the units to be "heated up" to regain gas cooling. The heat up procedure causes naphthalene and tar to be introduced to downstream components.

During the October outage, Acme Steel is going to address the liquor intrusion into the Primaries by modifying the knock-out pot (cone) at the decanters. This modification should aid tremendously in controlling the primary cooler fouling potential.

Baker Petrolite is recommending adding IPC-5010 to the recirculating spray water to reduce the fouling of the exchangers and water sprays. IPC-5010 water wets the tar and helps prevent its adhesion to system piping. Our program, in conjunction with controlled tar levels in the recirculation system, will significantly decrease the "hot gassing" of the primaries.

There are hard water intrusions into this system that cause some degree of $CaCO_3$ scaling. Baker Petrolite is recommending injecting IPC-7055 into the recirculating water to control scaling. We will investigate the amount of hardness contamination and recommend methods to minimize or eliminate this problem.

The following dosages where calculated using 150 gpm blowdown from the primaries. We realize that the average blowdown is 105 gpm, but, until we gain control of this process, we feel more comfortable dosing to the higher blowdown rate.

IPC-5010 FEED RATES:	**50 ppm**
IPC-7055 FEED RATES:	**15 ppm**

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COG LINE TREATMENT

COG Flow 13 -15 MMCF/D

This is the area of the plant that is experiencing the most trouble. The plant's COG line is nearly full of deposits. The analysis Krupp Wilputte performed on the COG deposits indicates that the majority of the deposit is inorganic and bound by tar. The recommendations to control upstream operations (i.e. gas temperature, ammonia removal and tar precipitation) is necessary before any chemical treatment can be successful.

Baker Petrolite has the experience and background to assist Acme Steel in solving these operating problems. Our district sales representatives have worked in steel / coke plants most of their careers and have well over 70 years combined experience.

Baker Petrolite is recommending using UltraSOLV™ 1750. This product was formulated especially for COG line deposits. UltraSOLV™ 1750 is patented technology for Coke Plants. The dosage is entirely dependent on the level of contaminants after the gas cleaning operations. We are recommending feeding UltraSOLV™ 1750 to the boosters at a initial rate of 5 GPD and 3 GPD split between two down stream sites. This is a total of 8 GPD at start-up. Baker Petrolite will monitor the progress of our program by monitoring the booster efficiency and the appearance of the drip leg material. Again, we must stress the importance of controlling upstream components in order for this portion of the program to be effective.

The primary cooler is the first step in improving the gas cleaning process. We believe we can accomplish this by implementing the IPC-5010 program, in conjunction with the modification to the cone at the decanters.

Our feed rates were calculated using 13 - 15 MMCF of COG per day.

UltraSOLV™ 1750 FEED RATES: 4.5 Pints per MMCF

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COAL TAR MOISTURE

Decanters:

Flow through Decanters	≈2500 GPM
Tar Moisture Spec	< 2 Percent

Your current program treats the tar entering the tar receivers. Baker Petrolite is recommending feeding IPC-5010 to the inlet of the decanters. This enhances the tar/water separation in the decanters which yields lower tar moistures as well as a cleaner liquor returning to the batteries. The ancillary effect of cleaner liquor at the sprays may result in reduced maintenance costs.

The following dosages where calculated using ≈11,000 GPD tar production and 120 gpm excess liquor flow.

IPC-5010 FEED RATES: **10 ppm**

Wash Oil Demulsifier

Wash Oil System:

The wash oil system has an occasional upset that requires the addition of a demulsifier. Baker Petrolite is recommending adding IPC-3540 . The feed rate of IPC-3540 can only be approximated at this time so we are quoting on a cost per pound basis. This will allow you to keep product on hand for these upsets at which time we will test the emulsion for proper treatment levels

IPC- 3540 FEED RATE: **To Be Determined**

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REFERENCES

A partial reference list where we have used IPC-5010 and Ultrasolv™ 1750 technology include the following customers:

1. USS - Clairton Works
2. Shenango Steel
3. LTV - Warren
4. LTV - Hazelwood (closed)
5. Wheeling Pittsburgh Steel - Follansbee
6. Stelco - Hamilton

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COST SUMMARY

PRIMARY COOLER PROGRAM COSTS

IPC-5010 FEED RATES:

Dosage	50 ppm
Density	8.3 pounds per gallon
Cost per pound	$1.44 delivered
Cost per Day	$129.60
Cost per Year	$47,304.00

IPC-7055 FEED RATES:

Dosage	15 ppm
Density	9.58 pounds per gallon
Cost per pound	$1.64 delivered
Cost per Day	$44.28
Cost per Year	$16,162.20

Total Cost per Year **$63,466.20**

COG LINE PROGRAM COSTS

ULTRASULV™ 1750 FEED RATES:

Dosage	4.5 Pints per MMCF
Density	8.51 pounds per gallon
Cost per pound	$4.54 delivered
Cost per Day	$309.08
Cost per Year	**$112,815.37**

COAL TAR MOISTURE PROGRAM COSTS

IPC-5010 FEED RATES:

Dosage	10 ppm
Density	8.3 pounds per gallon
Cost per pound	$1.44 delivered
Cost per Day	$22.32
Cost per Year	**$8,146.60**

DEMULSIFIER PROGRAM COSTS

IPC-3540 FEED RATES:

Dosage	To Be Determined
Density	7.66 pounds per gallon
Cost per pound	$1.66 delivered
Cost per Drum	**$673.93**

Total Program Cost **$185,102.10**