

**STRATEGIC PETROLEUM RESERVE**

**ENGINEERING CHANGE PROPOSAL**

**SUMMARY SHEET**

**CLASS I CHANGE**

ECP NUMBER <b>SJ-M/O-4644</b>	TITLE <b>Upgrade Sample System</b>
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BUDGET SOURCE <input type="checkbox"/> SPR BLI _____ <input type="checkbox"/> CONTRACTOR BASELINE <input type="checkbox"/> AUD <input type="checkbox"/> OTHER: Lease Contractor	AUTHORITY <input checked="" type="checkbox"/> PCCB <input type="checkbox"/> ECC
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SCHEDULE <input type="checkbox"/> YES MILESTONE NUMBER _____ CMCR NUMBER _____  <input checked="" type="checkbox"/> NO	TOTAL ESTIMATED COST OF CHANGE FY 01  DESIGN  CONSTRUCTION      \$30,000  TOTAL                      \$30,000
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PCCB/ECC SIGNATURES	DISPOSITION	COMMENTS CONDITIONS/LIMITATIONS
	C O N C U R  N O N C U R  D A T E	
APM MANAGEMENT AND ADMIN. DOE SENIOR SITE DESIGN <i>Michael M...</i> E. H. Kelly	✓	Need Marked-up Drawings showing changes.  ENTER VENDOR DATA INTO CENTRA 2000 SOFTWARE FOR SAMPLES?
APM TECHNICAL ASSURANCE <i>...</i>	✓	
APM SYSTEMS AND PROJECTS <i>...</i>	✓	
APM MAINTENANCE AND OPERATIONS <i>...</i>	✓	
DEPUTY PROJECT MANAGER		
DOE CMO		
PROJECT MANAGER		
DEPUTY ASSISTANT SECRETARY - SPR		

PCCB/ECC ACTION

FULL APPROVAL     
  CONDITIONAL/LIMITED APPROVAL     
  DISAPPROVAL

completed 2001

# STRATEGIC PETROLEUM RESERVE ENGINEERING CHANGE PROPOSAL

ECP NUMBER <b>SS-M/o-4644</b>		ECP TITLE <b>Upgrade Sample System</b>		PAGE 1 OF 4	
CONTRACTOR CHANGE NO. / REV.		INITIATED BY <b>Richard Krebs</b>	DATE <b>1/22/03</b>	SUBMITTED BY <b>Jill Derise</b>	DATE <b>1/22/03</b>
PRIORITY  <input type="checkbox"/> EMERGENCY  <input type="checkbox"/> URGENT  <input checked="" type="checkbox"/> ROUTINE		ORG / CONTRACTOR <b>Shell Pipeline Company LP</b>	PHONE NO. <b>(504) 728-3573</b>	ORG/CONTRACTOR <b>Shell Pipeline Company LP</b>	PHONE NO. <b>(504) 728-7366</b>
VALUE ENGINEERING <input type="checkbox"/> VEP (MANDATORY) <input type="checkbox"/> VECP (VOLUNTARY)		DRAWDOWN CRITICAL <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO		ROM ESTIMATE  \$ <u>30,000</u>	

### DESCRIPTION:

PROBLEM / EXISTING CONFIGURATION

**This ECP is being submitted as documentation of work that was done at Sugarland in 2001. The existing sampling system on the Bayou Choctaw and Weeks Island meter skids did not comply with Shell Pipeline custody transfer meter specifications. Several sources of crude oil were sampled with the same system and were contained in the same container thus requiring excessive Operator attention.**

PROPOSED SOLUTION / ENHANCEMENT

**Installed a Cliff Mock Tru-Cut Sampler that is isokinetic and proportional to flow, sample containers, and sample mixing system. Additional sampler containers were installed to reduce operational requirements. The sample probe is a Cliff Mock model C-22 with a CD-20 drive. The mixing pump is a Viking Model SG-435 External Gear Pump with a 1/2 HP Viking motor.**

[Reference Shell AFE ]

REASON/JUSTIFICATION

**The new installation was necessary to comply with Shell Pipeline specifications to ensure accurate sampling and reduce Operator workload. The work was not considered to be a capital improvement (therefore not "unfunded liability").**

CI'S AFFECTED

TECHNICAL ANALYSIS/RECOMMENDATION

IMPLEMENTATION METHOD

- SUBCONTRACT
- M&O LABOR (LOE)
- COMBINATION

ENGINEERING

DATE

DOE SSR

DATE

- CONCUR
- NONCONCUR

**STRATEGIC PETROLEUM RESERVE**

**ENGINEERING CHANGE PROPOSAL**

**SOFTWARE, HARDWARE, FIRMWARE CHANGE**

CONTRACTOR CHANGE NUMBER	REVISION NUMBER	ECP NUMBER <i>SJ-M/0-4644</i>	Page 3 of 4
SOFTWARE CHANGE ANALYSIS		HARDWARE/SOFTWARE AFFECTED	
		(NOTE: REDLINE CI BOM)	
DISPOSITION OF PARTS			
<input type="checkbox"/> REWORK SITE COMPONENTS ONLY <input type="checkbox"/> REWORK ALL SITE COMPONENTS <input type="checkbox"/> COMPONENTS NOT AFFECTED <input type="checkbox"/> OTHER (DESCRIBE) _____			
COMPONENT COMPATIBILITY (LIST COMPONENTS SEPARATELY IF COMPATIBILITIES ARE DIFFERENT)			
<input type="checkbox"/> INTERCHANGABLE <input type="checkbox"/> DRAWDOWN COMPATIBLE <input type="checkbox"/> NONCOMPATIBLE			
OPCS SUPPORT ENGINEER	DATE	FUNCTIONAL MANAGER	DATE
IMPLEMENTATION/TEST COMMENTS			
WITNESSED BY			DATE
TEST APPROVED BY	DATE	CHANGE RELEASE AUTHORITY	DATE

STRATEGIC PETROLEUM RESERVE  
ENGINEERING CHANGE PROPOSAL  
CONFIGURATION CHANGE AFFECTED REPORT

"TO BE COMPLETED BY TECHNICAL REVIEW PROCESS, ENGINEERING AND CONFIGURATION MANAGEMENT ORGANIZATION DEFINED PROCESS"

ECP NO. <b>SJ-M/O-4644</b>	CONTRACTOR CHANGE NO.	REV.	CHANGE CLASSIFICATION <input checked="" type="checkbox"/> CLASS I <input type="checkbox"/> CLASS II
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FUNCTIONS AFFECTED			DOCUMENTS AFFECTED		
Y	N	ITEM	Y	N	ITEM
		LEVEL 1 <input type="checkbox"/> II <input checked="" type="checkbox"/> III <input type="checkbox"/> CRITERIA			ELECTRICAL
		PERFORMANCE CRITERIA			315 - CATHODIC PROTECTION
		RAM			350 - STANDARDS
		INTERFACE CHARACTERISTICS			INSTRUMENTATION
		I/O POINTS			401 - BLOCK DIAGRAM
		DOE LEVEL I, II, III SCHEDULES			402 - LOOP DIAGRAMS
		GUARANTEES/DELIVERABLES			403 - INSTRUMENT PLANS AND DETAILS
		SAFETY/ENV/FP (CIRCLE ONE)			404 - INSTRUMENT WIRING DIAGRAM
		SECURITY REQUIREMENTS			409 - INSTRUMENT INDEX
		OPCS SOFTWARE			450 - STANDARDS
		OPCS HARDWARE			MAPPING
		OPCS FIRMWARE			501 - ALIGNMENT SHEETS
		RANGES/ I/O POINTS			509 - PIPELINE DWGS (MAINLINE VALVES, DRIPS, SCRAPER, TRAPS
		DIP SWITCH SETTINGS/JUMPERS			550 - STANDARDS
		MASTER CI LIST			ARCHITECTURAL
		WELLHEAD CONFIGURATION			720 - ELEVATIONS AND FLOOR PLANS
		SPARES/PROVISIONING REQUIREMENTS			750 - STANDARDS
		OPERATIONS MANUALS			DOCUMENTATION
		MAINTENANCE MANUALS			900 - RESERVED
		GOVERNMENT FURNISHED EQUIPMENT			901 - TECHNICAL/PERFORMANCE/DESIGN CRITERIA
		ENERGY USAGE			910 - DESIGN DESCRIPTION/BASIS
		VALUE ENG. (COST SAVINGS)			911 - PROCESS SET POINT DOCUMENTS
		OPERATIONS MODELS			912 - EQUIPMENT LIST
		OTHER			913 - MOV LIST
					915 - ELECTRICAL SAFETY
					920 - I/O DOCUMENT
					930 - OPERATION AND MAINTENANCE MANUALS
					950 - STANDARD SPECIFICATIONS
					970 - TASK SPECIFICATIONS
					990 - CONFIGURATION MANAGEMENT REPORTS 1.B.O.M
					999 - RESERVED
					COMMENTS:xn
		105 - GENERAL PIPING PLANS			
		106 - AREA PLANS (MECHANICAL EQUIPMENT LOCATION)			
		122 - WELLHEAD DRAWINGS			
		130 - VALVE LIST			
		135 - LINE LIST			
		140 - PSV LIST			
		150 - STANDARDS			
		CIVIL/STRUCTURAL			
		201 - PLOT PLANS			
		202 - SITE WORK, GRADING (ROUGH & FINISH DRAINAGE FENCING			
		210 - FOUNDATIONS: LOCATION PLANS			
		216 - MINES (WEEKS ISLAND ONLY)			
		250 - STANDARDS			
		ELECTRICAL			
		301 - AREA CLASSIFICATION			
		302 - ONE LINE DIAGRAMS			
		303 - SCHEMATIC DIAGRAMS			
		304 - POWER PLANS AND DETAILS			
		305 - LIGHTING PLANS AND DETAILS			
		307 - SUBSTATION PLANS AND DETAILS			
		308 - WIRING DIAGRAMS			
		310 - GROUNDING			
		311 - CONDUIT & CABLE SCHEDULES (INCLUDING INSTRUMENTS)			
		313 - MCC/SWITCH GEAR EVALUATION & SCHEDULE			

**ENGINEERING CHANGE PROPOSAL  
LIFE CYCLE COST FORM**

<b>ECP NUMBER:</b> <p style="text-align: center; font-size: 1.2em; margin-left: 100px;">SJ-M/O-4644</p>	<b>ECP TITLE:</b> Upgrade Sample System						
<b>EXECUTIVE SUMMARY:</b> <p>This ECP is being submitted as documentation of work that was done at Sugarland in 2001. The existing sampling system on the Bayou Choctaw and Weeks Island meter skids did not comply with Shell Pipeline custody transfer meter specifications. Several sources of crude oil were sampled with the same system and were contained in the same container requiring excessive Operator attention.</p>							
<b>IMPLEMENTATION PLAN:</b> Installed a Cliff Mock Tru-Cut Sampler that is isokinetic and proportional to flow, sample containers, and sample mixing system. Additional sampler containers were installed to reduce operational requirements. The sample probe is a Cliff Mock model C-22 with a CD-20 drive. The mixing pump is a Viking Model SG-435 External Gear Pump with a 1/2 HP Viking motor.							
<b>IMPLEMENTATION COST:</b> <table style="margin-left: auto; margin-right: auto; border: none;"><tr><td style="padding-right: 20px;"><b>DESIGN:</b></td><td></td></tr><tr><td><b>CONSTRUCTION:</b></td><td style="text-align: right;">\$30,000</td></tr><tr><td><b>TOTAL:</b></td><td style="text-align: right;">\$30,000</td></tr></table>		<b>DESIGN:</b>		<b>CONSTRUCTION:</b>	\$30,000	<b>TOTAL:</b>	\$30,000
<b>DESIGN:</b>							
<b>CONSTRUCTION:</b>	\$30,000						
<b>TOTAL:</b>	\$30,000						
<b>LIFE CYCLE COST:</b> Not applicable. The new installation was necessary to comply with Shell Pipeline specifications to ensure accurate sampling and reduce Operator workload.							
<b>IMPACT SUMMARY:</b>							
<b>LEVEL I, II, and III CRITERIA:</b>	<b>CONTRACT COMPLETION DATES:</b>						
<b>CODES, REGULATIONS, PERMITS, ETC.:</b>	<b>GOVERNMENT-FURNISHED EQUIPMENT:</b>						
<b>SAFETY, ENVIRONMENTAL, FIRE PROTECTION SYSTEMS, SECURITY:</b>	<b>SCHEDULE:</b> Installed in 2001						

**2.5 SAMPLER:** to extract a representative composite sample for the determination of quality. The sampler **MUST** include a static mixer and a sample extraction device. All sampling systems **MUST** be proven, initially, by water injection testing in accordance with API MPMS Chapter 8.2, and anytime there is a change in system component configuration.

- **EXTRACTOR (PROBE) TYPE:** An isokinetic proportional to flow sample extractor **MUST** be used. It **MUST** uniformly deliver a minimum of 1 cc per grab and be capable of delivering 80% of the sample container capacity during any sample period.

**INSTALLATION:** The extractor **MUST** be installed in the center third of the pipe and in accordance with the manufacturer's instructions.

All pipes from the sample extractor to the sample container **MUST** be stainless steel and no less than 3/8" in diameter. The piping **MUST** slope continuously downward to the sample container so that all samples extracted for a given batch are deposited in the sample container before conducting the analysis for S&W and gravity.

- A manual sample probe (to center 1/3 of flowing stream) and valve **MUST** be installed immediately downstream of the sampler, to provide a means of spot sampling to verify gravity and S&W.
- **STATIC MIXER:** uses the kinetic energy of the moving fluid to achieve stream conditioning.

**INSTALLATION:** The static mixer **MUST** be used and installed in accordance with API MPMS Chapter 8.2.

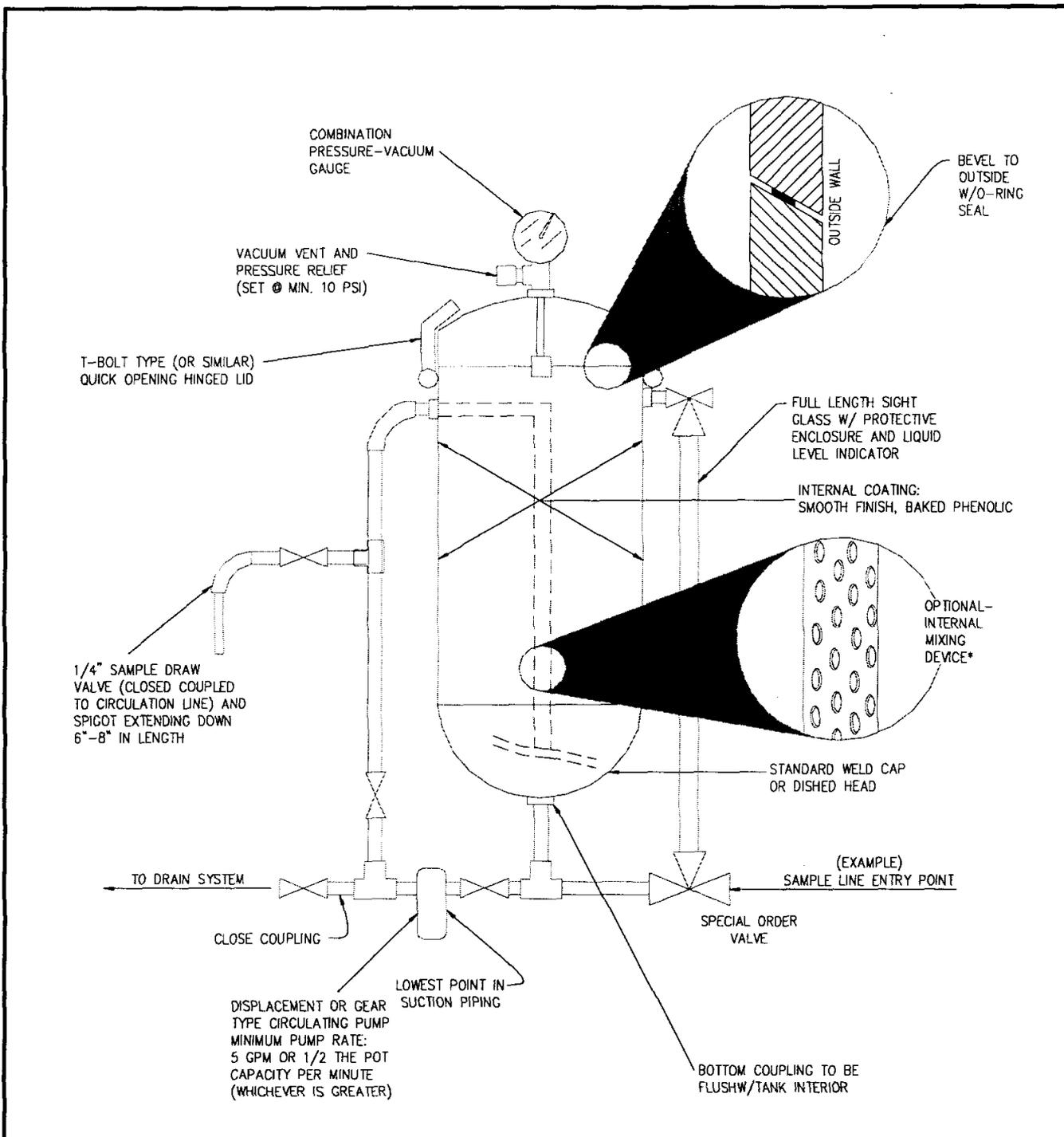
**2.6 SAMPLE CONTAINERS:** for collecting, maintaining integrity and mixing the composite sample for quality determination. All sampling containers **MUST** be proven, initially, by water injection testing in accordance with API MPMS Chapter 8.2, and anytime there is a change in system component configuration. The sample containers **MUST** be designed for the maximum expected pressure for the product being sampled.

**TYPE:** A minimum of two 5 gallon containers that **MUST** include:

- A quick opening top closure for ease of inspection and cleaning. Access to the sample container should not require tools. The sample container lid **MUST** be capable of the maximum expected pressure setting.
- A pressure relief valve and vacuum breaker with a combination pressure/vacuum gauge. The relief valve **MUST** be set to hold a minimum of 10 psig above the RVP of the sample.
- An elliptical bottom that continuously slopes towards the drain. The container walls **MUST** be smooth and free of pits.
- A full internal coating **MUST** be provided on carbon steel containers. The coating **MUST** be baked phenolic or amine cured epoxy.
- A full-length, protected gauge glass to indicate the liquid volume level. The gauge glass **MUST** include permanent markings to indicate the volume of sample at various levels.
- An internal mixing line restricted at the bottom or equipped with a nozzle to mix the S&W at the bottom of the container. The internal mixing line should have perforations or nozzles along the lower half of its length to allow the container contents to be mixed. The internal mixing line **MUST** not be routed through the quick-opening top closure.

- A displacement or gear type pump, which **MUST** be sized to circulate one half of the sample container capacity per minute. The pump **MUST** be located at the lowest point of all container piping. The pump suction **MUST** be as short as possible and have a shut-off valve. The shut-off valve **MUST** be located between the container and pump.
- A drain valve should be located at the lowest point in the circulation piping to allow for the piping contents to be completely drained between sampling periods.
- A ¼" sample draw-off valve (close coupled to circulating line) **MUST** be located on the circulating line between the pump and the sample container. It **MUST** also include a spigot that extends downward 6" to 8" in length to facilitate bottom filling of the container.

**INSTALLATION:** The piping on the sample container **MUST** be a minimum of 1/2" diameter, be made of stainless steel and be free of pockets that could collect residue when the contents of the sample container are pumped out. Turn to the Appendix for a detailed picture of the sample container system.



01/27/00

<b>EQUILON</b> PIPELINE COMPANY LLC				
TYPICAL STATIONARY SAMPLE CONTAINER				
SCALE	N.T.S.	DATE	REF.	REV.
DRAWN	JDELEON	01/00	AO - 1063	00

\*INTERNAL MIXING DEVICE CAN EITHER BE A SPRAY BAR OR BOTTOM SWIRL TUBE-DEPENDING ON AREA PREFERENCE.



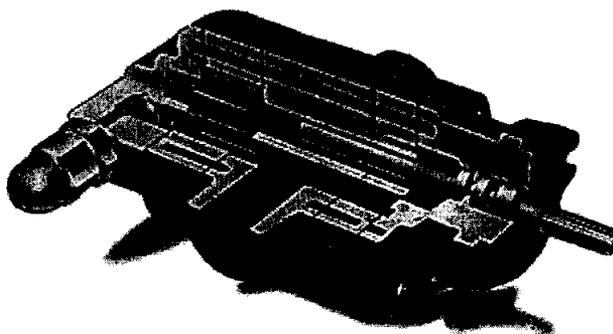


# External Gear Pumps



## Featuring The VI-CORR Composite Pump.

Viking Spur Gear Pumps are ideal for low-capacity, high-pressure, high-speed transfer applications. That's because the external gear principle displaces a precise amount of liquid with each revolution. These "fixed-displacement" pumps increase by capacities of 40 percent, so a pump is always within 20 percent of your capacity needs.



## Advantages:

- **Enhanced Leak Protection.** Standard Buna-N O-rings provide positive sealing between sections. VI-CORR pumps use Viton® O-rings for even greater sealing between sections.
- **Improved Efficiency.** Standard antifriction needle bearings on all lip seal spur gear pumps reduce torque and improve efficiency.
- **Long Gear And Shaft Life.** Precision-ground, heat-treated gears and case-hardened steel shafts offer long-life performance.
- **Reduced Equipment Costs.** A single power source can operate both pumping units of a double pump. Plus, each pumping unit can operate at different pressures for easier system integration.
- **Easy System Integration.** Viking Spur Gear and VI-CORR Pumps are available with lip seal, mechanical seal, and Viking Mag Drive® options. Select from one of four 180° port configurations.

## Specifications:

All specifications at 6.9 BAR/100 PSI discharge pressure.

<b>Spur Gear Pumps</b>						
Viscosity: 100 SSU						
	Metric			U.S.		
Size	M <sup>3</sup> /Hr	RPM	KW	GPM	RPM	BHP
SG-0417	.009	1450	.04	.05	1750	.09
SG-0418	.019	1450	.06	.1	1750	.12
SG-0425	.032	1450	.07	.17	1750	.13
SG-0435	.045	1450	.09	.24	1750	.5
SG-0450	.064	1450	.11	.34	1750	.2
SG-0470	.083	1450	.14	.44	1750	.26
SG-0518	.12	1450	.05	.65	1750	.08
SG-0525	.17	1450	.07	.9	1750	.13
SG-0535	.25	1450	.09	1.3	1750	.15
SG-0550	.38	1450	.11	2.0	1750	.2
SG-0570	.51	1450	.15	2.7	1750	.27
SG-0510	.76	1450	.21	4.0	1750	.35
SG-0514	1.04	1450	.28	5.5	1750	.5
SG-0519	1.3	1450	.34	7.0	1750	.6
SG-0528	2.1	1450	.52	11.0	1750	.8
SG-0729	.53	1450	.20	2.8	1750	.31
SG-0741	.76	1450	.34	4.0	1750	.6
SG-0758	1.06	1450	.37	5.6	1750	.7
SG-0782	1.51	1450	.45	8	1750	.7
SG-0711	1.98	1450	.75	10.5	1750	1.2
SG-0716	3.02	1450	.81	16	1750	1.5
SG-0722	3.97	1450	1.3	21	1750	2.4
SG-0732	5.67	1450	1.7	30	1750	3
Viscosity: 25,000 SSU						
	Metric			U.S.		
Size	M <sup>3</sup> /Hr	RPM	KW	GPM	RPM	BHP
SG-0417	.01	1450	.17	.06	1750	.27
SG-0418	.02	1450	.21	.12	1750	.35
SG-0425	.03	1450	.24	.17	1750	.43
SG-0435	.05	1450	.26	.25	1750	.5
SG-0450	.06	1450	.31	.33	1750	.55
SG-0470	.09	1450	.34	.48	1750	.60
SG-0518	.14	1450	.22	.75	1750	.42
SG-0525	.19	1450	.28	1.0	750	.48
SG-0535	.28	1450	.32	1.5	1750	.57
SG-0550	.4	1450	.45	2.1	1750	.8
SG-0570	.36	920	.31	2.0	1750	.55
SG-0510	.43	780	.26	1.9	780	.35

SG-0514	.48	640	.27	2.1	640	.36
SG-0519	.59	640	.37	2.6	640	.5
SG-0528	.87	1450	.52	3.8	640	.7
SG-0729	.53	1450	.6	2.8	1750	1.0
SG-0741	.77	1450	.9	4.1	1750	1.5
SG-0758	1.1	1450	1.1	5.8	1750	1.9
SG-0782	.98	920	.9	5.4	1150	1.5
SG-0711	1.37	920	1.2	7.5	1150	2
SG-0716	1.64	780	1.1	7.2	780	1.5
SG-0722	2.55	920	2.5	14	1150	4
SG-0732	3.19	780	2.2	14	780	3

- **Temperature Range:** -40°C to +230°C / -40°F to +450°F
- **Viscosity Range, Single Pumps:** 6.2 cSt to 220,000 cSt / 28 SSU to 1,000,000 SSU
- **Viscosity Range, Double Pumps:** 6.2 cSt to 16,500 cSt / 28 SSU to 75,000 SSU
- **Differential Pressures:** To 34 BAR / 500 PSI
- **Certification:** Some cast iron spur gear models are NSF certified
- 

## Viking VI-CORR Pumps

The **Viking VI-CORR Pump** (*above, right*) uses corrosion-resistant materials for all product-wetted parts for outstanding fluid compatibility. In fact, Viking VI-CORR Pumps are compatible with hundreds of corrosive liquids listed on the *PPS Corrosion Guide*. Specifically, casing and gears are constructed of Rytan®, the shaft is coated stainless steel or optional solid hastelloy, and the relief valve is made of stainless steel. Not only is fluid compatibility assured, but the corrosive-resistant materials prohibit thermal expansion so that the VI-CORR retains exceptional dimensional stability for better performance.

### Specifications:

All specifications at 6.9 BAR/100 PSI discharge pressure.

VI-CORR Pumps						
Viscosity: 100 SSU						
Size	Metric			U.S.		
	M3/Hr	RPM	KW	GPM	RPM	BHP
RP-0518	.008	1450	.06	0.4	1750	.1
RP-0525	.14	1450	.06	.75	1750	.1

RP-0535	.24	1450	.09	1.25	1750	.15
RP-0550	.34	1450	.13	1.8	1750	.22
RP-0570	.45	1450	.20	2.6	1750	.3
RP-0510	.72	1450	.23	3.8	1750	.4
RP-0514	1.0	1450	.37	5.5	1750	.6
RP-0782	1.5	1450	.63	8	1750	1.1
RP-0716	3.0	1450	.72	16	1750	1.2
RP-0724	4.5	14501450	1.3	24	1750	2.2
RP-0732	6.0	1450	1.5	32	1750	2.4
Viscosity:7,500 SSU						
	Metric			U.S.		
<b>Size</b>	<b>M<sup>3</sup>/Hr</b>	<b>RPM</b>	<b>KW</b>	<b>GPM</b>	<b>RPM</b>	<b>BHP</b>
RP-0518	.08	920	.07	.45	1150	.15
RP-0525	.12	920	.09	.65	1150	.18
RP-0535	.16	920	.11	.9	1150	.2
RP-0550	.25	920	.13	1.35	1150	.27
RP-0570	.23	640	.13	1.0	640	.17
RP-0510	.34	640	.13	1.5	640	.18
RP-0514	<b>Consult Factory.</b>					
RP-0782	1.1	920	.63	5.25	1150	1.1
RP-0716	1.2	920	.87	10.5	1150	1.5
RP-0724	2.9	920	1.5	16	1150	2.5
RP-0732	3.8	920	1.8	21	1150	2.9

- **Temperature Range:** -40°C to +90°C / -40°F to +200°F
- **Viscosity Range:** 0.8 cSt to 5,500 cSt / 28 SSU to 25,000 SSU
- **Differential Pressures:** To 14 BAR / 200 PSI

### Typical VI-CORR And Spur Gear Applications

- Industrial and mobile applications
- Fuel and lubrication
- Filtering
- Metering
- Mixing and blending (Double Pump)
- Special hydraulic applications

Viton® is a registered trade name of the DuPont Dow Elastomers L.L.C.

Ryton® is a registered trade name of Phillips Petroleum Company.

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## Clif Mock™ True Cut™ "C" Series Samplers

The True Cut sample probe was the first truly isokinetic sampler available for crude oil sampling. For over three decades of service, it has proven to be one of the most accurate and reliable methods of extracting a sample from a pipeline for BS & W analysis.

The "C" Series Isokinetic Sampler opens a sample chamber inside the pipeline. This guarantees the linear velocity and direction of flow inside the sample chamber is equal to the velocity in the pipeline. This enables the sampler to remove a sample "grab" which is representative of the fluid in the pipeline.



C-Sampler

Halliburton's Clif Mock has been designing and installing sampling systems for over three decades. To achieve accurate, reliable custody transfer sampling, all aspects of the application, such as pipeline mixing, sample extraction, sampler pacing, and sample receptacles must be considered. The True Cut "C" Series Sample Probe is one of the critical components of total system accuracy.

### Specifications:

- C-22 / 1.5 cc / 50 to 195 psi
- C-22V / 1.5 cc / 10 to 50 psi
- C-22 with PEV 1 / 1.5 c.c. / 195 to 1,500 psi
- Design pressure: "C" probes 1,500-psi max. working pressure

### Features:

- Low maintenance design
- Suitable for a wide range of products
- Stainless steel wetted parts
- Isokinetic Sampler
- Accurate and Reliable
- Easy Installation
- Sample grab size - 1.5 cc

### Construction Material:

- 316 Stainless Steel, standard
- Seals - Buna, Viton, Teflon
- 2- to 48-in. pipelines
- 1 1/4" NPT connection standard; other models are available

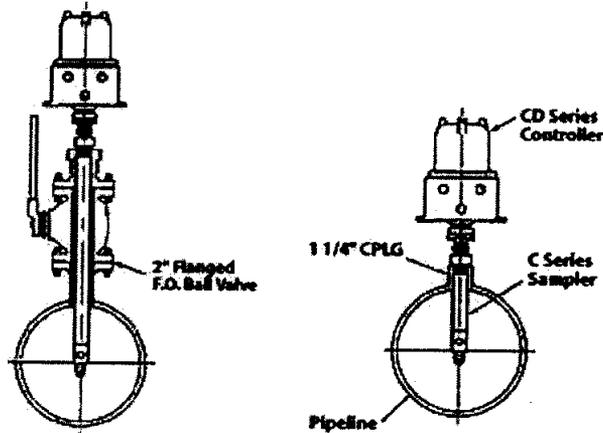
### Applications:

- Tanker loading/unloading systems
- Truck terminals
- Pipeline measurement

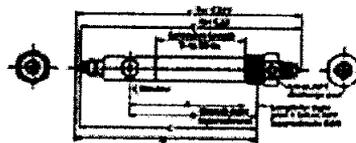
[Contact Info](#)  
[Solution Con](#)[Related Inf](#)  
[Health, Safet](#)  
[Environment](#)

- Refineries/pipelines
- LACT units
- Loss control
- Custody transfer points
- Petrochemical plants
- Process vessels
- Barge facilities
- H2S service

**Typical Installations:**



**"C" Series Probe Dimensions:**



Probe Length	A	B	C	D	E	F
27 1/2	9.00	8.75	4.00	5.50	7.00	7.00
3	8.00	7.75	3.00	5.00	6.00	6.00
3	10.00	9.75	4.00	5.50	7.00	7.00
3	4.00	3.75	7.00	7.50	10.00	10.00
3	5.00	4.75	6.00	6.50	11.00	11.00
3	6.00	5.75	5.00	5.50	10.00	10.00
3	7.00	6.75	4.00	4.50	10.00	10.00
3	8.00	7.75	3.00	3.50	10.00	10.00
3	9.00	8.75	2.00	2.50	10.00	10.00
3	10.00	9.75	1.00	1.50	10.00	10.00
3	11.00	10.75	0.00	0.50	10.00	10.00
3	12.00	11.75	0.00	0.00	10.00	10.00
3	13.00	12.75	0.00	0.00	10.00	10.00
3	14.00	13.75	0.00	0.00	10.00	10.00
3	15.00	14.75	0.00	0.00	10.00	10.00
3	16.00	15.75	0.00	0.00	10.00	10.00
3	17.00	16.75	0.00	0.00	10.00	10.00
3	18.00	17.75	0.00	0.00	10.00	10.00
3	19.00	18.75	0.00	0.00	10.00	10.00
3	20.00	19.75	0.00	0.00	10.00	10.00
3	21.00	20.75	0.00	0.00	10.00	10.00
3	22.00	21.75	0.00	0.00	10.00	10.00
3	23.00	22.75	0.00	0.00	10.00	10.00
3	24.00	23.75	0.00	0.00	10.00	10.00
3	25.00	24.75	0.00	0.00	10.00	10.00
3	26.00	25.75	0.00	0.00	10.00	10.00
3	27.00	26.75	0.00	0.00	10.00	10.00
3	28.00	27.75	0.00	0.00	10.00	10.00
3	29.00	28.75	0.00	0.00	10.00	10.00
3	30.00	29.75	0.00	0.00	10.00	10.00

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ENERGY SERVICES

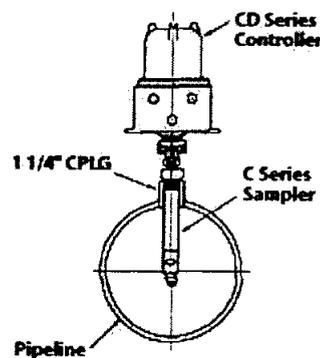
KBR  
ENGINEERING & CONSTRUCTIONINVESTOR RELATIONS  
NEWS  
SUPPLIER RELATIONS  
CAREERS  
OFFICE LOCATIONS  
ABOUT HALLIBURTON

## Clif Mock™ True Cut™ CD Series Sampler Drive

The True Cut CD Series Sampler Controllers are designed to be used specifically with C-22 Isokinetic Samplers. These units are available in four different configurations and are capable of pulse counting, timing, pacing from computer and sending out a loss of signal alarm.

These units are equipped with an internal motor which is activated by the control card to rotate 180° to allow the "C" series sampler to take one sample per 180° of rotation.

The CD-20A has four switches on the control card which can be enabled through a jumper wire to be either pulse counts or time in seconds. This allows the unit to be used for proportional to flow sampling by counting from 1 to 9,999 pulses. It also can be switched to a timer mode and will count from 1 to 9,999 seconds between samples.



The CD-20 Controller is most often used where P.L.C.'s or computers pace the sampler proportional to flow. This unit provides one sample per pulse from a prescaled source. The CD20 SFA has the added feature of a sample failure alarm. A relay is deactivated if a sample command is not received within a preset period of time.

All of these units are easily attached directly to the sampler in the pipeline and require no other mounting hardware. They can be easily removed from the pipeline and have proven to be readily adaptable to most sampling applications.

### Specifications:

#### CD-20A

- Explosion proof-Class 1 Div. 1 Groups C & D
- Preset pulse counts 1 to 9,999 pulses
- Signal input - dry contact closure or current sinking device
- Preset timer - 1 to 9,999 seconds
- 110 VAC, 220 VAC, 12 VDC, 24 VDC

#### CD-20

- 1 sample/contact closure from computer or pacing device
- 110 VAC, 220 VAC, 12 VDC, 24 VDC
- Explosion proof - Class1, Div. 1, Group C & D

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**CD-20 SFA**

- Explosion proof - Class 1 Div. 1 Groups C & D
- Signal input - dry contact closure or current sinking device
- 110 VAC, 220 VAC, 12 VDC, 24 VDC
- Sample verification switch

**CD-30A (Canadian)**

- Explosion proof, Class 1, Div. 1 Groups C & D (C.S.A. Certified)
- Preset Pulse counts 1 to 9,999 pulses
- Signal input - dry contact closure or current sinking device
- Preset timer - 1 to 9,999 seconds
- 110 VAC, 220 VAC

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