How to Calculate a Processing UCA:

Below is an example of how to calculate a processing Unbundling Cost Allocation (UCA). This is not the only method by which the UCAs may be calculated. Other methods may be used provided they are in accordance with appropriate regulations. Regardless of the method used to unbundle, you are still subject to audit. ***(Updated February 1, 2017)***

Data Collection

1) Obtain a Process Flow Diagram (PFD) of the processing plant that includes all major pieces of equipment and represents all major functions performed in the plant.

2) Determine the discharge mainline(s) at the tailgate of the plant and their requirements for pressure, CO_2, H_2S and H_2O. Some mainlines might also have a "total acid gas" or "total inert gas" specification. **These values are your Marketable Condition requirements for each mainline**. *Marketable condition for each specification (pressure, water content, contaminant content, etc) need only be met once. Residue boosting/recompression is* ***never*** *an allowed process.*

3) Obtain costs related to the processing of gas:

   a. Costs associated with capital investment (equipment, building costs and installation) within plant boundaries.

   b. Costs associated with operations, maintenance, and overhead.

   c. For a complete list of information needed, refer to the equipment on the **List-of-Engineering-Data-Needs-UCA.pdf**

   d. Match equipment costs to the PFD obtained in #1, making sure that there are no inconsistencies

4) Obtain inlet and outlet gas composition data and pressure for each compressor, dehydrator, sweetening unit and measurement point within the processing plant for the following (as appropriate):

   a. CO_2

   b. H_2S

   c. H_20

Suggested Unbundling Method

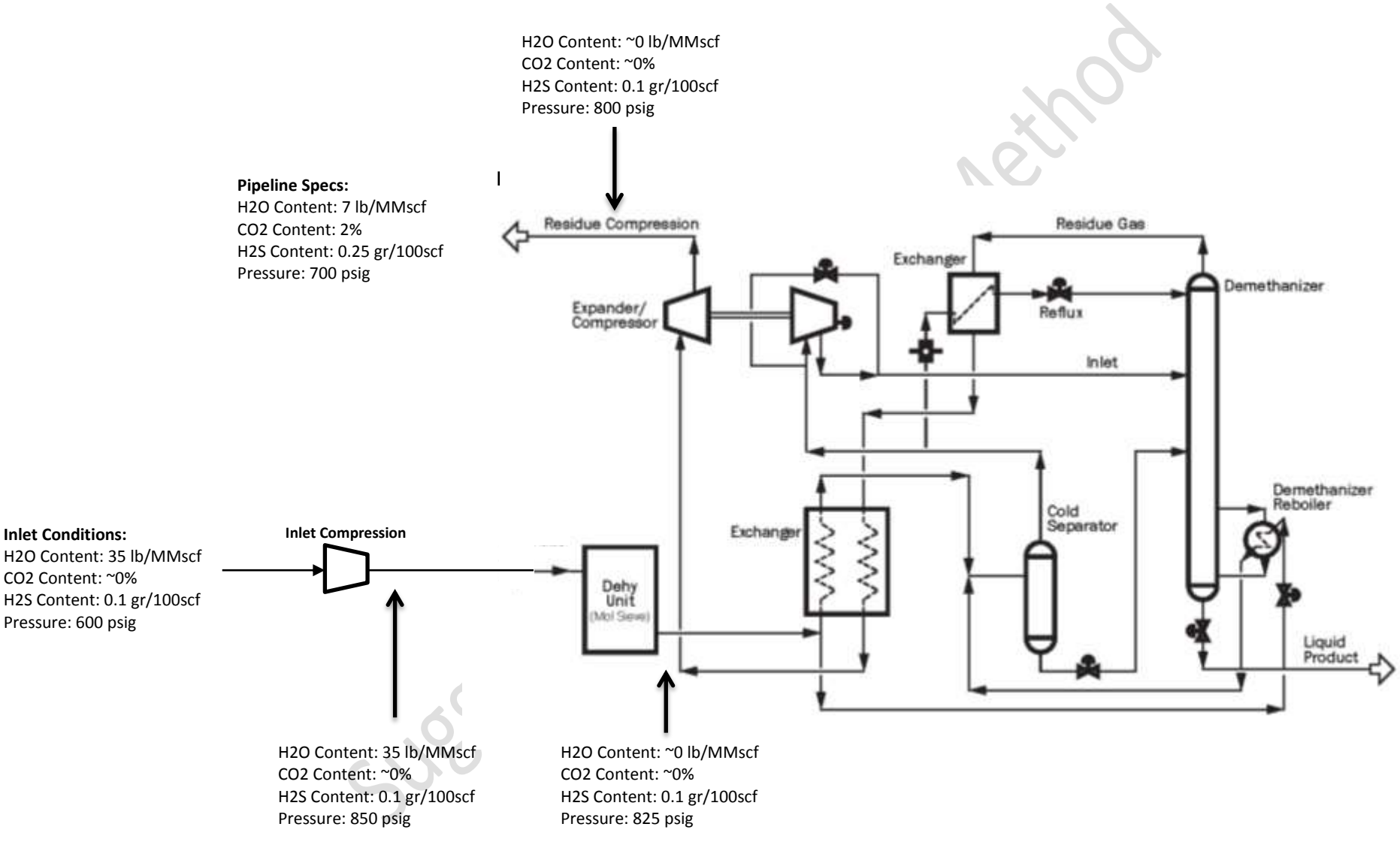
d. Compressor discharge pressure

Compile and Organize Data

5) Take the PFD from #1 and assign the values obtained in #4 to each piece of equipment (example below only shows values for the first unit).

Suggested Unbundling Method

Figure 1: PFD


H2O Content: ~0 lb/MMscf
CO2 Content: ~0%
H2S Content: 0.1 gr/100scf
Pressure: 800 psig
Pipeline Specs:
H2O Content: 7 lb/MMscf
CO2 Content: 2%
H2S Content: 0.25 gr/100scf
Pressure: 700 psig
Residue Compression
Residue Gas
Exchanger
Demethanizer
Expander/
Compressor
Reflux
Inlet
Demethanizer
Reboiler
Cold
Separator
Exchanger
Inlet Conditions:
H2O Content: 35 lb/MMscf
CO2 Content: ~0%
H2S Content: 0.1 gr/100scf
Pressure: 600 psig
Inlet Compression
Dehy
Unit
(Mol Sieve)
Liquid
Product
H2O Content: 35 lb/MMscf
CO2 Content: ~0%
H2S Content: 0.1 gr/100scf
Pressure: 850 psig
H2O Content: ~0 lb/MMscf
CO2 Content: ~0%
H2S Content: 0.1 gr/100scf
Pressure: 825 psig

6) Classify compressors, sweetening, dehydration and processing units as allowed, non-allowed and partially allowed based on the Marketable Condition Rule. The Marketable Condition Rule states that lessees must compress, remove sulfur, carbon dioxide and water content to mainline specifications at no cost to the lessor. The first piece of equipment to reach marketable condition is not allowed. Once the mainline specifications have been met for pressure, water, CO_2 or H_2S content, downstream equipment that perform the same function are allowed (residue compression is never allowed). For example, after the gas stream has been dehydrated to mainline specifications, downstream dehydrators are allowed.

7) If the first piece of equipment to reach Marketable Condition also exceeds the specifications, use the following method to calculate the allowed percentage of units that exceed Marketable Condition for the first time. (Note: There are two equations for calculation of the allowable percentage for compressors. When supportable data is available for both the inlet and outlet pressures for each compressor station, then use Option #1. If inlet pressure data to each compressor station is not available, and only outlet pressure is available, then use Option #2):

Allowed Percentage (dehydrator and amine units):

$$\left(\frac{Marketable\ Condition\ Specification - Outlet\ Measurement}{Inlet\ Measurement}\right) \times 100$$

Option #1: Allowed Percentage (compressors):

$$\left(\frac{Discharge\ Pressure\ of\ Compressor - Marketable\ Condition\ Pressure}{Discharge\ Pressure\ of\ Compressor - Inlet\ Pressure\ of\ Compressor}\right) \times 100$$

Option #2: Allowed Percentage (compressors):

$$\left(\frac{Discharge\ Pressure\ of\ Unit - Marketable\ Condition\ Pressure}{Discharge\ Pressure\ of\ Unit}\right) \times 100$$

Example from schematic above (Figure 1):

Allowed Percentage of mol sieve dehyration:

$$\left(\frac{7\ lb\ H_2O/mmscf - 0 lb\ H_2O/mmscf}{35 lb\ H_2O/mmscf}\right) \times 100 = 20\%\ Allowed$$

Option #1: Allowed Percentage of compression ∗:

$$\left(\frac{850\ psig - 700\ psig}{850\ psig - 600\ psig}\right) \times 100 = 60\%\ Allowed$$

Suggested Unbundling Method

Option #2: Allowed Percentage of compression:

$$\left(\frac{850\ psig - 700\ psig}{850\ psig}\right) \times 100 = 18\%\ Allowed$$

Note: The remainder of this example uses Option #1.

8) Organize all cost data from #3 into the following categories

   A. Compression facilities for refrigeration

   B. All other compression except boosting

   C. Any equipment whose primary function is the recovery of plant products, including NGLs

   D. Equipment that supports NGL recovery (heat exchangers, etc.)

   E. Meters

   F. Storage tanks

   G. Residue boosting compressors

   H. Sweetening (amine) units

   I. Dehydrators

9) Using Marketable Condition data from #2, the PFD and the methods outlined in #5, #6 and #7, calculate the allowed percentage of any equipment that serves a marketing function (removing water, H_2S, CO_2, increasing pressure).

10) Use the following table to classify the equipment from #8 into allowed and non-allowed categories:

Allowed	Non-allowed
Compression facilities for refrigeration	Storage tanks
Pipe, valves and fittings	Residue boosting compressors
Absorbers, heat exchangers, coolers, chillers, fractionating columns,	Sweetening units (until marketable conditions specifications for CO2 and H2S have been met, see #6 and #7)
Any equipment whose primary function is the recovery of plant products, including NGLs	Compressors (until marketable conditions specifications for pressure have been met, see #6 and #7)
Meters	Dehydrators (until marketable conditions specifications for pressure have been met, see #6 and #7)

Suggested Unbundling Method

11) Determine whether your plant uses Depreciation and Return on Undepreciated Capital Investment (RUC) or Initial Depreciable Capital Investment multiplied by the BBB Rate to determine processing UCAs. Refer to 30 CFR §1206.161 for Federal Gas or 1206.180(b)(2) for Indian Gas.

12) The Return on Undepreciated Capital Investment is calculated by taking the undepreciated capital balance times a rate of return (The industrial rate for Standard & Poor's BBB bond).

13) Calculate UCA's using the following equations:

$$\text{UCA for allowed processing (using Depreciation and RUC method)} = \left[\frac{\text{Total Yearly Depreciation and RUC on Allowed Processing Units + Allowable Operating and Maintanence}}{\text{Total Yearly Depreciation and RUC on all Processing Units + Total Operating and Maintanence}}\right]$$

$$\text{UCA for allowed processing (using Initial Capital Investment method)} = \left[\frac{(\text{Total Initial Depreciable Capital Investment of Allowed Processing Units}) * \text{BBB Rate + Allowable Operating and Maintanence}}{(\text{Total Initial Depreciable Capital Investment of all Processing Units}) * \text{BBB Rate + Total Operating and Maintanence}}\right]$$

14) Example Using Depreciation and Return method:

Equipment Costs:				
Equipment Name	Category of equipment	Percent Allowed	Total Yearly Depreciation and RUC:*	Total Yearly allowed Depreciation and RUC
Mol Sieve Dehydration	Dehydration	20% Allowed	$20,230	$4,046
Heat Exchangers	NGL recovery support equipment	100%	$10,150	$10,150
Cold Separator	NGL recovery	100%	$1,000	$1,000
Inlet Compression	Compression	60%	$27,400	$16,440
Demethanizer	NGL recovery	100%	$2,560	$2,560
Turbo Expander	NGL recovery	100%	$18,460	$18,460
Residue Booster	Boosting equipment	0%	$25,490	$0
Meters	Meters	100%	$5,100	$5,100
Long term storage tanks	Storage tanks	0%	$4,230	$0

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$114,620	**$57,756**

** Depreciation and RUC values are for illustrative purposes only, yours will vary depending on BBB rates, depreciation methods, equipment life, etc.*

Operating and Maintenance Costs:				
Description	Category	Percent Allowed	Total Yearly Operating and Maintenance	Allowed Yearly Operating and Maintenance
Mol Sieve Dehydrator Operating and Maintenance	Dehydration	20% Allowed	50,000	10,000
Turbo Expander Operating and Maintenance	NGL recovery	100%	$2,560	$2,560
Residue Boosting Operating and Maintenance	Boosting equipment	0%	$5,400	$0
Inlet Compression Operating and Maintenance	Compression	60%	$5,400	$3,240
			$63,360	**$15,800**

15) Sum all annual depreciation, return on undepreciated capital investment, operating and maintenance costs, as shown above.

16) Calculate the UCA for allowed processing:

$$\text{UCA for allowed processing (using Depreciation and RUC method)} = \left[\frac{\text{Total Yearly Depreciation and RUC on Allowed Processing Units + Allowable Operating and Maintanence}}{\text{Total Yearly Depreciation and RUC on all Processing Units + Total Operating and Maintanence}}\right] = \frac{\$57,756+\$15,800}{\$114,620+\$63,360} =$$

$$41\% \; allowed$$

17) Allowed and non-allowed UCAs should be calculated for each mainline in the system. Repeat the above procedure for each mainline.

18) Apply the allowed UCAs to calculate your Transportation and Processing Allowance when reporting and paying royalties.

Note: The above UCA calculation is an example of the simplest case scenario. If your plant varies significantly from the above example and you need assistance please refer to 30 CFR §1206.158 -

Suggested Unbundling Method

§1206.160 Federal gas and 30 CFR §1206.179 – §1206.181 for Indian gas. If you need further assistance, please send an e-mail to **onrrunbundling@onrr.gov.**

For a complete list of what might be asked by ONRR in our attempt to unbundle see the **List of Accounting and Cost Data Needs** and **List of Engineering Data Needs Document**

Suggested Unbundling Method