



Tornado Technologies Inc.

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Husky Energy

Quote# JC07-ST135

May 29, 2007.

Husky Oil Operations Limited
Calgary, AB. T2P 3L5

Attn: Saeed Davari Email: Saeed.Davari@huskyenergy.ca

Ref: Invitation to Bid –
Flare Stack and Associated equipment

The following is a quotation to provide One (1) Utility Flare Stack and Associated equipment designed specifically to meet the operating conditions listed within this quotation. This quotation includes a detailed description of the equipment provided, and additional services provided by Tornado Technologies Inc.

The overall project scope of work will be as follows:

- * Engineering to furnish General Arrangement Drawings, for approval.
- * Fabrication, packaging and assembly of all Vendor supplied items.
- * Procurement of critical long lead items.
- * Shipment to site (Extra if requested).
- * On-site Installation (Extra if requested).
- * Operator training (Extra if requested).

We sincerely appreciate your interest, and thank you for this opportunity to be of service.

With Regards,
Tornado Technologies Inc.
John J. Cassidy

Scope of Work

Tornado Technologies Inc. will furnish all labor, materials, and tools necessary to fabricate the following equipment:

One (1) Tornado Utility Flare Tip and Self Supported Stack designed to provide Flaring of the Waste stream vapors at the maximum volume flow rate and molecular weight as listed for the Block Flow, C3 Relief, C4 Relief, and Recycle Compressor Down cases.

General construction bolts, nuts, washers, gaskets and any other bolts / fixings are included except foundation bolts and piping/wiring/gaskets between major equipment items.

Design Basis:

Location	Ansell
LSD	7-27-51-19-W5M
Stack height (meter)	40
Waste gas tip diameter (nps)	16"

Utilities required:

Electrical:	
Control Panel -	120V ac
Natural Gas:	
Tornado Pilot -	20 scfh @ 15 psig

Equipment Description:

Item #1.0 - one (1) - 16" x 40 meter tall Tornado Utility Flare Tip and Guy Wire Supported Stack complete with the following features / equipment:

- Flare Tip - Tornado Utility Flare Tip:

- Model: TTI-UT-16-6-316L
- Approx. 6' - 0" overall length
- Waste Gas Riser Tip - 16" std SA312 Tp-316L s.s.
- Tip Break Flanges - 16" A350 LF2 150# RFWN flanges c/w B7M studs & 2H nuts, Spiral wound gasket
- Velocity Airrestor (purge gas reducer)- 304L stainless steel, flange in model, Minimum purge rate = 190 scfh

- Waste Gas Riser and connections:

- Waste Gas Riser - 16" std A333-6 smls pipe
- Waste Gas Inlet - 16" std A350 LF2 150 Ansi RFWN Flange on a 45 degree angle to vertical utilizing a 16" std SA420 WPL6 45° weld ell
- Break Flanges - @ approx. 40' elevations - 16" std SA350 LF2 150 Ansi RFWN Flange c/w B7M studs & 2H nuts, Spiral wound gasket

- Lifting Lug: - carbon steel

- Baseplate: - 44W baseplate and four gussets (anchors by others)

- Paint Specifications:

- sandblast to SSPC-SP6, and primed with 1-1.5 mils DFT Rust-Oleum 4285 (Gray), and finished with 1.5 mils DFT Rust-Oleum 4285 (Gray)

- Pilot and Ignition System:

- One (1) - Tornado Retractable Pilot Model: TSI#6 (Natural Gas) c/w Complete Stainless Steel construction x 10' long, Alumina Ceramic Pilot nozzle mounted in 310 s.s., Tornado Pilot Retracting system with 2" x 1" HSS Pilot Tracking, 1/4" x 3" flat tracking supports (4' o/c), Pilot retracting winch, enclosed pulley housing with stainless steel pulley, stainless steel pilot retracting cable, Type 3 Flexible fuel supply line with fuel line stabilizers 10' o/c, Regulator & Gauge
- One (1) - Tornado Pilot Monitoring & Automatic Relight System
Model - TPMR-A FS (120V ac) Flame front type ignition that mounts directly on the back of the pilot system, stainless steel construction c/w Nema 4 Carbon steel Junction box at the base of stack, Nema 4 Carbon steel Control Panel to be installed in Non-hazardous location, Exp. solenoid valve, 1/4" Type "K" 310 s.s. Thermocouple, and 1/4" pipe 310 s.s. Thermowell, NTK Ignition Transformer & Enclosure, #16-4 SOW cable from Ignition Transformer enclosure to Nema 4 junction box at base of flare. Control Panel c/w - Hand/Off/Auto switch with Digital Temperature Controller, LED display indicates alarm setpoint or operating temperature of pilot, individual pilot Dry Alarm contacts on flame failure

Commercial Proposal:

Item #1.0 - One (1) - 16" x 40 meter tall Tornado Utility Flare Tip and Guy Wire Supported Stack, designed and fabricated per the above specifications

Price FCA Tornado yard - \$74,100.00

Option #1 - One High Pressure Gas Assist System to supply smokeless flaring of the Recycle Compressor fail down case and partial smokeless flaring of the C3 & C4 cases (40% Opacity):

This option would consist of the following equipment:

- 2" XH SA333-6 Pipe Riser
- 316 Stainless Steel Manifold Ring
- Ten - 3/4" 316 Stainless Steel Injection Orifices
- Upper 6 feet to be 316 Stainless Steel
- Inlet Connection - 2" XH SA350 LF2 150# RFWN at 6 feet elevation,
- Break Flanges - 2" XH SA350 LF2 150# RFWN at 40 feet intervals and base of tip
- Fuel Consumption – 37,400 SCFH
- The Minimum recommended supply pressure required for this natural gas High Pressure Gas Assist Device is 115 PSIG

Price FCA Tornado yard - \$10,600.00

Option #2 - Adder to Item #1 to supply 100 % RT on all Long & Circ butt welds \$2,300.00

Option #3 – Adder for On/Off Control for gas assist - Habonin 2" Nace trim Full port ball valve c/w Pneumatic actuator, position indicator c/w limit switch and Asco EF8320G202 solenoid valve \$2,300.00

Option #4 – Adder for 100% Magnetic particle or Dye Penetrant testing of all load bearing fillet welds (carbon & stainless) \$1,000.00

Option #5 – Mating baseplate c/w SA193-B7M Studs and 2H Nuts \$450.00

Option #6 - Onsite Technician for Assembly & Installation Supervision

Hourly rate Truck & Technician	\$95.00 / hr
Helper rate	\$35.00 / hr / each
Overtime Rate (Holidays & Sunday)	\$20.00/hr/man
Subsistence expences	\$150.00 / night / man

Payment Terms:

- Proposed Terms of payment: Net 30 days from receipt of Invoice
- 100% upon notification Equipment ready for Shipment
- Prices are quoted in Canadian Funds
- Prices do not include federal, state, or local sales, excise, use or other taxes.
- Pricing is firm for acceptance for 30 days after Tender submittal date.

Delivery Schedule:

Time periods for our proposed schedule begin upon receipt and acceptance of a written or telefaxed purchase order number.

Drawings Issued for Approval	1 week A.R.O.
Receive Materials	3 weeks A.R.O.
Fabrication of equipment	3 weeks A.R.A.D
Delivery	6 weeks A.R.A.D.

Terms and Conditions:

- Should we have the successful Tender please make any Purchase Order Payable to:
Tornado Technologies Inc.
P.O. Box 1799
Stettler, AB. Canada. T0C 2L0
Can. Contact: John J. Cassidy
Phone: (403) 883-2400
Fax: (403) 883-2550
- Tornado Technologies Inc. Standard General Terms and Conditions apply including the following:
- Cancellation:
If the work is cancelled by Owner, Contractor shall invoice for all work completed or in progress. A project cancellation fee of 15% shall be applied to the invoiced amount.
- Taxes:
Contractor shall not be liable for any federal, state, foreign or local sales, excise, use or other taxes associated with the sale or use of goods hereunder.
- Warranty:
Contractor warrants the Work against defective workmanship and /or materials, under normal and proper use, for a period of twelve (12) months from Start-up or eighteen (18) months after Mechanical Completion. Warranty shall be replacement of defective part only, on-site labor and/or associated on-site costs to replace defective part are not covered under warranty. Sub-vendor Control parts (Eg. Instruments), purchased by Tornado, will only receive pass through warranty if warranty is deemed applicable by the original equipment manufacturer.
- Origin of Shipment: Tornado yard being 30 miles N.E. of Stettler, Alberta, Canada

Tornado Technologies Inc. is pleased to provide this quotation to your firm and hope to continue business with you in the future. Should you have any questions or concerns feel free to contact us at your convenience.

With Regards: Tornado Technologies Inc.
John J. Cassidy, Group Manager, TTI

Flow Rate: 200,000 8333.33333

COMPOUND	Component Mol Wt.	BTU/SCF/COMPOUN D/net	Mole fraction
C1 Methane	16.043	909.4	0.3929
C2 Ethane	30.07	1618.7	0.2127
C3 Propane	44.097	2314.9	0.3068
IC4 Isobutane	58.123	3000.4	0.0191
nC4 n-Butane	58.123	3010.8	0.0289
IC5 Isopentane	72.15	3699	0.0087
nC5 n-Pentane	72.15	3706.9	0.0076
Neopentane	72.15	3682.9	0
C6 n-Hexane	86.177	4403.8	0.0043
2-Methylpentane	86.177	4395.2	0
3-Methylpentane	86.177	4398.2	0
Neohexane	86.177	4384	
2,3-Dimethylbutane	86.177	4392.9	
C7 n-Heptane	100.204	5100	0.0007
2-Methylhexane	100.204	5092.2	
3-Methylhexane	100.204	5096	
3-Ethylpentane	100.204	5098.3	
2,2-Dimethylpentane	100.204	5079.6	
2,4-Dimethylpentane	100.204	5084.2	
3,3-Dimethylpentane	100.204	5086.4	
Triptane	100.204	5081.2	
C8 n-Octane	114.231	5796.1	0.0003
Diisobutyl	114.231	5780.5	
Isooctane	114.231	5778.8	
C9 Nonane	128.258	6493.2	0
C10 Decane	142.285	7189.6	0
Cyclopentane	70.134	3512.1	
Methylcyclopentane	84.161	4199.4	
Cyclohexane	84.161	4179.7	
Methylcyclohexane	98.188	4863.6	
Ethylene	28.054	1499.1	
Propylene	42.081	2181.8	
Butylene	56.108	2878.7	
cis-2-Butene	56.108	2871	
trans-2-Butene	56.108	2866.8	
Isobutene	56.108	2859.9	
1-Pentene	70.134	3575	
1,2-Butadiene	54.092	2789	
1,3-Butadiene	54.092	2729	
Isoprene	68.119	3410.8	
Acetylene	26.038	1423.2	
Benzene	78.114	3590.9	0
Toluene	92.141	4273.6	0
Ethylbenzene	106.167	4970.5	
o-Xylene	106.167	4958.2	
m-Xylene	106.167	4956.3	0
p-Xylene	106.167	4957.1	
Styrene	104.152	4829.8	
Isoproylbenzene	120.194	5660.9	
Methyl alcohol (Methanol)	32.042	766.1	0.0065
Ethyl alcohol (Ethanol)	46.069	1448.1	
Carbon Monoxide	28.01	320.5	0
C02 Carbon Dioxide	44.01	0	0.0103
H2S Hydrogen Sulphide	34.08	586.8	0
SO2 Sulfur Dioxide	64.06	0	
NH3 Ammonia	17.0305	359	
Air	28.9625	0	
H2 Hydrogen	2.0159	273.8	0
O2 Oxygen	31.9988	0	
Nitrogen	28.0134	0	0.0007
Cl2 Chlorine	70.906	0	0
H2O Water	18.0153	0	0.0005
HE Helium	4.0026	0	0
HCN Hydrogen Cyanide	27.026	786	

Flow Rate: 375,000 15625

COMPONENT	Component Mol Wt.	BTU/SCF/COMPOUN D/net	Mole fraction
C1 Methane	16.043	909.4	0.400571
C2 Ethane	30.07	1618.7	0.252807
C3 Propane	44.097	2314.9	0.256929
IC4 Isobutane	58.123	3000.4	0.023257
nC4 n-Butane	58.123	3010.8	0.040091
IC5 Isopentane	72.15	3699	0.007193
nC5 n-Pentane	72.15	3706.9	0.005593
Neopentane	72.15	3682.9	0
C6 n-Hexane	86.177	4403.8	0.001681
2-Methylpentane	86.177	4395.2	0
3-Methylpentane	86.177	4398.2	0
Neohexane	86.177	4384	
2,3-Dimethylbutane	86.177	4392.9	
C7 n-Heptane	100.204	5100	0.001059
2-Methylhexane	100.204	5092.2	
3-Methylhexane	100.204	5096	
3-Ethylpentane	100.204	5098.3	
2,2-Dimethylpentane	100.204	5079.6	
2,4-Dimethylpentane	100.204	5084.2	
3,3-Dimethylpentane	100.204	5086.4	
Triptane	100.204	5081.2	
C8 n-Octane	114.231	5796.1	0.000332
Diisobutyl	114.231	5780.5	
Isooctane	114.231	5778.8	
C9 Nonane	128.258	6493.2	0
C10 Decane	142.285	7189.6	0
Cyclopentane	70.134	3512.1	
Methylcyclopentane	84.161	4199.4	
Cyclohexane	84.161	4179.7	
Methylcyclohexane	98.188	4863.6	
Ethylene	28.054	1499.1	
Propylene	42.081	2181.8	
Butylene	56.108	2878.7	
cis-2-Butene	56.108	2871	
trans-2-Butene	56.108	2866.8	
Isobutene	56.108	2859.9	
1-Pentene	70.134	3575	
1,2-Butadiene	54.092	2789	
1,3-Butadiene	54.092	2729	
Isoprene	68.119	3410.8	
Acetylene	26.038	1423.2	
Benzene	78.114	3590.9	0
Toluene	92.141	4273.6	0
Ethylbenzene	106.167	4970.5	
o-Xylene	106.167	4958.2	
m-Xylene	106.167	4956.3	0
p-Xylene	106.167	4957.1	
Styrene	104.152	4829.8	
Isopropylbenzene	120.194	5660.9	
Methyl alcohol (Methanol)	32.042	766.1	0
Ethyl alcohol (Ethanol)	46.069	1448.1	
Carbon Monoxide	28.01	320.5	0
C02 Carbon Dioxide	44.01	0	0.009578
H2S Hydrogen Sulphide	34.08	586.8	0
SO2 Sulfur Dioxide	64.06	0	
NH3 Ammonia	17.0305	359	
Air	28.9625	0	
H2 Hydrogen	2.0159	273.8	0
O2 Oxygen	31.9988	0	
Nitrogen	28.0134	0	0.000626
Cl2 Chlorine	70.906		0
H2O Water	18.0153	0	0.000283
HE Helium	4.0026	0	0
HCN Hydrogen Cyanide	27.026	786	

Flow Rate: 4,450,000 185416.667

COMPONENT	Mol Wt.	BTU/SCF/COMPOUN	Mole fraction
C1 Methane	16.043	909.4	0
C2 Ethane	30.07	1618.7	0
C3 Propane	44.097	2314.9	0.1165
IC4 Isobutane	58.123	3000.4	0.2656
nC4 n-Butane	58.123	3010.8	0.5947
IC5 Isopentane	72.15	3699	0.0115
nC5 n-Pentane	72.15	3706.9	0.0034
Neopentane	72.15	3682.9	0
C6 n-Hexane	86.177	4403.8	0.0001
2-Methylpentane	86.177	4395.2	0
3-Methylpentane	86.177	4398.2	0
Neohexane	86.177	4384	
2,3-Dimethylbutane	86.177	4392.9	
C7 n-Heptane	100.204	5100	0.0001
2-Methylhexane	100.204	5092.2	
3-Methylhexane	100.204	5096	
3-Ethylpentane	100.204	5098.3	
2,2-Dimethylpentane	100.204	5079.6	
2,4-Dimethylpentane	100.204	5084.2	
3,3-Dimethylpentane	100.204	5086.4	
Triptane	100.204	5081.2	
C8 n-Octane	114.231	5796.1	0
Diisobutyl	114.231	5780.5	
Isooctane	114.231	5778.8	
C9 Nonane	128.258	6493.2	0
C10 Decane	142.285	7189.6	0
Cyclopentane	70.134	3512.1	
Methylcyclopentane	84.161	4199.4	
Cyclohexane	84.161	4179.7	
Methylcyclohexane	98.188	4863.6	
Ethylene	28.054	1499.1	
Propylene	42.081	2181.8	
Butylene	56.108	2878.7	
cis-2-Butene	56.108	2871	
trans-2-Butene	56.108	2866.8	
Isobutene	56.108	2859.9	
1-Pentene	70.134	3575	
1,2-Butadiene	54.092	2789	
1,3-Butadiene	54.092	2729	
Isoprene	68.119	3410.8	
Acetylene	26.038	1423.2	
Benzene	78.114	3590.9	0
Toluene	92.141	4273.6	0
Ethylbenzene	106.167	4970.5	
o-Xylene	106.167	4958.2	
m-Xylene	106.167	4956.3	0
p-Xylene	106.167	4957.1	
Styrene	104.152	4829.8	
Isopropylbenzene	120.194	5660.9	
Methyl alcohol (Methanol)	32.042	766.1	0.0081
Ethyl alcohol (Ethanol)	46.069	1448.1	
Carbon Monoxide	28.01	320.5	0
C02 Carbon Dioxide	44.01	0	0
H2S Hydrogen Sulphide	34.08	586.8	0
SO2 Sulfur Dioxide	64.06	0	
NH3 Ammonia	17.0305	359	
Air	28.9625	0	
H2 Hydrogen	2.0159	273.8	0
O2 Oxygen	31.9988	0	
Nitrogen	28.0134	0	0
Cl2 Chlorine	70.906		0
H2O Water	18.0153	0	0
HE Helium	4.0026	0	0
HCN Hydrogen Cyanide	27.026	786	

Flow Rate: 8,600,000 358333.333

COMPONENT	Component Mol Wt.	BTU/SCF/COMPOUND D/net	Mole fraction
C1 Methane	16.043	909.4	0
C2 Ethane	30.07	1618.7	0.0205
C3 Propane	44.097	2314.9	0.0623
IC4 Isobutane	58.123	3000.4	0.0112
nC4 n-Butane	58.123	3010.8	0.0058
IC5 Isopentane	72.15	3699	0.0002
nC5 n-Pentane	72.15	3706.9	0
Neopentane	72.15	3682.9	0
C6 n-Hexane	86.177	4403.8	0
2-Methylpentane	86.177	4395.2	0
3-Methylpentane	86.177	4398.2	0
Neohexane	86.177	4384	
2,3-Dimethylbutane	86.177	4392.9	
C7 n-Heptane	100.204	5100	0
2-Methylhexane	100.204	5092.2	
3-Methylhexane	100.204	5096	
3-Ethylpentane	100.204	5098.3	
2,2-Dimethylpentane	100.204	5079.6	
2,4-Dimethylpentane	100.204	5084.2	
3,3-Dimethylpentane	100.204	5086.4	
Triptane	100.204	5081.2	
C8 n-Octane	114.231	5796.1	0
Diisobutyl	114.231	5780.5	
Isooctane	114.231	5778.8	
C9 Nonane	128.258	6493.2	0
C10 Decane	142.285	7189.6	0
Cyclopentane	70.134	3512.1	
Methylcyclopentane	84.161	4199.4	
Cyclohexane	84.161	4179.7	
Methylcyclohexane	98.188	4863.6	
Ethylene	28.054	1499.1	
Propylene	42.081	2181.8	
Butylene	56.108	2878.7	
cis-2-Butene	56.108	2871	
trans-2-Butene	56.108	2866.8	
Isobutene	56.108	2859.9	
1-Pentene	70.134	3575	
1,2-Butadiene	54.092	2789	
1,3-Butadiene	54.092	2729	
Isoprene	68.119	3410.8	
Acetylene	26.038	1423.2	
Benzene	78.114	3590.9	0
Toluene	92.141	4273.6	0
Ethylbenzene	106.167	4970.5	
o-Xylene	106.167	4958.2	
m-Xylene	106.167	4956.3	0
p-Xylene	106.167	4957.1	
Styrene	104.152	4829.8	
Isopropylbenzene	120.194	5660.9	
Methyl alcohol (Methanol)	32.042	766.1	0
Ethyl alcohol (Ethanol)	46.069	1448.1	
Carbon Monoxide	28.01	320.5	0
CO2 Carbon Dioxide	44.01	0	0
H2S Hydrogen Sulphide	34.08	586.8	0
SO2 Sulfur Dioxide	64.06	0	
NH3 Ammonia	17.0305	359	
Air	28.9625	0	
H2 Hydrogen	2.0159	273.8	0
O2 Oxygen	31.9988	0	
Nitrogen	28.0134	0	0
Cl2 Chlorine	70.906	0	0
H2O Water	18.0153	0	0
HE Helium	4.0026	0	0
HCN Hydrogen Cyanide	27.026	786	

Flow Rate: 50,000,000 2083333.33

COMPONENT	Mol Wt.	BTU/SCF/COMPOUN	Mole fraction
C1 Methane	16.043	909.4	0.8516
C2 Ethane	30.07	1618.7	0.0835
C3 Propane	44.097	2314.9	0.0343
IC4 Isobutane	58.123	3000.4	0.0036
nC4 n-Butane	58.123	3010.8	0.0071
IC5 Isopentane	72.15	3699	0.0024
nC5 n-Pentane	72.15	3706.9	0.0021
Neopentane	72.15	3682.9	0
C6 n-Hexane	86.177	4403.8	0.0011
2-Methylpentane	86.177	4395.2	0
3-Methylpentane	86.177	4398.2	0
Neohexane	86.177	4384	
2,3-Dimethylbutane	86.177	4392.9	
C7 n-Heptane	100.204	5100	0.0002
2-Methylhexane	100.204	5092.2	
3-Methylhexane	100.204	5096	
3-Ethylpentane	100.204	5098.3	
2,2-Dimethylpentane	100.204	5079.6	
2,4-Dimethylpentane	100.204	5084.2	
3,3-Dimethylpentane	100.204	5086.4	
Triptane	100.204	5081.2	
C8 n-Octane	114.231	5796.1	0.0001
Diisobutyl	114.231	5780.5	
Isooctane	114.231	5778.8	
C9 Nonane	128.258	6493.2	0
C10 Decane	142.285	7189.6	0
Cyclopentane	70.134	3512.1	
Methylcyclopentane	84.161	4199.4	
Cyclohexane	84.161	4179.7	
Methylcyclohexane	98.188	4863.6	
Ethylene	28.054	1499.1	
Propylene	42.081	2181.8	
Butylene	56.108	2878.7	
cis-2-Butene	56.108	2871	
trans-2-Butene	56.108	2866.8	
Isobutene	56.108	2859.9	
1-Pentene	70.134	3575	
1,2-Butadiene	54.092	2789	
1,3-Butadiene	54.092	2729	
Isoprene	68.119	3410.8	
Acetylene	26.038	1423.2	
Benzene	78.114	3590.9	0
Toluene	92.141	4273.6	0
Ethylbenzene	106.167	4970.5	
o-Xylene	106.167	4958.2	
m-Xylene	106.167	4956.3	0
p-Xylene	106.167	4957.1	
Styrene	104.152	4829.8	
Isopropylbenzene	120.194	5660.9	
Methyl alcohol (Methanol)	32.042	766.1	0.0013
Ethyl alcohol (Ethanol)	46.069	1448.1	
Carbon Monoxide	28.01	320.5	0
C02 Carbon Dioxide	44.01	0	0.0079
H2S Hydrogen Sulphide	34.08	586.8	0
SO2 Sulfur Dioxide	64.06	0	
NH3 Ammonia	17.0305	359	
Air	28.9625	0	
H2 Hydrogen	2.0159	273.8	0
O2 Oxygen	31.9988	0	
Nitrogen	28.0134	0	0.0045
Cl2 Chlorine	70.906		
H2O Water	18.0153	0	0.0003
HE Helium	4.0026	0	0
HCN Hydrogen Cyanide	27.026	786	