

**TALISMAN**

E N E R G Y

FOOTHILLS MIDSTREAM AREA

DRY GAS GATHERING SYSTEM

*Producers Tie-In Specifications*

Talisman Energy Canada.

June 2008

Revision #2

# T A L I S M A N

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## PRODUCER TIE-IN SPECIFICATIONS

Foothills Midstream Area - Dry Gas Gathering System Specification

### 1.0 DESIGN AND COMMISSIONING REQUIREMENTS

Item	Description	Specification	Notes
1.1	<b>Process Tie-in Connection (Direct Tie-in Only)</b>	<p>Approved riser / tee tie-in's are required for any tie-in. If a Producer uses an existing tie-in, the Producer must provide provisions for a future tie-in (with approved valve).</p> <p>TMO will install a manual block valve to connect new pipelines into the gas gathering system. The Producer lateral must allow for inline inspection ('smart pigging'). Hot taps are NOT allowed on sour service pipelines.</p>	<p>Connections should be the same size as the Producer lateral.</p> <p>Hot taps on sweet service pipelines are permitted on a temporary basis and require TMO approval.</p>
1.2	<b>Utility Tie-in Connections (Direct Tie-in Only)</b>	If the Producer is taking fuel gas from the same well as the production, the fuel gas tie-in must be upstream of the receipt gas meter.	TMO will provide connections on existing TMO facilities for fuel gas, instrument air / gas, drain and flare, if available.
1.3	<b>Piping / Mechanical Requirements (Direct Tie-in Only)</b>	TMO requires the Producer to install: a spectacle blind, a check valve, pipeline ESD valve (remotely operable by TMO), cathodic protection insulating kit, and gas sampling connections with isolation valves, immediately upstream of an acceptance point.	The recommended CP Isolation kit is the LineBacker kit. Corpro is the CP Company used by TMO.
1.4	<b>Corrosion Requirements</b>	The continuous injection of a corrosion inhibitor is required as specified by TMO. Chemical injection must be ON when well commissioning is complete and Producer has permission to flow. Injection of methanol is NOT allowed on the Dry Gas Gathering System. Prior to implementing a chemical program, third party Producers must review their proposed chemical program with TMO's Corrosion Engineering Group and Operations Engineer to obtain approval.	The rate of injection will be as specified by the chemical manufacturer and TMO's Corrosion Engineering Group. Sulphur dispersants may be needed to control sulphur deposition within the pipeline.
	<b>(Direct Tie-in Only)</b>	A corrosion coupon shall be installed upstream of the acceptance point isolation valve such that it is positioned within regular production flows and does not interfere with pigging operations. High pressure retrievable coupons are required as the coupons can be retrieved without flow disruption.	Caproco is the vendor TMO uses for corrosion coupon installation, extraction and analysis. Corrosion analysis data should be sent to TMO Corrosion Engineering Group. TMO Corrosion Engineering Group will specify a minimum for analysis frequency on a well by well basis. The minimum coupon analysis frequency is quarterly.
	<b>(Direct Tie-in Only)</b>	Risers and tie-in connections to the TMO system must not impede, hinder, or make inline inspection tool ('smart pigs') unusable within the TMO gathering system. TMO Corrosion Engineering group reserves the right to review all tie-in proposals to ensure that system smart pig ability is not compromised.	TMO utilizes 'smart pigs' for pipeline inspection purposes. TMO requires 1 week notification before 3rd Parties smart pig lines that directly connect to our mainline assets. Results are to be submitted to TMO for review.

	<b>(Direct Tie-in Only)</b>	TMO, at its discretion, may require the Producer to collect water/solids samples recovered during pigging or normal operation.	Such samples shall be made available for TMO Corrosion Engineering Group to inspect and the Producer shall send out for compositional analysis if requested by TMO. Analysis results shall be submitted to TMO Corrosion Engineering Group for review.
1.5	<b>Pipeline ESD Valve (Direct Tie-in Only)</b>	Fire safe to API 604 and equipped with: fail close actuator, manual reset latch, solenoid valve, open and close limit switches and high/low pressure pilot. TMO Edson Control Center to have control of the remote valve operation and receives valve position status signals.	In case of remote shutdown, Producer will need to contact TMO Control Room for remote reset.
1.6	<b>Producer Facility Design</b>	TMO to review and approve the design of all facilities connecting into the gas gathering system prior to construction (for direct tie-ins) and prior to start up (for indirect tie-ins).	The Producer is required to provide TMO a complete Engineering Drawing Package (stamped by a registered APEGGA Professional Engineer) applicable to the facilities for TMO's review and approval (Note: this can take up to 14 days). The Producer is also required to resubmit an "as-built" drawings package stamped by a Professional Engineer.
	<b>(Direct Tie-in Only)</b>	Producer facilities may not encroach on or be installed on the TMO right-of-way without the appropriate agreements in place.	Producer is required to acquire the Pipeline Installation License (PIL) for the overlapping pipeline right-of-way tie-in area(s).
	<b>(Direct Tie-in Only)</b>	The maximum delivery pressure may not exceed TMO pipeline specifications (MOP).	Contact the TMO Development Engineer to acquire maximum delivery pressure.
	<b>(Direct Tie-in Only)</b>	No free liquids (hydrocarbon or water) are allowed into the Dry Gas Gathering System. TMO will require a dew point analyzer be installed at the acceptance point.	Refer to Gas Quality Specifications.
	<b>(Direct Tie-in Only)</b>	TMO approved gas meters and sampling points must be provided.	Refer to Section 2.0 Measurement Requirements for additional details.
	<b>(Direct Tie-in Only)</b>	The Producer's gas must not exceed TMO pipeline H <sub>2</sub> S license. TMO will require a H <sub>2</sub> S analyzer be installed at the acceptance point.	Refer to Gas Quality Specifications.
	<b>(Direct Tie-in Only)</b>	The Producer must incorporate into the design of facilities a means to depressurize and blow down the Producer's pipeline.	
1.7	<b>Facility Commissioning</b>	The Producer is required to keep TMO informed of the project schedule and progress to prevent any delays in start-up and commissioning of facilities.	
	<b>(Direct Tie-in Only)</b>	Producer representatives and contractors are required to participate in safety orientation prior to accessing any TMO sites or facilities. Notification shall be given 72 hours in advance of any construction activities. Work on TMO Lease or R.O.W. must be supervised by TMO Representatives.	All Producer representatives and contractors shall have a daily permit and all necessary regulatory permits prior to conducting any work on TMO sites. Arrangements are to be made with Production Foreman/Coordinator. Daily permits may be obtained from the Production Foreman/Coordinator.

	<b>(Direct Tie-in Only)</b>	A TMO representative must witness the calibration, configuring and adjusting of primary, secondary and tertiary measurement equipment at the time of site commissioning and prior to TMO issuance of a 'turn-on' approval. The remote activation via SCADA of devices configured to provide remote control must be tested and their functioning verified. Status monitoring functionality must also be verified and tested. Documentation in support of calibrations must be provided to TMO.	
		Provisions shall be made to ensure NO pipeline hydro test fluids or well completion fluids enter into the TMO pipeline. TMO must review the Producer's plan for ensuring these fluids do not enter the pipeline.	
1.8	<b>Costs</b>	The Producer is responsible for all costs (material and labour), including costs incurred by TMO for work required to meet these tie-in specifications.	Cost recovery will be a lump sum payment. Any future site conversion costs to meet receipt point requirements will be the Producer's responsibility.

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### 2.0 MEASUREMENT REQUIREMENTS

Item	Description	Specification	Notes
2.1	<b>Gas Metering Requirements</b>	TMO will require scheduled meter inspections and recommends using orifice with senior fittings to facilitate these inspections. Where multi run flow metering is utilized, separate temperature, pressure and flow transmitters for each run (complete with local indicators) is required. TMO must approve all meters (orifice or non-orifice meters) incorporated into the facilities design.	<p>Metering designs should be submitted to TMO for approval before any facilities detailed engineering design is initiated. Primary meters of a type other than orifice may be utilized by permission of TMO.</p> <p>Orifice meter design (and instances where flow conditioners are utilized) per ERCB Directive 017 'Measurement Requirements for Upstream Oil and Gas Operations' specifying which version of AGA Report #3 Orifice Metering of Natural Gas is applicable.</p>
2.2	<b>Fuel Gas Metering Requirements</b>	Fuel gas meters compliant with ERCB, API and industry standards must be incorporated into the facilities design up-stream of the receipt point meter. Meters upstream of the receipt point meter need not be approved by TMO. If however, TMO gas is provided to the Producer as fuel gas, TMO must approve all gas meters and related secondary and tertiary devices expected to be incorporated into the facilities design.	<p>Metering designs should be submitted to TMO for approval before any facilities detailed engineering design is initiated. Fuel meters measuring TMO gas cannot exceed a maximum measurement uncertainty of 3%. A six year minimum calibration or verification frequency is required. Fuel gas volumes greater than <math>0.5 \times 10^3 \text{ m}^3/\text{day}</math> must be measured, less than <math>0.5 \times 10^3 \text{ m}^3/\text{day}</math> requires an engineering estimate. For PD meters, pressure and temperature shall be measured from the upstream side of the meter within 20 pipe diameters.</p>
2.3	<b>General Sampling Requirements</b>	Dedicated sample probes must be installed upstream of gas meters. Gas must be sampled through the top of the pipe. Sample points must be uniquely, clearly marked and identified with non-destructible tags.	<p>The presence of H<sub>2</sub>S requires an on-site Tutwiler test or appropriate means for measurement of lower H<sub>2</sub>S concentrations. TMO retains the right to check gas at the outlet of the de-hydrators and separators for liquids at their discretion.</p>
		A gas analysis from an analogy or completion results is required at the time of tie-in application submission, followed by a flowing gas and liquid analysis is required to be taken 14 days after initial start-up and results submitted within 30 days after sampling.	<p>Gas analysis shall be standardized to C<sub>7</sub><sup>+</sup> for all samples.</p>

2.4	<b>Sampling Requirements</b>	<p><b>Single zone well:</b> Annual gas analysis required.</p> <p><b>Commingled multi zone well:</b> TMO requires monthly gas sampling for the first six months of production. An evaluation of each of the first six months of spot analysis received by TMO will be performed to determine the extent of compositional fluctuation. If it is determined that the resulting gas analysis is non-fluctuating then yearly spot sampling may be undertaken thereafter. If however, the resulting analysis reveals a fluctuating composition, then the installation of a continuous (monthly), proportional to flow gas samplers is required at the receipt point. Invalid sample results derived from continuous sampling would require near real time gas chromatographs be installed.</p> <p><b>Multi zone or multi wells across a receipt point (facility meter):</b> Require the installation of continuous, proportional to flow gas samplers. Sample cylinders are required to be analyzed at monthly intervals.</p>	
2.5	<b>Analysis Using Gas Samplers</b>	The Producer shall be responsible for the collecting and delivery of monthly samples to a certified laboratory for analysis (if applicable).	TMO requires the Producer to obtain the gas analysis at specific times of the month to accommodate production accounting business processes. The schedule should be confirmed with the TMO Operations Engineer.
2.6	<b>ProTrend</b>	The results of the analysis shall be made available to TMO via ProTrend.	After review and approval from TMO, the gas analysis results shall be deemed to be the typical gas analysis for the particular receipt point from the date identified to TMO by the Producer and shall be used for measurement and allocation purposes for the receipt point. TMO reserves the right to reject any invalid gas analysis and ask Producer to take another gas sample for analysis.
2.7	<b>Costs</b>	The Producer is responsible for all costs (material and labour), including costs incurred by TMO for work required to meet these tie-in specifications.	Cost recovery will be a lump sum payment. Any future site conversion costs to meet receipt point requirements will be the Producer's responsibility.

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### 3.0 DATA ACQUISITION REQUIREMENTS

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3.1	<b>Data Requirements</b>	<p>A technical solution must meet the following requirements for standard data set: equivalent latency, accuracy, completeness of data. Final approval of solutions is at the sole discretion of TMO. TMO requires the ability to download or export data in a .csv file format anytime.</p> <p><b>Direct Tie-in:</b> Minimally, both real time and archived data is required as per Directive 017 Daily Report and Meter Report requirement. In addition, the following data is also required, both real time and archived: -dew point analyzer reading, - H<sub>2</sub>S concentration, -emergency shutdown valve (ESD)</p> <p><b>Indirect Tie-in:</b> Producer wells that are not delivering gas directly into the system on a daily basis need to provide daily cumulative volume.</p>	<p>Confirm data lists with TMO. TMO reserves the right to collect additional data as required. Prior to start-up at the time of commissioning the RTU must be validated using an approved flow calculation application applying ERCB Directive 17 4.3.3.2 test cases.</p>
3.2	<b>Fixed Frequency Radio (Direct Tie-in Only)</b>	<p>The Producer must confirm radio frequency and adequate communication path with TMO to ensure there is two-way communication.</p>	<p>TMO will not allow tower access to third parties.</p>
3.3	<b>Remote Terminal Units and Transmitters Requirements (Direct Tie-in Only)</b>	<p>TMO has standardized on the Bristol 'Control Wave Micro' RTU utilizing Bristol 3820 transmitters or the Bristol model 'XFC XP' with three in one transmitters internal to the unit incorporating standardized programs and algorithms approved by TMO. EFM or RTU devices must provide the necessary control enablement, status monitoring by and data uploading to the TMO owned and operated SCADA system.</p> <p>Transmitters must be of the "SMART" type and provide output signal (either analog or digital), continuous measurement of fluid temperature, static pressure, and remote re-ranging. It must also provide configuration and diagnostics using either a dedicated hand held or laptop computer with appropriate software and a local indication with remote configuration lock out capability.</p>	<p>All field instruments must be capable of operating between -40°C to 60°C and incorporate in their design a means of adjusting the calibration to compensate for a shift in ambient temperature.</p> <p>Approved hardware (processor type, I/O modules, etc) shall be supplied by the Producer. This hardware shall be installed consistent with the standard RTU configuration (Refer to 3.3 RTU Programming).</p> <p>TMO strongly recommends any RTU installed upstream of a receipt point be in accordance with the attached specifications to allow for future receipt point movement.</p>

3.4	<b>RTU Programming (Direct Tie-in Only)</b>	Producer shall use the TMO provided standard RTU configuration. Producer is responsible for RTU configuration, loading, RTU commissioning, RTU commissioning to the SCADA Host, and shall communicate any and all changes to the standard RTU configuration to TMO. The Producer is responsible for providing TMO a complete and updated Tag List for all tags defined in the RTU configuration. This information shall be provided to TMO in reasonable time for SCADA Host configuration prior to commissioning and start-up.	Configuration of the SCADA Host will be based on tag signals/addresses as configured in the standard RTU configuration load. TMO will execute the SCADA host configuration.  Also refer to section 3.7. All RTU/EFM devices must comply with API Chapter 21, Flow Measurement Using Electronic Metering Systems, AGA and ERCB Directive 017 Measurement Requirements for Upstream Oil and Gas Operations.
3.5	<b>Protocol (Direct Tie-in Only)</b>	Bristol BSAP.	
3.6	<b>Polling Requirements (Direct Tie-in Only)</b>	TMO SCADA as master. Producer RTU shall be polled as a slave device by TMO SCADA. The RTU slave address will be assigned by TMO for the RTU.	
3.7	<b>Time Sync</b>	All RTUs will be time synced to the TMO SCADA Master using M.S.T. Time sync will be performed via the slave port of the Producer owned RTU.	All clocks set to Mountain Standard Time (M.S.T.). Contract time set at 8 am (M.S.T). Daylight savings must be disabled.
3.8	<b>SCADA Host Configuration (Direct Tie-in Only)</b>	TMO will develop the SCADA host configuration based on the standard RTU configuration and Producer supplied P&IDs and/or shutdown key.	
3.9	<b>Power Requirements (Direct Tie-in Only)</b>	Backup power source for 24 hours. Voltage monitoring signal will be provided to allow for a LOW Voltage alarm to be generated and communicated to the SCADA Host.	TMO recommends separate power supply for the radio and separate power supply for RTU.
3.10	<b>Remote Control Commands (Direct Tie-in Only)</b>	TMO requires SCADA remote shut-in and SCADA open (reset) control for acceptance point ESD including fuel gas (where applicable) and water dew point analyzer bypass. The Producer shall not reset an electronic ESD command that has been issued by TMO.	TMO shall have the ability to ESD any production into the TMO gathering system from SCADA. In the case where it is agreed that a well site ESD is to be used as the tie-in ESD, the Producer must retain the ability to independently control the well head ESD. The manual ESD reset latch still remains the final control element.
3.11	<b>RTU Atmospheric Pressure Configuration (Direct Tie-in Only)</b>	TMO requires atmospheric pressure be configured in the RTU.	The atmospheric pressure is based on actual elevation utilizing the following formulas:  $P \text{ (kPa)} = 101.560 - (0.0113 \times \text{elevation})$ , where elevation is in meters.
3.12	<b>Costs</b>	The Producer is responsible for all costs (material and labour), including costs incurred by TMO for work required to meet these tie-in specifications.	Cost recovery will be a lump sum payment. Any future site conversion costs to meet receipt point requirements will be the Producer's responsibility.