24. FORM 5 DETAILED FACILITY AND EQUIPMENT DATA

This FORM 5 must be appended to Section A of the Project Proposal. (See Section 4.5 of this RFP.)

Unless otherwise specified in this Proposal form, variable quantities (i.e. temperature, pressures, mass and volumetric flows, gas and liquid velocities, heat duties, powers and efficiencies) are to be given for operating conditions which correspond with the Maximum Continuous Rating (MCR) operation of the unit of equipment assuming fuel HHV – 13.0 MJ/kg. The terms "design," and "maximum continuous rating (MCR)," are synonymous. Unless otherwise indicated, "percent" and "%" mean weight percent.

PART A – GENERAL

1. Drawings. Note drawing requirements identified in Section 4.5.1 of the RFP and the Technical Requirements.

2. Process Flow Diagram. The process flow diagram and called for in Section X will be found in Drawing No. _____

3. Mass Balance Diagrams for the same three (3) cases as in Item 4 below. See attached Drawings Nos. _____, through _____.

4. Process Energy Balances:

   Complete the following table for each column, corresponding to varying fuel HHV.

CASE A			
HHV, Processible Waste MJ/kg	11.0 **Low**	13.0 **MCR**	15.0 **High**
Furnace/Boiler Unit Feed Rate			
Excess air, %			
Furnace/boiler Losses per Unit (MJ/kg):			
Dry gas			
Sensible heat in dry gas			
H_2 and H_2O in fuel			
H_2O in combustion air			
H_2O from Residue pit & quench			
Unburned combustibles			
Radiation and convection			
Unaccounted (mfr.'s margin, max. 1.5%)			
Subtotal furnace/boiler losses			
(MJ/hr), per unit			
Total steam output:			
Pressure, bars			
Temperature, ^{O}C			
Mass flow, kg/hr (sum all units)			
Net efficiency of steam generating units, %			

Main Steam for each unit:			
Pressure, bars			
Temperature, ^{O}C			
Mass flow, kg/hr			
Process Flow:			
Pressure, bars			
Temperature, ^{O}C			
Mass flow, kg/hr			
Extractions:			
Feedwater Heater			
Pressure, bars			
Temperature, ^{O}C			
Mass flow, kg/hr			
Dearator			
Pressure, bars			
Temperature, ^{O}C			
Mass flow, kg/hr			
Plant Heat Rate			
Gross, HHV based			
Net, HHV based			
Turbine Heat Rate (average each unit)			
Energy Summary:			
Gross TG power output, MW, total			
In-plant electric consumption, MW			
Net Facility power output, MW			
Corresponding diagrams as described in Section 4.5.1 of the RFP Drawing Nos.:			
Furnace/Boiler MCR (each unit) in Tonne per hour of Processible Waste			

5. Facility Water Mass Balance Diagrams for: (a) average day and (b) peak day Facility Water Consumption conditions.

   a. 426 tonne/day Facility Throughput, average day of year with respect to Facility water consumption. See attached Drawing No. _____.

   b. 426 tonne/day Facility Throughput, peak summertime daily Facility Water Consumption for average climatological year. See Drawing No. _____.

   Basis for both a) and b) above is HHV = 13.0 MJ/kg and 426 tonne/day Throughput.

6. a. Line Diagram complete with protective relays and metering. See attached Drawing Nos. _____

   b. Electrical transmission structure detail. See attached Drawing No. _____.

7. Civil/Structural

The Company must acknowledge and certify, by checking the first blank below, that all civil/structural requirements specified in the Technical Requirements, are included in its Proposal.

Facility design and construction ☐conforms ☐does not conform (check one) to the Technical Requirements. If not, the Company must provide an itemized schedule of all exceptions to those items, if any, which do not conform to Section 4.0 of the Technical Requirements. Such schedule must be clearly labeled "Schedule of Exceptions to Civil/Structural Requirements," and must be attached to this Proposal form.

8. Facility Data

The Company must provide a rendering and brief description of the type of structure and materials of construction, along with approximate building size, for each building or enclosure proposed in the space below. Rendering No. _____.

9. Truck Unloading and Storage at Facility

a. Number of truck unloading positions _____

b. Dimensions of pit (length x width x depth x _____ x _____ x _____ from tipping floor), meters

c. Pit storage capacity, m^3_____

d. Pit storage capacity at tipping floor level, tonne _____
total tonne _____

e. Design density of refuse in storage pit, kg/m^3 _____

PART B – COMBUSTION PLANT EQUIPMENT

Parts B and C must be accompanied by a complete process flowsheet sufficiently detailed so as to indicate each of the stream flows for which data is requested in Parts B and C of this Proposal FORM 5. Each stream will be numbered, and these numbers will be inserted *in Parts* B and C where indicated by the heading "STM#" meaning "stream number".

1. Steam Generating Unit

a. Manufacturer/Number of Units _____ / _____

b. Furnace Volume, m^3 _____

c. Gross furnace heat liberation rate, volume basis, MJ/m^3) _____

d. Gross heat release per plan area grate, MJ/meter _____

e. Declared parameters (See Notes 1, 2 and 3 below): _____

1. MCTD Tonnes per hr [1] _____
2. MCR Tonnes per hr[2] _____
3. TOL_f Tonnes per hr [3] _____
4. Period, basis for TOL (hours) _____

Notes:

1. MCTD refers to "minimum continuous turndown" capability and means the lowest point each unit can safely operate for extended periods, without supplemental fuel firing. The required MCTD is 75%.. (See Technical Requirements, Subsection 3.3).

2. MCR refers to Maximum Continuous Rating. See note at top of this Proposal form.

3. TOL_f refers to "temporary overload" and means specifically the control point conditions with the furnace/boiler unit operating at its maximum temporary overload capacity. Company to indicate period (number of hours) as basis for TOL_f.

f. Steam Flow, kg/hr

	STM#	MCTD	MCR	TOL_f
Superheater outlet				
Boiler blowdown				
Economizer inlet				
Sootblowers				
Attemporator, if applicable				
Feedwater pump				

g.	Steam and Water Pressures, bars				
	Superheater outlet				
	Steam drum				
	Economizer inlet				
	Sootblowers				
h.	Steam and Water Temperatures, ^{o}C				
	Superheater outlet				
	Primary superheater outlet if app.				
	Economizer inlet				
	Economizer outlet				
i.	Steam Purity				
	Average solids in outlet steam, ppm				
	Maximum cation conductivity, Microhm/cm				
	Maximum silica, ppb				
j.	Flue Gas Flows leaving economizer kg/hr				
k.	Flue Gas Pressures, +/- mm H_2O				
	Furnace inlet				
	Furnace exit				
	Economizer exit				
	ID Fan inlet				
	ID Fan outlet				
	Stack inlet				
l.	Average Flue Gas Temperatures, ^{o}C				
	Furnace temperature, max.				
	Superheater (inlet)				
	Economizer exit				
	Baghouse (inlet)				
	APC outlet				
	Stack exit				
m.	Average flue Gas Velocities, meter/s				
	Through furnace pass				
	Through superheater section				
	Through Boiler section				

	Through economizer	_____	_____	_____	_____
	Through baghouse	_____	_____	_____	_____
	Maximum duct velocity	_____	_____	_____	_____
	Stack exit (> 60 meter/s)	_____	_____	_____	_____
n.	Air Flows, kg/hr		_____	_____	_____
	Secondary air inlet		_____	_____	_____
	Primary air inlet		_____	_____	_____
	Excess air for fan sizing, %		_____	_____	_____
o.	Air Pressures, mm H_2O (in H_2O) FD fan outlet		_____	_____	_____
	Air heater pressure drop		_____	_____	_____
	Pressure drop through grate		_____	_____	_____
	Secondary fan outlet		_____	_____	_____
p.	Air Temperatures, ^oC		_____	_____	_____
	Design ambient, min. ^oC		_____	_____	_____
	Air temperature to forced draft fan and Secondary air fan, ^oC (for boiler performance Evaluation)		_____	_____	_____
q.	Design humidity		_____	_____	_____
	Primary air heater inlet		_____	_____	_____
	Primary air heater outlet		_____	_____	_____
r.	Raw Gas Loadings		_____	_____	_____
	Portion of total Residue leaving boiler with Flue gas, weight percent Typical concentration of particulate in flue Gas leaving boiler, mg/Rm^3 @ 11% O_2		_____	_____	_____
	Typical size of particulate in flue gas. %		_____	_____	_____
	pm 2.5-<10 microns		_____	_____	_____ pm
	10		_____	_____	_____
	> 10 microns		_____	_____	_____
s.	Design clean Gas Loadings		_____	_____	_____
	Portion of total particulate matter leaving Stack with flue gas, %		_____	_____	_____
	Particle size distribution in flue gas, %		_____	_____	_____
	pm 2.5-<10 microns		_____	_____	_____pm
	10		_____	_____	_____
	> 10 microns		_____	_____	_____

t. Estimated stack emissions based on an installed capacity of 213 tonnes per day per unit (for a two unit system) of Reference Waste at 12.8 MJ/kg and plant Operating conditions corrected in order to Generate an equivalent flue gas rate @ 11% O_2 Dry, 101 kPa and 25^o C.

	Uncontrolled mg/Rm^3	Controlled mg/Rm^3
POLLUTANTS:		
Sulfur Dioxide (SO_2)		
Hydrogen Chloride (HCl)		
Hydrogen Fluoride (HF)		
Oxides of Nitrogen (NO_x)		
Carbon Monoxide (CO)		
Mercury (Hg)		
Cadmium (Cd)		
Cadmium and Thallium (Cd + Th)		
Lead (Pb)		
Sum of (As, Ni, Co, Pb, Cr, Cu, V, Mn, Sb)		
Dioxins (as TEQ Toxic Equivalents)		
Total Particulate Matter		
Organic Matter (as CH_4)		
OTHER POLLUTANTS:[3]		
Trace Metals:		
Chromium (hexavalent)		
Total Chromium (and compounds)		
Aluminum Oxide		
Arsenic		
Barium		
Phosphorus Pentachloride		
Selenium		
Respirable Silica (less than 10 micrometres)		
Ammonia Slip (at stack)		
Polycyclic Organic Matter:		
Acenaphthylene		
Acenaphthene		
Anthracene		
Benzene		
Benzo(a)anthracene		
Benzo(b)fluoranthene		
Benzo(k)fluoranthene		
Benzo(a)fluorene		
Benzo(b)fluorene		
Benzo(ghi)perylene		
Benzo(a)pyrene		
Benzo(e)pyrene		
2-chloronaphthalene		
Chrysene		

[3] As stipulated in the latest revisions to Ontario Regulations 419/05, or as stipulated by the Ontario Ministry of Environment in the Certificate of Approval.

Coronene	_____	_____
Dibenzo(a,c)anthracene	_____	_____
9,10 – dimethylanthracene	_____	_____
7,12 – dimethylbenzo(a)anthracene	_____	_____
Fluoranthene	_____	_____
Fluorine	_____	_____
Indeno(1,2,3 – cd)pyrene	_____	_____
2 – mehtylanthracene	_____	_____
3 – methylcholanthrene	_____	_____
1 – methylnaphthalene	_____	_____
2 – methylnaphthalene	_____	_____
1 – methylphenanthrene	_____	_____
9 – methylphenanthrene	_____	_____
Naphthalene	_____	_____
Pentachlorophenol	_____	_____
Perylene	_____	_____
Phenanthrene	_____	_____
Picene	_____	_____
Polychlorinated Biphenyls	_____	_____
Pyrene	_____	_____
Tetralin	_____	_____
1,2,4 – Trichlorobezene		
Triphenylene	_____	_____
Dibenzo(a,h)anthracene	_____	_____
Dibenzo(a,e)pyrene	_____	_____
Quinoline	_____	_____
Biphenyl	_____	_____
O-terphenyl	_____	_____
M-terphenyl	_____	_____
P-terphenyl	_____	_____
Other Volatile Organic Matter:		
Acetaldehyde	_____	_____
Acetone	_____	_____
Acrolein	_____	_____
Bromodichloromethane	_____	_____
Bromoform	_____	_____
Bromomethane	_____	_____
Butadiene, 1,3 -	_____	_____
Butanone, 2 -	_____	_____
Carbon tetrachloride	_____	_____
Chloroform	_____	_____
Cumene	_____	_____
Dibromochloromethane	_____	_____
Dichlorodifluoromethane	_____	_____
Dichloroethane, 1,2 -	_____	_____
Dichloroethane, trans – 1,2 -	_____	_____
Dichloroethene, 1,1 -	_____	_____
Dichloropropane, 1,2 -	_____	_____

Ethylbenzene	_____	_____
Ethylene Dibromide	_____	_____
Formaldehyde	_____	_____
Mesitylene	_____	_____
Methylene chloride	_____	_____
Styrene	_____	_____
Tetrachloroethene	_____	_____
Toluene	_____	_____
Trichloroethane, 1,1,1 -	_____	_____
Trichloroethene	_____	_____
Trichloroethylene, 1,1,2 -	_____	_____
Trichlorofluoromethane	_____	_____
Trichlorotrifluoroethane	_____	_____
Vinyl chloride	_____	_____
Xylenes, m-, p- and o-	_____	_____

u. Estimated Fugitive Emissions:

	Emissions tonne/yr
1. Waste Handling and Storage	_____
2. Residue Handling, Storage Treatment	
(a) Bottom Ash System	_____
(b) Fly Ash (include. boiler fly ash	_____
3. On-Site Fuel Storage	_____
4. Sorbent Handling, Storage and Preparation	_____
5. Ammonia Slip, Handling, Storage and Preparation (if applicable)	_____
6. Other: _____	_____

v. Describe method used to estimate uncontrolled fugitive emissions and measures to be used to control these emissions:

w. Describe measures to be used to control odours resulting from waste handling and storage during normal operations:

x. Describe measures to be used to control odours resulting from waste handling and storage during normal operations:

_____
_____
_____
_____
_____

y.

Residue	MCTD	MCR	TOL_f
Bottom ash, kg/hr (dry)			
Fly ash, kg/hr (dry)			
Moisture of Residue (combined ash)			
Weight percent			
Weight of Residue (combined ash) kg/hr			

z. Gas Side Design Data

Furnace Design Pressure, mm H_2O	
Boiler Design Pressure, mm H_2O	
Ductwork Design Pressure, mm H_2O	
Scrubber, mm H_2O (if appl.)	
Baghouse Design Pressure, mm H_2O	

aa. Boiler Data

Steam Drum/Mud Drum	
Inside dia. and thickness of drum, mm	
Boiler section heat transfer surface are, m^2	
Boiler tube O.D./wall thickness, mm	/
Boiler tube spacing, mm	
Waterwall tube O.D./wall thickness, mm	/
Tube arrangement, check one	____ in line, ____ staggered
Design Pressure, bars	

bb. Superheater Data

	Primary	Reheat (if applies)
Design pressure, bars		
Primary superheater surface, m^2		
Size and material of superheater outlet header		
Type of attemperator		
Superheater tube O.D./wall thickness, mm	/	/
Superheater tube spacing, mm		
State tube arrangement: inline or staggered		
Superheater pressure drop at GL and Over pressure flow, bars		

cc. Economizer Data

Type of economizer	
Design pressure, bars	
Effective heat transfer surface, m^2	
Size/material of economizer inlet nozzle	/
Tube O.D. wall thickness, mm	/
Tube spacing, mm	
Tube arrangement, check one staggered	____ in line, ____ staggered

dd. Main steam line pressure drop at TOL_f and 5% over pressure flow, bars (excluding boiler stop check valve) _____

ee. Boiler stop check valve pressure drop at furnace TOL_f and over pressure flow, bars _____

2. Refuse Handling Cranes

a. Manufacturer, Model No. _____

b. Quantity (primary/spare) _____

c. Crane Capacity, tonne _____

d. Grapple Size, m^3 _____

e. Grapple Type _____

f. Crane design handling rate, tonne/hr _____

g. Speeds at full load _____

1. Hoist, m/min _____

2. Bridge travel, meter/min _____

3. Trolley travel, meter/min _____

h. Maximum hoist lift, meter _____

i. Controls, type _____

j. CMAA Rating _____

k. Description of Controls and Stationary Operator and degree of automation:

_____

_____

3. Pit Fire Safety Features (See also the Technical Requirements)

a. Describe smoke and heat handling features: _____

_____

b. Describe safety features for protection of crane operator: _____

_____

c. Describe pit fire control equipment: _____

_____

d. Justification as to the sufficiency of proposed fire water provisions as called for in the Technical Requirements. See attached sheets numbered _____ through _____.

4. Refuse Hoppers and Feed Chutes

a. Manufacturer, Model _____ / _____

b. Hopper Capacity, volume/density m^3 @ kg/m^3 _____ @ _____

c. Hopper Material/Plate Thickness, mm _____

d. Feed Chute

1. Dimensions, LxW, meter _____ x _____

2. Size of largest item which will pass Through chute, LxWxH, meter _____ x _____ x _____

3. Chute cooling system _____

4. Shut off damp, size, meter x meter _____ x _____

e. Level Indicators, qty. and type _____

5. Refuse Feeders

a. Type and Manufacturer _____

b. Capacity (24 hr. maximum), tonne/hr _____

6. Stokers and Grates

a. Type and Manufacturer _____

b. Grate Area, m^2 _____

c. Grate Material Type _____

d. Grate bar life, hours (20,000 hr min) _____

e. Cross-sectioned area of grate bar(s), m^2 _____

f. End/Side Seal Material _____

g. Sifting Handling Description _____

h. No. Siftings Hoppers _____

i. Capacity Control Method _____

j. Grate Cooling System (i.e. air, water) _____

7. Fans

	FD	SA	ID
a. Manufacturer			
b. Type of Wheel			
c. Diameter of Wheel			
d. Net Operation Requirements:			
Capacity, kg/hr, m^3/min			
Gas/Air temperature, ^oC			
Static pressure, kPa			
Efficiency, %			
Power to fan coupling, kW			
e. Test Block Requirements:			
Capacity, kg/hr, m^3/min			
Gas/Air temperature, ^oC			
Static pressure, kPa			
Efficiency, %			
Power to fan coupling, kW			

f. Motor Data:

	Manufacturer			
	Motor size, kW			
	Frame Size			
	Enclosure Type			
	Service Factor			
	Volts/phase/Hz			
	Full load current, amp			
g.	Variable Frequency Drive Data:			
	Manufacturer			
	Other			
h.	Type/Manufacturer of bearings			
i.	Materials			
	Wheel			
	Shaft			
	Scroll			
j.	Operating speed, rpm			

8. Air Preheaters

a.	Manufacturer, Type, Model No.	
b.	Number, Size, mm x mm	/ / x
c.	Duty, MJ/hr	
d.	Design Conditions	
	Inlet temperature, ^{o}C	
	Outlet temperature, ^{o}C	
e.	Heat transfer medium	

9. Residue Handling System

a.	Bottom Ash System: Primary/Standby		
	Manufacturer	/	
	Type	/	
	Capacity, tonne/hr	/	
	Residue Pit Dimensions, ((LxWxD) from Bottom ash inlet point) in meters		
		x	x

	Design density of bottom ash for storage/Structural design, kg/m^3	_____ / _____
	Type of drive for conveyance system	_____
	Capacity of drive mechanism (i.e. if Motor drive, kW	_____
	Size of largest item passable through System, LxWxH, meter	_____ x _____ x _____
b.	Air Pollution Control Equipment Ash System	
	Manufacturer	_____
	Type	_____
	Capacity, tonne/hr	_____
	Dimensions, mm	_____
	Design density for Storage/structural design, kg/m^3	_____
	Type of drive for conveyance system	_____
	Capacity of drive mechanism i.e. if motor drive, kW	_____
c.	Boiler Fly Ash System	
	Manufacturer	_____
	Type	_____
	Capacity, kg/hr	_____
	Dimensions, mm	_____
	Design density of fly ash for storage/Structural design, kg/m^3	_____

	Type of drive for conveyance system	
	Capacity of drive mechanism (e.g., if motor drive, kW)	
	Compatibility with separate APC fly ash collection	
d.	Fly Ash Storage Silo	
	Manufacturer	
	Type	
	Capacity, tonne and No. of days	
	Dimensions, mm	
	Type of unloading system	
	Dust control/collection system	
e.	Maximum water use, total Residue handling system, lpd	

10. Stack

a.	Manufacturer	
b.	Number of Flues	
c.	Diameter of Flues	
d.	flue Material/Thickness, mm	
e.	Height, meters	
f.	Insulation Properties	

11. Soot Removal System

a.	Manufacturer	
b.	Type (e.g., steam sootblower, rapping)	
c.	Description of System and Controls:	

12. Fabric Filter Data

a. Air-to-Cloth Ratio:

Net _____

Gross _____

b. Number of Compartments _____

c. Manufacturer _____

d. Flue Gas Data (per unit)

Maximum Flow, actual m^3/min _____

Maximum Temperature, ^oC _____

Flange-to-Flange Pressure Drop, mm Hg _____

e. Particulate Removal Efficiency

Efficiency, % _____

Inlet loading at 11% O_2, mg/Rm^3 _____

Outlet Loading at 11% O_2, mg/Rm^3 _____

f. Item Descriptions

Number of Bags/Compartment _____

Diameter and length of each Bag, mm _____ / _____

Service Life (minimum), hours _____

Bag Frames, if applicable _____

Shell material, ASTM _____

Hoppers

Quantity, number _____
Capacity, tonne each _____
Storage Capacity, hours @ GL _____
Material Type _____

g. Description of System for Removing Collected Material:

_____

_____

_____

h. Power Consumption

Connected, kW _____

Operating, kW _____

i. Compressed Air Consumption (annual average), m^3/min _____

j. Insulation

Materials _____

Thickness, mm _____

Areas covered _____

Cladding _____

k. Shell

Materials _____

Thickness, mm _____

l. Accessories (Description)

Hopper Heaters _____

Hopper Vibrators _____

Poke Holes _____

Air Tight Connection at Hopper Outlet _____

Temperature Control for Reverse Air Or Pulse Jet Air _____

m. Monitoring System (Description)

Type and Quantity of Sensors /

Type and Quantity of Signal Processors /

Type of Control Unit

Type of Alarm

13. Acid Gas Scrubbing Equipment (Spray-dry, Dry injection or wet scrubber)

a. Type (e.g. semi-dry, dry, or wet)
b. Number of Units
c. Manufacturer
d. Flue Gas Data (per unit)

Maximum Flow, ACMM

Maximum Temperature, ^{o}C

Flange-to-Flange Pressure Drop, mm Hg

Maximum Outlet Temperature, ^{o}C

Minimum Outlet Temperature, ^{o}C

Average Outlet Temperature, ^{o}C

e. Removal Efficiencies

1. HCl
   a. Efficiency, %
   b. Inlet Concentration, mg/Rm^3 @11% O2
   c. Outlet Concentration, mg/Rm^3 @11% O2

2. SO_2
   a. Efficiency, %

	b. Inlet Concentration, mg/Rm^3 @11% O_2	
	c. Outlet Concentration, mg/Rm^3 @11% O_2	
f.	Chemical Used for Neutralization (e.g. pebble lime, hydrated lime, etc.)	
g.	Average Neutralization Chemical Use (per unit), kg/hr	
h.	Average Water Use (per unit), lpm	
i.	Electric Power (Total)	
	Connected, KW	
	Operating (Annual Average), KW	
j.	Compressed Air Use (Average Annual Consumption per Unit), dry std m^3/min	
k.	Atomization System	
	Type	
	Manufacturer	
l.	Control and Instrumentation	
	HCl	
	SO_2	
	Outlet Temperature	
m.	Materials of construction and description	
	Chemical Storage	
	Chemical Slaker	
	Chemical Pump	
	Chemical/Water Solution % at Atomizer	
	Scrubber Shell Material and Thickness	

n. Describe Neutralization Chemical Loading, Storage, Slaking or Slurry injection, and atomization system (include number of units and spares)

o. Atomization System Replacement (Describe expected equipment downtime associated with each replacement and number of replacements per year)

If dry injection is proposed:

p. Materials of construction and description

Reagent Storage

Scrubber Shell Material and Thickness

q. Describe Loading, Storage, Powder injection, and water atomization system (include number of units and spares)

r. Atomization System Replacement (Describe expected equipment downtime associated with replacement)

PART C - BALANCE OF FACILITY SYSTEMS

14. Turbine-Generator System:

a. Manufacturer _____

b. Model No. _____

c. Nameplate Capacity, MW (each unit) _____ / _____

d. High Pressure Throttle Flow at TOL_1 and 5% Over Pressure, kg/hr (See Note 3 below) _____

		STM#	MCTDTG[1]	MCR[2]	TOL_1[3]
e.	High Pressure Throttle Flow, kg/hr				
f.	Throttle Steam Pressures, bars				

NOTES:

[1] MCTDTG above refers to "maximum continuous turndown-turbine/generator" and above means specifically the control point conditions at maximum permissible turndown of the turbine/generator set.

[2] MCR refers to Maximum Continuous Rating. See note at top of this Proposal form.

[3] TOL_1 above refers to "temporary (one hour) overload" and means specifically the control point conditions with the turbine/generator set unit operating at its maximum one hour overload capacity. (See the Technical Requirements).

g.	Throttle Steam Temperatures, ^oC				
h.	Extraction Steam Pressures, bars				
i.	Extraction Steam Temperatures, ^oC				
j.	Turbine Exhaust Pressures, mmHg abs				
k.	Turbine Generator Heat Rates, MJ/kWh, High Pressure Turbine				

l. Governing System Type _____

m. Generator Voltage, kV _____

n. Gland Steam Condenser

1. Manufacturer _____
2. Capacity, kg/hr and/or MJ/hr _____ / _____

o. Generator Cooling System, description: _____

_____

_____

_____

15. Air Cooled Steam Condenser

a. Manufacturer, Model _____ / _____

		STM#	MCTDTG[1]	MCR[2]	TOL_1[3]
b.	Operating pressures, mm Hg abs (in Hg abs)				
c.	Steam flows, kg/hr(kg/hr)				
d.	Heat duties, MJ/hr				
e.	Design dry bulb temperature, ^{o}C				
f.	Quantity, no. of cells				
g.	Design Range, ^{o}C				
h.	Design Approach, ^{o}C				
i.	Condensate Tank, size liters				
j.	Condensate Pump number and type				
k.	Condensate Pump, kW each				
l.	Ductwork, diameter, mm				
m.	Ductwork, length, meter				
n.	Ductwork pressure drop, mm Hg				
o.	Gas Removal System				
	1. Gas Removal System				
	2. Pump kW, each				
	3. Collection Tank, size, litters				

p.	Fan(s), number and type				
q.	Fan motor kW each				
r.	Variable Frequency Drive Data:				
	Number				
	Type				
s.	Fan electrical consumption (with VFDs), kW each				

t. Fan Flow control, description:

16. Feedwater System (Provide a description of the feedwater cycle, with equipment arrangements)

17. Boiler Feed Pumps

a.	Manufacturer, Model No.		
b.	Quantity		
c.	Design capacity, m^3/min		
d.	Design total head, meter		
e.	Design inlet pressure, bars		
f.	Design outlet pressure, bars		
g.	Design temperature, ^oC		
h.	Efficiency at design conditions, %		
i.	Type of seals		
		Electric Drive	Steam Drive

j.	Drive horsepower, kW		
k.	Cooling method		N/A
l.	Energy consumption at design capacity		
	1. Electric, KW		N/A
	2. Steam, kg/hr	N/A	
m.	Steam inlet pressure, bars	N/A	
n.	Steam outlet pressure, bars		

18. Condensate Pumps

a.	Manufacturer, Model No.	
b.	Quantity	
c.	Design capacity, m^3/min	
d.	Design total head, meter	
e.	Motor horsepower, kW	
f.	Electrical power at design capacity, kW	

19. Circulating Water Pumps

a.	Manufacturer, Model No.	/
b.	Quantity	
c.	Design capacity, m^3/min	
d.	Design total head, mm	
e.	Motor horsepower, kW	
f.	Electrical consumption at design capacity, kW	

20. Auxiliary Cooling Water Pumps (Bearing Cooling Water Pumps)

a.	Manufacturer, Model No.	/
b.	Quantity	
c.	Design capacity, m^3/min	
d.	Design total head, mm	
e.	Motor horsepower, kW	

f. Electrical consumption at design capacity, kW _____

21. Miscellaneous Pumps

a.	Service	_____	_____	_____
b.	Manufacturer, Model	_____	_____	_____
c.	Quantity	_____	_____	_____
d.	Design capacity, m^3/min	_____	_____	_____
e.	Design total head, meter	_____	_____	_____
f.	Motor horsepower, kW	_____	_____	_____
g.	Electrical consumption at design capacity, kW	_____	_____	_____

22. Air Compressors

a. Manufacturer, model, type _____ / _____ / _____

b. Quantity _____

c. Operating/design pressure, bars _____

d. Air dryer, manufacturer, model _____ / _____

e. Receiver, pressure/capacity _____ bars/ _____ m^3

23. Miscellaneous Heat Exchangers

a.	Manufacturer	_____	_____	_____
b.	Service, number	____ / ____	____ / ____	____ / ____
c.	Type, tube material	____ / ____	____ / ____	____ / ____
d.	Heat duty, MJ/hr.	_____	_____	_____
e.	Surface area, m^2	_____	_____	_____

24. Makeup Water Treatment/Demineralizer

a. Manufacturer _____

b. Description of system: _____

_____

_____

_____

c. Design flow rate, m^3/min and m^3/day _____ / _____

d. Redundancy in equipment number and capacity, description:

e. Water quality monitor, description:

Wastewater Treatment

a. Manufacturer:

b. Description of system:

Deaerating Feedwater Heater and Storage Tank

a. Manufacturer

b. Quantity

c. Tray material (if used)

d. Storage tank capacity, liters

e. Outlet capacity, kg/hr

f. Oxygen content of water, cc/L

g. Operating pressure, bars

Feedwater Heaters

a. Manufacturer

b. Quantity

c. Heater duty, MJ/hr

d. Heater steam-side pressure, temperature and stream number; bars, ^{o}C , STM# ____ / ____ / ____

e. Heater terminal temperature difference, ^{o}C

f. Heater drain cooler approach ^{o}C

g. Tube material/type/no. passes ____ / ____ / ____

h. Tube diameter and gauge, mm BWG ____ / ____

i. Cleanliness factor, % _____

Tanks, Demineralized Water and Condensate

	Service	DMW	Cond.
a.	Manufacturer		
b.	Design pressure and temperature, bars, ^{o}C		
c.	Size, liters		
d.	Material		

	Tanks, Other	DMW	Cond.
a.	Manufacturer, Type	/	/
b.	Service		
c.	Design pressure and temperature, bars, ^{o}C		
d.	Size, liters		
e.	Material		

Turbine Room Crane

a. Hoist Ratings

1. Main hoist rating, tonnes _____
2. Auxiliary hoist rating, tonnes _____

b. Speeds at full load

1. Main hoist, meter/min _____
2. Bridge travel, meter/min _____

c. Maximum hoist lift, meter _____

d. Controls, type _____

e. CMAA rating _____

Miscellaneous Hoists and Cranes
(Other than those associated with railhaul system)

a.	Manufacturer, Model	/	/
b.	Location		
c.	Type and function	/	/
d.	Capacity, tonne		

Elevator(s)

a.	Manufacturer, Model	/	/
b.	Location		
c.	Type and function	/	/
d.	Capacity, tonne		

Fire Protection other than Pit

Building/Area	Type/Description

Heating and Ventilation

Building/Area	Capacity. m^3/MJ/hr	Description/Function

Mobile Equipment

Mfr/Model	No./Type	Description/Function

PART D - ELECTRICAL AND INSTRUMENTATION AND CONTROL DATA

1. Generator

Manufacturer, Model _____

Cooling System, description:

_____

_____

Capacity, MW _____

Power Factor _____

Voltage _____

Frequency/Short Circuit Ratio _____

Insulation Class _____

Overspeed Limitation _____

No. Terminal Leads _____

Type Fire Protection _____

Exciter Type, Voltage Controls, describe: _____

_____

_____

Generator Protective Relays

Type _____

Manufacturer _____

Model _____

Displays, meters and recorders, list on attached sheet by manufacturer, type and range

compatibility with telemetry requirements, describe: _____

_____

_____

2. Transformers

a.	Service	_____	_____	_____
b.	Manufacturer	_____	_____	_____
c.	Type, KVA Rating	_____	_____	_____
d.	Voltage, No. Phases	_____	_____	_____
e.	Taps	_____	_____	_____
f.	Impedance	_____	_____	_____
g.	Protective Relays (Type, Manufacturer, Model)			

_____

_____

_____

3. Metal-Clad Switchgear

Manufacturer	_____	_____	_____
Service	_____	_____	_____
Voltage	_____	_____	_____
Materials of Construction	_____	_____	_____
Description	_____	_____	_____

4. DC System

Battery Charger, (Type, Manufacturer, Model)	_____	_____	_____
Batteries (Type, Manufacturer, Model)	_____	_____	_____
Description	_____	_____	_____

5. Essential AC System

Invertor (Type, Manufacturer, Model)	_____	_____	_____

Description

6. Power Factor Correction

Description, Type

7. Synchronization and Paralleling Systems

Description of systems for generator synchronization and paralleling which allow all power sources to function either independently or in unison, using whatever generators are available. The requested description shall be written specifically for this Project. The manufacturer's standard descriptions which refer only to typical operation are not acceptable.

8. Back-up Power (if applicable)

Diesel or gas turbine generator manufacturer, size /

Description of back-up power system (type, controls, logic):

Description of interface with mainpower system, especially with regard to priority circuitry and load shedding devices.

9. Control Hierarchy for Power Distribution Systems

Briefly describe the overall approach towards electrical systems reliability identifying major circuits and their priorities. Explain how the systems will respond to electrical failures by automatically shedding loads on a priority basis. Discuss the order by which alternate power sources will be activated. The requested description shall be written specifically for this project. The manufacturer's standard descriptions which refer only to typical operation are not acceptable.

Provide the outline, on a separate page, for a complete protective device and circuit study starting with utility incoming to the largest breaker in first downstream panel fed from switchgear[1].

Furnish composite one-line diagram of the power distribution systems, showing all power transformers, disconnect switches, circuit breakers, fuses, positive relays, current transformers, power sources and other essential devices. See attached Figure _____.

Name specialty subcontractor to be selected for this task.

Fire Alarm and Detection System

Furnish a description of the basic system including the method of operation and supervision of each type of circuit, sequence of automatic and manual operation.

10. Lighting

Description of Outdoor and Indoor Systems:

Lumens (Foot-candles) at Control Room Panels

Lumens (Foot-candles) at top of Pit

11. Emergency Lighting

Outline the type of emergency lighting to be used demonstrating that system shall be independent of all other wiring and shall be energized at all times:

12. Instrumentation and Controls

Control Room Facilities

1. Manufacturer
2. Description (refer to the attached sheets)

Description of Panel and Local Instrumentation and Controls (manufacturers, types, logic).

Description of control logic, auto/manual controls, main and remote control stations, primary instrumentation and metering.

Description of Data Display and Storage Capabilities.

Description of Compatibility with connectivity to the Regions' Offices

PART E - MISCELLANEOUS INFORMATION

1. Spare Parts and Tools

Itemize the spare parts required and/or recommended for operation of the Project. Each item must show Quantity, Size, Model, Output, Rating, etc., and other pertinent information necessary for Procurement. See attached sheets _____.

2. Mobile Equipment

Furnish an additional list of all rolling stock and other mobile equipment not elsewhere listed. Provide manufacturer, size data, and description. See attached sheets _____.

3. Additional Equipment

Furnish an additional list of Project Equipment not previously included in this Proposal FORM 10. Provide manufacturer, size data and description information.

4. Additional Information

Furnish additional information for items requested where adequate space was not provided in this Proposal form. Reference these sheets in the proposal form.