



COMISION REGULADORA DE ENERGIA

## ANEXO 3

# CARACTERISTICAS DE TECNOLOGIA, DISEÑO, INGENIERIA Y CONSTRUCCION





COMISION REGULADORA DE ENERGIA

### ANEXO 3

## CARACTERISTICAS DE TECNOLOGIA, DISEÑO, INGENIERIA Y CONSTRUCCION

- Apéndice 3.1 Memoria técnico-descriptiva del sistema de transporte.
- Apéndice 3.2 Especificaciones y características del sistema de transporte.
- Apéndice 3.3 Códigos y normas aplicables.





COMISION REGULADORA DE ENERGIA

Este anexo señala las especificaciones técnicas a que se sujetarán el diseño y la construcción del sistema de transporte, así como las características de tecnología e ingeniería del mismo, incluyendo los puntos de recepción y entrega del gas en dicho sistema.





COMISION REGULADORA DE ENERGIA

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## CARACTERISTICAS DE TECNOLOGIA, DISEÑO, INGENIERIA Y CONSTRUCCION

Apéndice 3.1 Memoria técnico-descriptiva del sistema de transporte.





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## **Análisis de flujos y capacidad**

Cálculo de la capacidad de transporte

En esta sección se presenta la capacidad del sistema de transporte Naco-Hermosillo. Asimismo se muestra la información necesaria para que cualquier interesado pueda reproducir el cálculo realizado.

### **Descripción del sistema**

El sistema aislado Naco-Hermosillo lo constituye un ducto de 406.4 mm (16 pulgadas), 339 Km . de longitud y 4 estaciones de medición y regulación.

Tiene dos puntos de extracción principales que son:

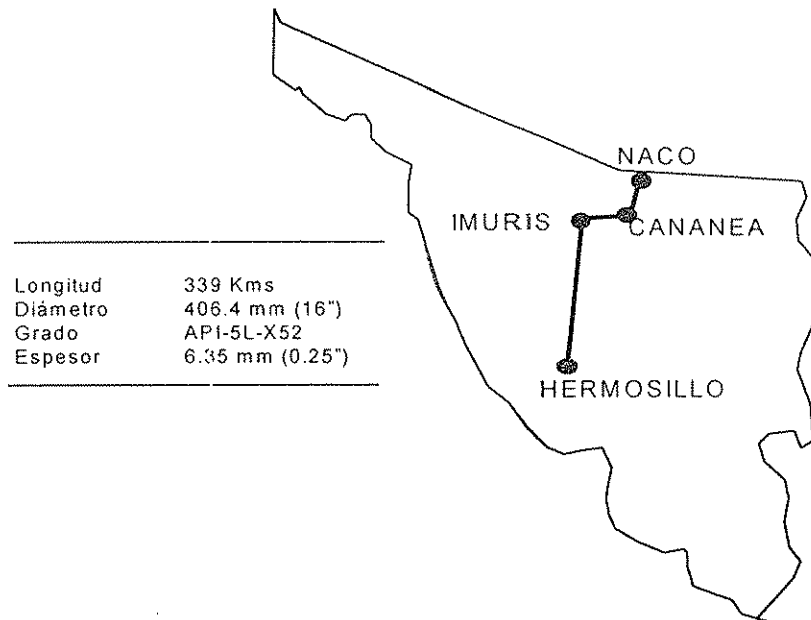
- En el Km 57+000 próximo a la ciudad de Cananea, Sonora
- Al final del ducto en Hermosillo, Sonora

En la siguiente gráfica se muestra la trayectoria de este sistema aislado.





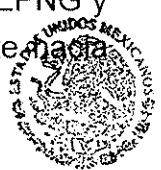
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**Gráfica 1****Estado de Sonora y Sistema Naco-Hermosillo**

Este sistema tiene un sólo punto de inyección en la localidad de Naco, Sonora, donde el gas alimentado proviene del sistema de transporte de El Paso Natural Gas (EPNG), particularmente del ramal denominado "Deming-Douglas-Bisbee" que parte de la línea troncal "El Paso", perteneciente a dicha compañía.

Es importante hacer notar el efecto que este ramal tiene sobre la capacidad del sistema Naco-Hermosillo; dicho ramal consta de un ducto de 304.8 mm. (12 pulgadas) con más de 160 Km. y un ducto de 254 mm. de aproximadamente (10 pulgadas), de aproximadamente 16 Km., cercano al punto de interconexión en Naco, Sonora.

Toda vez que este ramal está conectado al sistema de presión media de EPNG y dado los diámetros pequeños, se tiene una baja capacidad de transporte.



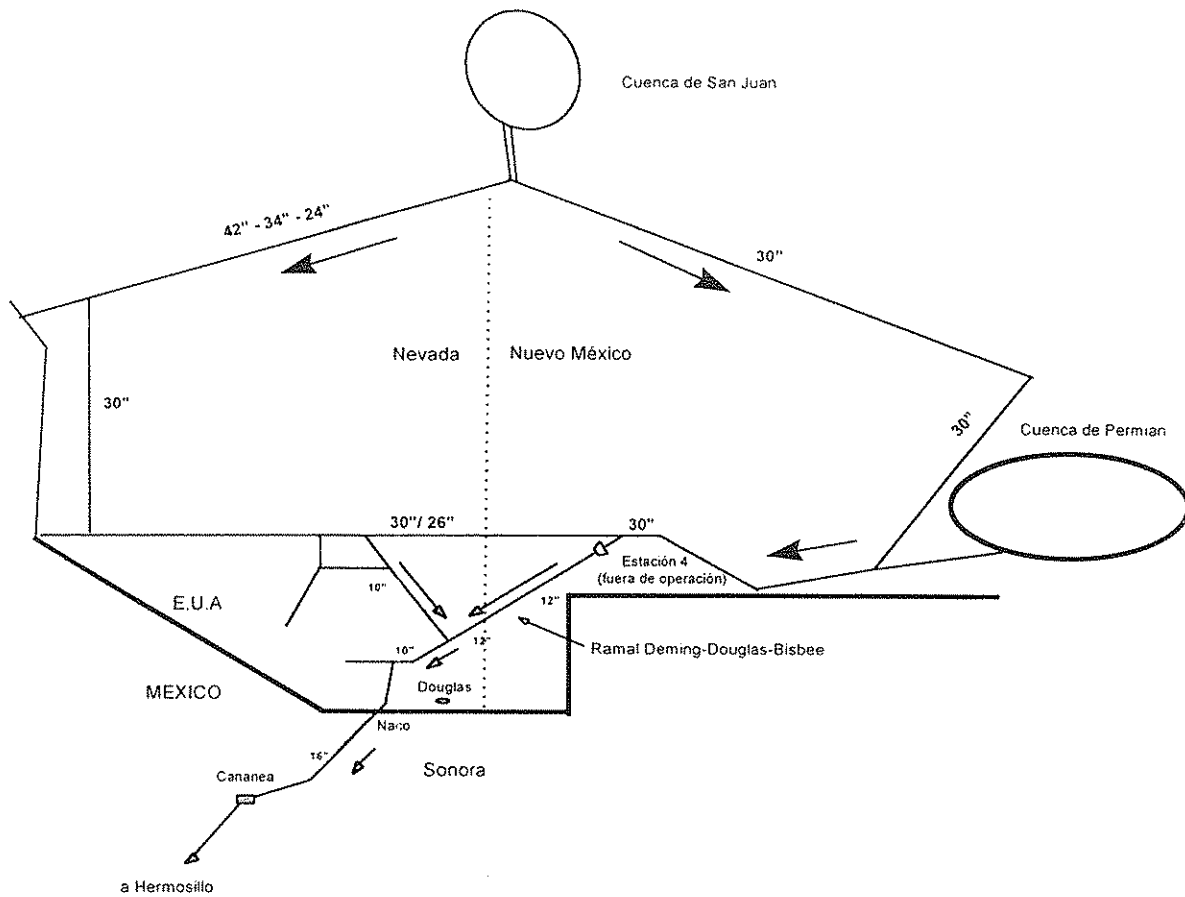


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Naco. El incremento de capacidad de este ramal implicaría la construcción, por parte de EPNG, de algunos libramientos e incremento de compresión.

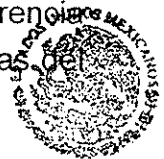
**Gráfica 2**

**Ramal Deming-Douglas-Bisbee del EPNG**



**Transporte de gas natural**

El gas natural fluye debido a la diferencial de presiones entre los extremos de un ducto. Asimismo, el flujo se ve afectado por la composición del gas, la diferencia de alturas sobre el nivel del mar, temperatura y por las características físicas del ducto: diámetro, rugosidad de las paredes internas y la longitud.





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Para ductos de grandes diámetros y longitudes y elevadas presiones una de las ecuaciones que mejor se aproxima al comportamiento del gas es la ecuación Panhandle-B, en unidades inglesas:

$$Q = 737E \left( \frac{T_0}{P_0} \right)^{1.02} D_i^{2.53} \left( \frac{(P_1^2 - P_2^2) - \frac{0.0375G(h_1 - h_2)P_m^2}{Z_m T_m}}{G^{0.961} Z_m T_m L} \right)^{0.51}$$

$$P_m = \frac{2}{3} \left( P_1 + P_2 - \frac{P_1 P_2}{P_1 + P_2} \right)$$

donde:

- Q es el flujo transportado en pies cúbicos por día
- $D_i$  es el diámetro interno del ducto en pulgadas.
- L la longitud en millas.
- $Z_m$  es el factor de compresibilidad del gas natural, que es adimensional calculado mediante la ecuación AGA NX-19 a condiciones  $T_m$  y  $P_m$ .
- $T_0$  y  $P_0$  son la temperatura y presión a las condiciones base de medición en °R (grados Rankine) y psia (lbs/pulg<sup>2</sup> abs.), en México  $T_0 = 528$  °R y  $P_0 = 14.22$  psia (1 kg/cm<sup>2</sup>).
- $P_1$  y  $P_2$  son las presiones en ambos extremos del ducto en psia.
- $P_m$  es la presión media en el tramo, es la presión utilizada en el cálculo del factor de compresibilidad.
- G es la gravedad específica del gas, i.e. densidad relativa a la del aire.
- $h_1$  y  $h_2$  son las alturas sobre el nivel del mar de los extremos del ducto en pies.







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- $T_m$  es la temperatura media de flujo, normalmente es constante pues los ductos son subterráneos, se toma 545 °R.
- E es la eficiencia de flujo adimensional, depende principalmente de la rugosidad y edad del ducto, en el sistema de ductos de PGPB una eficiencia del 85% es comunmente utilizada, pues resulta coherente con los datos de campo.

Para la simulación del ducto se utilizó el simulador SWS (Stoner Workstation Service), una de las mejores herramientas de simulación, utilizado por diversas compañías de transporte de gas e inclusive cuerpos regulatorios como la FERC en EUA.

### Restricciones consideradas

#### *Comportamiento de los ductos bajo presión y clase de localización*

La máxima presión que puede soportar un ducto sin daño irreversible depende del espesor, diámetro, tipo de material que lo compone, así como la clase de localización. Estas cantidades se relacionan entre si de acuerdo a la fórmula de Barlow:

$$P = \frac{2St}{D} FET$$

donde:

- P es la presión manométrica máxima permisible de operación del ducto en lbs/pulg<sup>2</sup> (psi)
- S es el esfuerzo mínimo de cedencia del material del ducto.
- t es el espesor del ducto en las mismas unidades que el diámetro
- D es el diámetro exterior del ducto, en pulgadas
- F es un factor de ajuste que depende de la clase de localización





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E es un factor de junta soldable, que depende del tipo de soldadura empleada y de las características del material, para este ducto en particular el factor es 1

T es un factor dependiente de la temperatura de flujo que a las condiciones normales de operación es 1

La clase de localización es una característica que indica la densidad poblacional en las cercanías del ducto. En el siguiente cuadro se muestra el valor del factor que se utiliza en la ecuación de Barlow para cada clase de acuerdo con la norma ANSI B 31.8 "Gas Transmission and Distribution Piping Systems" en su capítulo IV.

**Cuadro 1**  
**Clases de localización de ductos de transporte**





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Clase	Factor	Descripción
I	0.72	menos de 11 construcciones en una área unitaria de 1,600 mts. de largo y 200 mts. a ambos lados del eje del ducto.
II	0.6	De 11 a 49 construcciones en una área de 1,600 mts. de largo y 200 mts. a ambos lados del eje del ducto.
III	0.5	Cuando se cumple alguna de las siguientes condiciones: <ul style="list-style-type: none"> <li>a) Más de 49 construcciones en una área de 1,600 mts. de largo y 200 mts. a ambos lados del eje del ducto.</li> <li>b) Una o más construcciones a menos de 100 m del eje del ducto y se encuentre ocupada normalmente por 20 o más personas.</li> <li>c) Un área existente al aire libre normalmente ocupada por 20 o más personas, como un estadio, un templo, teatro o lugar público de reunión.</li> <li>d) Hay un fraccionamiento a menos de 100 metros del eje del ducto.</li> <li>e) Hay una carretera o instalaciones subterráneas a menos de 100 metros del ducto.</li> </ul>
IV	0.4	Zonas de tránsito pesado, construcción subterránea, edificios altos, hospitales, escuelas, etc. en una área de 1,600 mts. de largo y 200 mts. a ambos lados del eje del ducto.

El sistema que nos interesa en su mayor parte cruza por zonas deshabitadas, no obstante, ha sufrido cambios en la clase de localización en algunos de sus tramos.

**Características del gas Transportado**

Una composición representativa del gas natural que fluye en el ducto Naco-Hermosillo se presenta en el siguiente cuadro:

**Cuadro 2**  
**Composición del gas natural considerada.**





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Composición del gas	% mol
TOTAL	100.00
CO <sub>2</sub>	0.86
H <sub>2</sub> S	0.0
N <sub>2</sub>	1.58
C1	92.42
C2	3.97
C3	0.84
iC4	0.08
nC4	0.13
iC5	0.04
nC5	0.03
C6 +	0.05

Esta composición corresponde a un gas de poder calorífico de 36.22 MJ/m<sup>3</sup>, (equivalente a 8655 kcal/m<sup>3</sup> y 1,023 Btu/pc) superior al mínimo establecido por la NOM-001-SE-1997 de 35.42 MJ/m<sup>3</sup>. El nivel de licuables, como el propano y más pesados, es inferior al límite superior establecido por la misma norma que es de 0.059 l/m<sup>3</sup>. Los niveles de N<sub>2</sub> y CO<sub>2</sub> son menores al 3% en volumen que la norma establece. El sistema debe aceptar cualquier gas que cumpla la NOM-001-SE-1997, por ello se considera para transporte de energía el poder calorífico mínimo establecido por la norma de 35.42 MJ/m<sup>3</sup>.

### Inyecciones y extracciones de gas natural

El patrón de flujo es completamente lineal y no puede presentar cambios en el sentido del flujo. Dado que no hay inyecciones a lo largo del ducto, las características del gas no varían desde su inyección hasta los usuarios finales. Sin embargo es muy importante recalcar las principales limitaciones a la capacidad del ducto provienen de las limitaciones en el sistema de El Paso Natural Gas.





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### ***Inyección de gas natural al sistema Naco-Hermosillo***

La inyección considerada para el cálculo de capacidad es la máxima que puede manejar la infraestructura propiedad de Pemex-Gas. Esta se muestra en el siguiente cuadro:

#### **Cuadro 3**

#### **Condiciones de inyección en Naco, Sonora (0 + 000 km)**

Capacidad nominal	30,062 MJ/d 7,182 Gcal/d 28,500 MMBtu/d 30 mmscf/d <sup>(1)</sup> 0.83 M m3/d <sup>(2)</sup>
Presión de Inyección:	31.03 barg (450 psig)
Temperatura de recepción y flujo:	302.7 K (545 °R)
	(1) a condiciones base 14.22 psia y 67.67°F
	(2) a condiciones base 1 kg/cm2 y 20°C

### ***Extracciones de gas natural del sistema nacional de ductos***

A continuación se presentan los flujos volumétricos en los diferentes puntos de entrega a lo largo del Sistema aislado Naco-Hermosillo y que son resultado de tomar en cuenta las condiciones de inyección, las máximas presiones permisibles de operación del ducto y las condiciones de entrega a los diferentes usuarios.

#### **Cuadro 4**

#### **Condiciones de entrega a Cananea, Sonora (57 + 000 km)**

TJ/d	GCal/d	mMBtu	mmpcd	Mm3/d	Presión
------	--------	-------	-------	-------	---------

G/059/TRA/99

3 001 010



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Cananea	15.031	3,591	14,250	15	0.425	27. bars (397 psia)
Hermosillo	15.031	3,591	14,250	15	0.425	18.14 bars (263 psia)
Total	30.062	7,182	28,500	30	0.83	

\*La temperatura del gas es en ambos casos es 302.7 K (545 °R)

### Condiciones para análisis del ducto

A continuación se resumen las principales características del ducto utilizadas en la determinación de las capacidades del mismo:

#### Cuadro 5 Condiciones de diseño del ducto

Eficiencia	0.85
Temperatura promedio del flujo	302.7 K (545 °R)

#### Cuadro 6 Características del ducto

Diámetro	406.4 mm(16 plg)
Espesor de la pared	6.35 mm (0.250 plg, mínimo)
Longitud del ducto	339 km
Especificación	API-5L Grado X52
Límite de cedencia	3,657 kg/cm <sup>2</sup> (52,000 psig)
Presión máxima permisible de op. (MPPO)	69 kg/cm <sup>2</sup> (980 psig)

#### Cuadro 7 Condiciones ambientales

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Altitud sobre el nivel medio del mar	
Inicio del ducto:	1,394.35 m
Punto alto:	1,839.62 m
Punto bajo:	234.86 m
Punto final del ducto:	243.39 m

### **Empaque de gas natural en el sistema nacional de ductos**

El empaque es el gas contenido en el volumen interno de los ductos de un sistema. Cada segmento tiene un conjunto de condiciones de presión y temperatura particulares, en general, distintas de las condiciones base ( $T_0 = 20^\circ\text{C}$  y  $P_0 = 1 \text{ kg/cm}^2$ ). Por ello hay que ajustar el volumen de gas a condiciones base y así poder compararlos adecuadamente. La suma de los empaques ajustados de todos los segmentos es el empaque total del sistema.

Los resultados obtenidos son:

#### **Cuadro 8** **Empaque del sistema Naco-Hermosillo** M m3(MMPC)

<b>Empaque Total</b>	<b>1.05 (37)</b>
Sistema de Naco-Hermosillo	

### **Resultados del cálculo de la capacidad de Transporte**

La capacidad de transporte del Sistema Naco-Hermosillo, asciende a 7,182 Gigacalorías diarias, que corresponde a 30.062TJ/d, 28,500 MMBtu/d, 0.83 M m3/d,

30MMPCD en condiciones base  $20^\circ\text{C}$  y  $1 \text{ Kg/cm}^2$ .

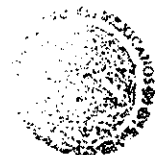
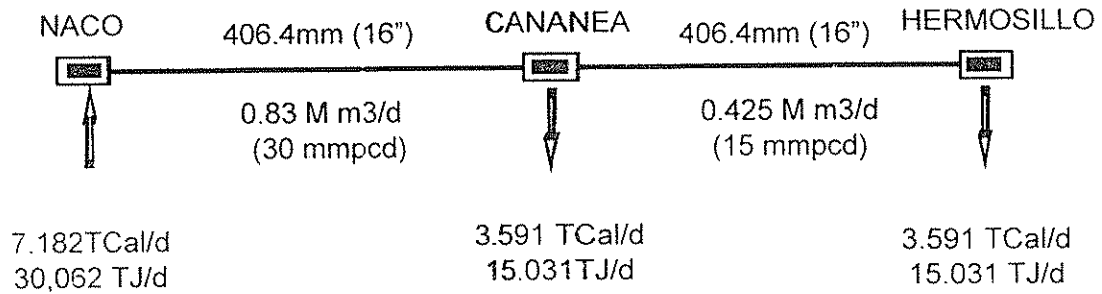
En el siguiente diagrama se resumen los resultados del análisis de capacidades:





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**Gráfica 3**  
**Capacidad de transporte del Sistema Naco-Hermosillo**





REPORTE STONER WORKSTATION SERVICE  
SIMULACIÓN DE DUCTOS DE TRASPORTE DE GAS NATURAL

Naco2

February 06, 1998 at 01:36 PM

Stoner Workstation Service  
Stoner Associates, Inc.  
1170 Harrisburg Pike  
Carlisle, PA 17013

3 001 014



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FULL NCE RESULTS FOR:

RUN ON 06-FEB98 AT 13:35:34

FROM	TO	F-P	T-P	TYPE	MMCFD	PARAM.	REMARKS
NACO	N1	450.	450.S	PB	50.000	15.500 V=	13.2 PSI2/MI= 1164
					LEN= 0.622		
N1	N2	450.S	449.S	PB	50.000	15.500 V=	13.2 PSI2/MI= 1164
					LEN= 0.622		
N2	N3	449.S	448.S	PB	50.000	15.500 V=	13.2 PSI2/MI= 1164
					LEN= 0.622		
N3	N4	448.S	447.S	PB	50.000	15.500 V=	13.3 PSI2/MI= 1164
					LEN= 0.622		
N4	N5	447.S	445.S	PB	50.000	15.500 V=	13.3 PSI2/MI= 1164
					LEN= 0.622		
N5	N6	445.S	444.S	PB	50.000	15.500 V=	13.4 PSI2/MI= 1165
					LEN= 0.622		
N6	N7	444.S	443.S	PB	50.000	15.500 V=	13.4 PSI2/MI= 1165
					LEN= 0.622		
N7	N8	443.S	442.S	PB	50.000	15.500 V=	13.4 PSI2/MI= 1165
					LEN= 0.622		
N8	N9	442.S	441.S	PB	50.000	15.500 V=	13.5 PSI2/MI= 1165
					LEN= 0.622		
N9	N10	441.S	440.S	PB	50.000	15.500 V=	13.5 PSI2/MI= 1165
					LEN= 0.622		
N10	N11	440.S	439.S	PB	50.000	15.500 V=	13.5 PSI2/MI= 1166
					LEN= 0.622		
N11	N12	439.S	437.S	PB	50.000	15.500 V=	13.6 PSI2/MI= 1166
					LEN= 0.622		
N12	N13	437.S	436.S	PB	50.000	15.500 V=	13.6 PSI2/MI= 1166
					LEN= 0.622		
N13	N14	436.S	434.S	PB	50.000	15.500 V=	13.7 PSI2/MI= 1166
					LEN= 0.622		
N14	N15	434.S	432.S	PB	50.000	15.500 V=	13.8 PSI2/MI= 1167
					LEN= 0.622		
N15	N16	432.S	430.S	PB	50.000	15.500 V=	13.8 PSI2/MI= 1167
					LEN= 0.622		
N16	N17	430.S	428.S	PB	50.000	15.500 V=	13.9 PSI2/MI= 1167
					LEN= 0.622		
N17	N18	428.S	428.S	PB	50.000	15.500 V=	13.9 PSI2/MI= 1167
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N18	N19	428.S	426.S	PB	50.000	15.500 V=	14.0 PSI2/MI= 1168
					LEN= 0.622		
N19	N20	426.S	426.S	PB	50.000	15.500 V=	14.0 PSI2/MI= 1168
					LEN= 0.622		
N20	N21	426.S	426.S	PB	50.000	15.500 V=	14.0 PSI2/MI= 1168
					LEN= 0.622		
N21	N22	426.S	425.S	PB	50.000	15.500 V=	14.0 PSI2/MI= 1168
					LEN= 0.622		
N22	N23	425.S	424.S	PB	50.000	15.500 V=	14.0 PSI2/MI= 1168
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N23	N24	424.S	424.S	PB	50.000	15.500 V=	14.0 PSI2/MI= 1168
					LEN= 0.622		
N24	N25	424.S	425.S	PB	50.000	15.500 V=	14.0 PSI2/MI= 1168
					LEN= 0.622		
N25	N26	425.S	425.S	PB	50.000	15.500 V=	14.0 PSI2/MI= 1168
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N26	N27	425.S	424.S	PB	50.000	15.500 V=	14.0 PSI2/MI= 1168
					LEN= 0.622		
N27	N28	424.S	424.S	PB	50.000	15.500 V=	14.0 PSI2/MI= 1168
					LEN= 0.622		
N28	N29	424.S	423.S	PB	50.000	15.500 V=	14.0 PSI2/MI= 1168
					LEN= 0.622		
N29	N30	423.S	423.S	PB	50.000	15.500 V=	14.0 PSI2/MI= 1168



N30	N31	423.S	423.S	PB	LEN= 0.622 50.000 15.500 V= 14.1 PSI2/MI= 1168
N31	N32	423.S	422.S	PB	LEN= 0.622 50.000 15.500 V= 14.1 PSI2/MI= 1168
N32	N33	422.S	422.S	PB	LEN= 0.622 50.000 15.500 V= 14.1 PSI2/MI= 1168
N33	N34	422.S	421.S	PB	LEN= 0.622 50.000 15.500 V= 14.1 PSI2/MI= 1168
N34	N35	421.S	419.S	PB	LEN= 0.622 50.000 15.500 V= 14.2 PSI2/MI= 1169
N35	N36	419.S	419.S	PB	LEN= 0.622 50.000 15.500 V= 14.2 PSI2/MI= 1169
N36	N37	419.S	418.S	PB	LEN= 0.622 50.000 15.500 V= 14.2 PSI2/MI= 1169
N37	N38	418.S	418.S	PB	LEN= 0.622 50.000 15.500 V= 14.2 PSI2/MI= 1169
N38	N39	418.S	416.S	PB	LEN= 0.622 50.000 15.500 V= 14.3 PSI2/MI= 1169
N39	N40	416.S	415.S	PB	LEN= 0.622 50.000 15.500 V= 14.3 PSI2/MI= 1169
N40	N41	415.S	415.S	PB	LEN= 0.622 50.000 15.500 V= 14.3 PSI2/MI= 1169
N41	N42	415.S	414.S	PB	LEN= 0.622 50.000 15.500 V= 14.4 PSI2/MI= 1169
N42	N43	414.S	413.S	PB	LEN= 0.622 50.000 15.500 V= 14.4 PSI2/MI= 1170
N43	N44	413.S	413.S	PB	LEN= 0.622 50.000 15.500 V= 14.4 PSI2/MI= 1170
N44	N45	413.S	412.S	PB	LEN= 0.622 50.000 15.500 V= 14.4 PSI2/MI= 1170
N45	N46	412.S	411.S	PB	LEN= 0.622 50.000 15.500 V= 14.5 PSI2/MI= 1170
N46	N47	411.S	410.S	PB	LEN= 0.622 50.000 15.500 V= 14.5 PSI2/MI= 1170
N47	N48	410.S	409.S	PB	LEN= 0.622 50.000 15.500 V= 14.6 PSI2/MI= 1170
N48	N49	409.S	408.S	PB	LEN= 0.622 50.000 15.500 V= 14.6 PSI2/MI= 1170
N49	N50	408.S	407.S	PB	LEN= 0.622 50.000 15.500 V= 14.6 PSI2/MI= 1171
N50	N51	407.S	406.S	PB	LEN= 0.622 50.000 15.500 V= 14.7 PSI2/MI= 1171
N51	N52	406.S	404.S	PB	LEN= 0.622 50.000 15.500 V= 14.7 PSI2/MI= 1171
N52	N53	404.S	403.S	PB	LEN= 0.622 50.000 15.500 V= 14.8 PSI2/MI= 1171
N53	N54	403.S	402.S	PB	LEN= 0.622 50.000 15.500 V= 14.8 PSI2/MI= 1171
N54	N55	402.S	401.S	PB	LEN= 0.622 50.000 15.500 V= 14.8 PSI2/MI= 1172
N55	CANANEA	401.S	399.S	PB	LEN= 0.622 50.000 15.500 V= 14.9 PSI2/MI= 1172
CANANEA	N57	399.S	398.S	PB	LEN= 0.622 35.000 15.500 V= 10.5 PSI2/MI= 582
N57	N58	398.S	397.S	PB	LEN= 0.622 35.000 15.500 V= 10.5 PSI2/MI= 582
N58	N59	397.S	396.S	PB	LEN= 0.622 35.000 15.500 V= 10.5 PSI2/MI= 583
N59	N60	396.S	395.S	PB	LEN= 0.622 35.000 15.500 V= 10.6 PSI2/MI= 583
N60	N61	395.S	394.S	PB	LEN= 0.622 35.000 15.500 V= 10.6 PSI2/MI= 583
N61	N62	394.S	393.S	PB	LEN= 0.622 35.000 15.500 V= 10.6 PSI2/MI= 583
N62	N63	393.S	393.S	PB	LEN= 0.622 35.000 15.500 V= 10.6 PSI2/MI= 583
N63	N64	393.S	390.S	PB	LEN= 0.622 35.000 15.500 V= 10.7 PSI2/MI= 583
N64	N65	390.S	390.S	PB	LEN= 0.622 35.000 15.500 V= 10.7 PSI2/MI= 583



N65	N66	390.S	388.S	PB	LEN= 0.622	35.000	15.500	V=	10.8	PSI2/MI=	583
N66	N67	388.S	386.S	PB	LEN= 0.622	35.000	15.500	V=	10.8	PSI2/MI=	583
N67	N68	386.S	386.S	PB	LEN= 0.622	35.000	15.500	V=	10.8	PSI2/MI=	583
N68	N69	386.S	390.S	PB	LEN= 0.622	35.000	15.500	V=	10.8	PSI2/MI=	583
N69	N70	390.S	392.S	PB	LEN= 0.622	35.000	15.500	V=	10.7	PSI2/MI=	583
N70	N71	392.S	394.S	PB	LEN= 0.622	35.000	15.500	V=	10.6	PSI2/MI=	583
N71	N72	394.S	395.S	PB	LEN= 0.622	35.000	15.500	V=	10.6	PSI2/MI=	583
N72	N73	395.S	393.S	PB	LEN= 0.622	35.000	15.500	V=	10.6	PSI2/MI=	583
N73	N74	393.S	396.S	PB	LEN= 0.622	35.000	15.500	V=	10.6	PSI2/MI=	583
N74	N75	396.S	396.S	PB	LEN= 0.622	35.000	15.500	V=	10.5	PSI2/MI=	583
N75	N76	396.S	396.S	PB	LEN= 0.622	35.000	15.500	V=	10.5	PSI2/MI=	583
N76	N77	396.S	396.S	PB	LEN= 0.622	35.000	15.500	V=	10.5	PSI2/MI=	583
N77	N78	396.S	397.S	PB	LEN= 0.622	35.000	15.500	V=	10.5	PSI2/MI=	583
N78	N79	397.S	395.S	PB	LEN= 0.622	35.000	15.500	V=	10.5	PSI2/MI=	583
N79	N80	395.S	396.S	PB	LEN= 0.622	35.000	15.500	V=	10.5	PSI2/MI=	583
N80	N81	396.S	394.S	PB	LEN= 0.622	35.000	15.500	V=	10.6	PSI2/MI=	583
N81	N82	394.S	396.S	PB	LEN= 0.622	35.000	15.500	V=	10.6	PSI2/MI=	583
N82	N83	396.S	396.S	PB	LEN= 0.622	35.000	15.500	V=	10.5	PSI2/MI=	583
N83	N84	396.S	396.S	PB	LEN= 0.622	35.000	15.500	V=	10.5	PSI2/MI=	583
N84	N85	396.S	397.S	PB	LEN= 0.622	35.000	15.500	V=	10.5	PSI2/MI=	582
N85	N86	397.S	397.S	PB	LEN= 0.622	35.000	15.500	V=	10.5	PSI2/MI=	582
N86	N87	397.S	397.S	PB	LEN= 0.622	35.000	15.500	V=	10.5	PSI2/MI=	582
N87	N88	397.S	396.S	PB	LEN= 0.622	35.000	15.500	V=	10.5	PSI2/MI=	582
N88	N89	396.S	396.S	PB	LEN= 0.622	35.000	15.500	V=	10.5	PSI2/MI=	582
N89	N90	396.S	396.S	PB	LEN= 0.622	35.000	15.500	V=	10.5	PSI2/MI=	583
N90	N91	396.S	395.S	PB	LEN= 0.622	35.000	15.500	V=	10.5	PSI2/MI=	583
N91	N92	395.S	395.S	PB	LEN= 0.622	35.000	15.500	V=	10.5	PSI2/MI=	583
N92	N93	395.S	395.S	PB	LEN= 0.622	35.000	15.500	V=	10.5	PSI2/MI=	583
N93	N94	395.S	394.S	PB	LEN= 0.622	35.000	15.500	V=	10.6	PSI2/MI=	583
N94	N95	394.S	394.S	PB	LEN= 0.622	35.000	15.500	V=	10.6	PSI2/MI=	583
N95	N96	394.S	394.S	PB	LEN= 0.622	35.000	15.500	V=	10.6	PSI2/MI=	583
N96	N97	394.S	393.S	PB	LEN= 0.622	35.000	15.500	V=	10.6	PSI2/MI=	583
N97	N98	393.S	394.S	PB	LEN= 0.622	35.000	15.500	V=	10.6	PSI2/MI=	583
N98	N99	394.S	394.S	PB	LEN= 0.622	35.000	15.500	V=	10.6	PSI2/MI=	583
N99	N100	394.S	394.S	PB	LEN= 0.622	35.000	15.500	V=	10.6	PSI2/MI=	583

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COMISION REGULADORA  
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N100	N101	394.S	393.S	PB	LEN= 0.622	35.000	15.500	V=	10.6	PSI2/MI=	583
N101	N102	393.S	393.S	PB	LEN= 0.622	35.000	15.500	V=	10.6	PSI2/MI=	583
N102	N103	393.S	392.S	PB	LEN= 0.622	35.000	15.500	V=	10.6	PSI2/MI=	583
N103	N104	392.S	392.S	PB	LEN= 0.622	35.000	15.500	V=	10.6	PSI2/MI=	583
N104	N105	392.S	392.S	PB	LEN= 0.622	35.000	15.500	V=	10.6	PSI2/MI=	583
N105	N106	392.S	391.S	PB	LEN= 0.622	35.000	15.500	V=	10.6	PSI2/MI=	583
N106	N107	391.S	392.S	PB	LEN= 0.622	35.000	15.500	V=	10.6	PSI2/MI=	583
N107	N108	392.S	392.S	PB	LEN= 0.622	35.000	15.500	V=	10.6	PSI2/MI=	583
N108	N109	392.S	391.S	PB	LEN= 0.622	35.000	15.500	V=	10.6	PSI2/MI=	583
N109	N110	391.S	391.S	PB	LEN= 0.622	35.000	15.500	V=	10.6	PSI2/MI=	583
N110	N111	391.S	390.S	PB	LEN= 0.622	35.000	15.500	V=	10.7	PSI2/MI=	583
N111	N112	390.S	390.S	PB	LEN= 0.622	35.000	15.500	V=	10.7	PSI2/MI=	583
N112	N113	390.S	389.S	PB	LEN= 0.622	35.000	15.500	V=	10.7	PSI2/MI=	583
N113	N114	389.S	389.S	PB	LEN= 0.622	35.000	15.500	V=	10.7	PSI2/MI=	583
N114	N115	389.S	389.S	PB	LEN= 0.622	35.000	15.500	V=	10.7	PSI2/MI=	583
N115	N116	389.S	390.S	PB	LEN= 0.622	35.000	15.500	V=	10.7	PSI2/MI=	583
N116	N117	390.S	389.S	PB	LEN= 0.622	35.000	15.500	V=	10.7	PSI2/MI=	583
N117	N118	389.S	389.S	PB	LEN= 0.622	35.000	15.500	V=	10.7	PSI2/MI=	583
N118	N119	389.S	389.S	PB	LEN= 0.622	35.000	15.500	V=	10.7	PSI2/MI=	583
N119	N120	389.S	388.S	PB	LEN= 0.622	35.000	15.500	V=	10.7	PSI2/MI=	583
N120	N121	388.S	388.S	PB	LEN= 0.622	35.000	15.500	V=	10.7	PSI2/MI=	583
N121	N122	388.S	388.S	PB	LEN= 0.622	35.000	15.500	V=	10.7	PSI2/MI=	583
N122	N123	388.S	387.S	PB	LEN= 0.622	35.000	15.500	V=	10.7	PSI2/MI=	583
N123	N124	387.S	387.S	PB	LEN= 0.622	35.000	15.500	V=	10.8	PSI2/MI=	583
N124	N125	387.S	386.S	PB	LEN= 0.622	35.000	15.500	V=	10.8	PSI2/MI=	583
N125	N126	386.S	387.S	PB	LEN= 0.622	35.000	15.500	V=	10.8	PSI2/MI=	583
N126	N127	387.S	385.S	PB	LEN= 0.622	35.000	15.500	V=	10.8	PSI2/MI=	583
N127	N128	385.S	385.S	PB	LEN= 0.622	35.000	15.500	V=	10.8	PSI2/MI=	583
N128	N129	385.S	384.S	PB	LEN= 0.622	35.000	15.500	V=	10.8	PSI2/MI=	583
N129	N130	384.S	383.S	PB	LEN= 0.622	35.000	15.500	V=	10.9	PSI2/MI=	584
N130	N131	383.S	382.S	PB	LEN= 0.622	35.000	15.500	V=	10.9	PSI2/MI=	584
N131	N132	382.S	382.S	PB	LEN= 0.622	35.000	15.500	V=	10.9	PSI2/MI=	584
N132	N133	382.S	382.S	PB	LEN= 0.622	35.000	15.500	V=	10.9	PSI2/MI=	584
N133	N134	382.S	382.S	PB	LEN= 0.622	35.000	15.500	V=	10.9	PSI2/MI=	584
N134	N135	382.S	381.S	PB	LEN= 0.622	35.000	15.500	V=	10.9	PSI2/MI=	584



N135	N136	381.S	381.S	PB	LEN= 0.622	35.000	15.500	V=	10.9	PSI2/MI=	584
N136	N137	381.S	381.S	PB	LEN= 0.622	35.000	15.500	V=	10.9	PSI2/MI=	584
N137	N138	381.S	381.S	PB	LEN= 0.622	35.000	15.500	V=	10.9	PSI2/MI=	584
N138	N139	381.S	381.S	PB	LEN= 0.622	35.000	15.500	V=	10.9	PSI2/MI=	584
N139	N140	381.S	381.S	PB	LEN= 0.622	35.000	15.500	V=	10.9	PSI2/MI=	584
N140	N141	381.S	381.S	PB	LEN= 0.622	35.000	15.500	V=	10.9	PSI2/MI=	584
N141	N142	381.S	380.S	PB	LEN= 0.622	35.000	15.500	V=	10.9	PSI2/MI=	584
N142	N143	380.S	380.S	PB	LEN= 0.622	35.000	15.500	V=	10.9	PSI2/MI=	584
N143	N144	380.S	380.S	PB	LEN= 0.622	35.000	15.500	V=	10.9	PSI2/MI=	584
N144	N145	380.S	379.S	PB	LEN= 0.622	35.000	15.500	V=	11.0	PSI2/MI=	584
N145	N146	379.S	379.S	PB	LEN= 0.622	35.000	15.500	V=	11.0	PSI2/MI=	584
N146	N147	379.S	379.S	PB	LEN= 0.622	35.000	15.500	V=	11.0	PSI2/MI=	584
N147	N148	379.S	379.S	PB	LEN= 0.622	35.000	15.500	V=	11.0	PSI2/MI=	584
N148	N149	379.S	378.S	PB	LEN= 0.622	35.000	15.500	V=	11.0	PSI2/MI=	584
N149	N150	378.S	378.S	PB	LEN= 0.622	35.000	15.500	V=	11.0	PSI2/MI=	584
N150	N151	378.S	377.S	PB	LEN= 0.622	35.000	15.500	V=	11.0	PSI2/MI=	584
N151	N152	377.S	377.S	PB	LEN= 0.622	35.000	15.500	V=	11.0	PSI2/MI=	584
N152	N153	377.S	376.S	PB	LEN= 0.622	35.000	15.500	V=	11.1	PSI2/MI=	584
N153	N154	376.S	374.S	PB	LEN= 0.622	35.000	15.500	V=	11.1	PSI2/MI=	584
N154	N155	374.S	373.S	PB	LEN= 0.622	35.000	15.500	V=	11.1	PSI2/MI=	584
N155	N156	373.S	372.S	PB	LEN= 0.622	35.000	15.500	V=	11.2	PSI2/MI=	584
N156	N157	372.S	372.S	PB	LEN= 0.622	35.000	15.500	V=	11.2	PSI2/MI=	584
N157	N158	372.S	373.S	PB	LEN= 0.622	35.000	15.500	V=	11.2	PSI2/MI=	584
N158	N159	373.S	373.S	PB	LEN= 0.622	35.000	15.500	V=	11.2	PSI2/MI=	584
N159	N160	373.S	389.S	PB	LEN= 0.622	35.000	15.500	V=	11.2	PSI2/MI=	584
N160	N161	389.S	372.S	PB	LEN= 0.622	35.000	15.500	V=	11.2	PSI2/MI=	584
N161	N162	372.S	372.S	PB	LEN= 0.622	35.000	15.500	V=	11.2	PSI2/MI=	584
N162	N163	372.S	372.S	PB	LEN= 0.622	35.000	15.500	V=	11.2	PSI2/MI=	584
N163	N164	372.S	372.S	PB	LEN= 0.622	35.000	15.500	V=	11.2	PSI2/MI=	584
N164	N165	372.S	372.S	PB	LEN= 0.622	35.000	15.500	V=	11.2	PSI2/MI=	584
N165	N166	372.S	371.S	PB	LEN= 0.622	35.000	15.500	V=	11.2	PSI2/MI=	584
N166	N167	371.S	371.S	PB	LEN= 0.622	35.000	15.500	V=	11.2	PSI2/MI=	584
N167	N168	371.S	371.S	PB	LEN= 0.622	35.000	15.500	V=	11.2	PSI2/MI=	584
N168	N169	371.S	370.S	PB	LEN= 0.622	35.000	15.500	V=	11.2	PSI2/MI=	585
N169	N170	370.S	370.S	PB	LEN= 0.622	35.000	15.500	V=	11.2	PSI2/MI=	585



N170	N171	370.S	369.S	PB	LEN= 0.622 35.000 15.500 V=	11.3 PSI2/MI=	585
N171	N172	369.S	368.S	PB	LEN= 0.622 35.000 15.500 V=	11.3 PSI2/MI=	585
N172	N173	368.S	368.S	PB	LEN= 0.622 35.000 15.500 V=	11.3 PSI2/MI=	585
N173	N174	368.S	367.S	PB	LEN= 0.622 35.000 15.500 V=	11.3 PSI2/MI=	585
N174	N175	367.S	367.S	PB	LEN= 0.622 35.000 15.500 V=	11.3 PSI2/MI=	585
N175	N176	367.S	366.S	PB	LEN= 0.622 35.000 15.500 V=	11.4 PSI2/MI=	585
N176	N177	366.S	366.S	PB	LEN= 0.622 35.000 15.500 V=	11.4 PSI2/MI=	585
N177	N178	366.S	365.S	PB	LEN= 0.622 35.000 15.500 V=	11.4 PSI2/MI=	585
N178	N179	365.S	365.S	PB	LEN= 0.622 35.000 15.500 V=	11.4 PSI2/MI=	585
N179	N180	365.S	365.S	PB	LEN= 0.622 35.000 15.500 V=	11.4 PSI2/MI=	585
N180	N181	365.S	364.S	PB	LEN= 0.622 35.000 15.500 V=	11.4 PSI2/MI=	585
N181	N182	364.S	364.S	PB	LEN= 0.622 35.000 15.500 V=	11.4 PSI2/MI=	585
N182	N183	364.S	363.S	PB	LEN= 0.622 35.000 15.500 V=	11.4 PSI2/MI=	585
N183	N184	363.S	363.S	PB	LEN= 0.622 35.000 15.500 V=	11.5 PSI2/MI=	585
N184	N185	363.S	363.S	PB	LEN= 0.622 35.000 15.500 V=	11.5 PSI2/MI=	585
N185	N186	363.S	362.S	PB	LEN= 0.622 35.000 15.500 V=	11.5 PSI2/MI=	585
N186	N187	362.S	362.S	PB	LEN= 0.622 35.000 15.500 V=	11.5 PSI2/MI=	585
N187	N188	362.S	361.S	PB	LEN= 0.622 35.000 15.500 V=	11.5 PSI2/MI=	585
N188	N189	361.S	361.S	PB	LEN= 0.622 35.000 15.500 V=	11.5 PSI2/MI=	585
N189	N190	361.S	360.S	PB	LEN= 0.622 35.000 15.500 V=	11.5 PSI2/MI=	585
N190	N191	360.S	360.S	PB	LEN= 0.622 35.000 15.500 V=	11.6 PSI2/MI=	585
N191	N192	360.S	359.S	PB	LEN= 0.622 35.000 15.500 V=	11.6 PSI2/MI=	585
N192	N193	359.S	358.S	PB	LEN= 0.622 35.000 15.500 V=	11.6 PSI2/MI=	585
N193	N194	358.S	358.S	PB	LEN= 0.622 35.000 15.500 V=	11.6 PSI2/MI=	585
N194	N195	358.S	357.S	PB	LEN= 0.622 35.000 15.500 V=	11.6 PSI2/MI=	586
N195	N196	357.S	357.S	PB	LEN= 0.622 35.000 15.500 V=	11.7 PSI2/MI=	586
N196	N197	357.S	356.S	PB	LEN= 0.622 35.000 15.500 V=	11.7 PSI2/MI=	586
N197	N198	356.S	355.S	PB	LEN= 0.622 35.000 15.500 V=	11.7 PSI2/MI=	586
N198	N199	355.S	355.S	PB	LEN= 0.622 35.000 15.500 V=	11.7 PSI2/MI=	586
N199	N200	355.S	354.S	PB	LEN= 0.622 35.000 15.500 V=	11.7 PSI2/MI=	586
N200	N201	354.S	354.S	PB	LEN= 0.622 35.000 15.500 V=	11.8 PSI2/MI=	586
N201	N202	354.S	353.S	PB	LEN= 0.622 35.000 15.500 V=	11.8 PSI2/MI=	586
N202	N203	353.S	353.S	PB	LEN= 0.622 35.000 15.500 V=	11.8 PSI2/MI=	586
N203	N204	353.S	352.S	PB	LEN= 0.622 35.000 15.500 V=	11.8 PSI2/MI=	586
N204	N205	352.S	352.S	PB	LEN= 0.622 35.000 15.500 V=	11.8 PSI2/MI=	586



N205	N206	352.S	351.S	PB	LEN= 0.622	35.000	15.500	V=	11.8	PSI2/MI=	586
N206	N207	351.S	351.S	PB	LEN= 0.622	35.000	15.500	V=	11.9	PSI2/MI=	586
N207	N208	351.S	351.S	PB	LEN= 0.622	35.000	15.500	V=	11.9	PSI2/MI=	586
N208	N209	351.S	350.S	PB	LEN= 0.622	35.000	15.500	V=	11.9	PSI2/MI=	586
N209	N210	350.S	350.S	PB	LEN= 0.622	35.000	15.500	V=	11.9	PSI2/MI=	586
N210	N211	350.S	350.S	PB	LEN= 0.622	35.000	15.500	V=	11.9	PSI2/MI=	586
N211	N212	350.S	349.S	PB	LEN= 0.622	35.000	15.500	V=	11.9	PSI2/MI=	586
N212	N213	349.S	349.S	PB	LEN= 0.622	35.000	15.500	V=	11.9	PSI2/MI=	586
N213	N214	349.S	348.S	PB	LEN= 0.622	35.000	15.500	V=	12.0	PSI2/MI=	586
N214	N215	348.S	347.S	PB	LEN= 0.622	35.000	15.500	V=	12.0	PSI2/MI=	586
N215	N216	347.S	346.S	PB	LEN= 0.622	35.000	15.500	V=	12.1	PSI2/MI=	586
N216	N217	346.S	345.S	PB	LEN= 0.622	35.000	15.500	V=	12.1	PSI2/MI=	586
N217	N218	345.S	345.S	PB	LEN= 0.622	35.000	15.500	V=	12.1	PSI2/MI=	587
N218	N219	345.S	345.S	PB	LEN= 0.622	35.000	15.500	V=	12.1	PSI2/MI=	587
N219	N220	345.S	345.S	PB	LEN= 0.622	35.000	15.500	V=	12.1	PSI2/MI=	587
N220	N221	345.S	344.S	PB	LEN= 0.622	35.000	15.500	V=	12.1	PSI2/MI=	587
N221	N222	344.S	344.S	PB	LEN= 0.622	35.000	15.500	V=	12.1	PSI2/MI=	587
N222	N223	344.S	344.S	PB	LEN= 0.622	35.000	15.500	V=	12.1	PSI2/MI=	587
N223	N224	344.S	343.S	PB	LEN= 0.622	35.000	15.500	V=	12.1	PSI2/MI=	587
N224	N225	343.S	343.S	PB	LEN= 0.622	35.000	15.500	V=	12.1	PSI2/MI=	587
N225	N226	343.S	342.S	PB	LEN= 0.622	35.000	15.500	V=	12.2	PSI2/MI=	587
N226	N227	342.S	342.S	PB	LEN= 0.622	35.000	15.500	V=	12.2	PSI2/MI=	587
N227	N228	342.S	341.S	PB	LEN= 0.622	35.000	15.500	V=	12.2	PSI2/MI=	587
N228	N229	341.S	340.S	PB	LEN= 0.622	35.000	15.500	V=	12.2	PSI2/MI=	587
N229	N230	340.S	339.S	PB	LEN= 0.622	35.000	15.500	V=	12.3	PSI2/MI=	587
N230	N231	339.S	339.S	PB	LEN= 0.622	35.000	15.500	V=	12.3	PSI2/MI=	587
N231	N232	339.S	339.S	PB	LEN= 0.622	35.000	15.500	V=	12.3	PSI2/MI=	587
N232	N233	339.S	338.S	PB	LEN= 0.622	35.000	15.500	V=	12.3	PSI2/MI=	587
N233	N234	338.S	338.S	PB	LEN= 0.622	35.000	15.500	V=	12.3	PSI2/MI=	587
N234	N235	338.S	336.S	PB	LEN= 0.622	35.000	15.500	V=	12.4	PSI2/MI=	587
N235	N236	336.S	336.S	PB	LEN= 0.622	35.000	15.500	V=	12.4	PSI2/MI=	587
N236	N237	336.S	336.S	PB	LEN= 0.622	35.000	15.500	V=	12.4	PSI2/MI=	587
N237	N238	336.S	336.S	PB	LEN= 0.622	35.000	15.500	V=	12.4	PSI2/MI=	587
N238	N239	336.S	335.S	PB	LEN= 0.622	35.000	15.500	V=	12.4	PSI2/MI=	587
N239	N240	335.S	335.S	PB	LEN= 0.622	35.000	15.500	V=	12.4	PSI2/MI=	587





N240	N241	335.S	335.S	PB	LEN= 0.622 35.000 15.500 V= 12.4 PSI2/MI=	587
N241	N242	335.S	334.S	PB	LEN= 0.622 35.000 15.500 V= 12.5 PSI2/MI=	587
N242	N243	334.S	334.S	PB	LEN= 0.622 35.000 15.500 V= 12.5 PSI2/MI=	587
N243	N244	334.S	334.S	PB	LEN= 0.622 35.000 15.500 V= 12.5 PSI2/MI=	587
N244	N245	334.S	333.S	PB	LEN= 0.622 35.000 15.500 V= 12.5 PSI2/MI=	587
N245	N246	333.S	333.S	PB	LEN= 0.622 35.000 15.500 V= 12.5 PSI2/MI=	587
N246	N247	333.S	333.S	PB	LEN= 0.622 35.000 15.500 V= 12.5 PSI2/MI=	588
N247	N248	333.S	332.S	PB	LEN= 0.622 35.000 15.500 V= 12.5 PSI2/MI=	588
N248	N249	332.S	332.S	PB	LEN= 0.622 35.000 15.500 V= 12.5 PSI2/MI=	588
N249	N250	332.S	331.S	PB	LEN= 0.622 35.000 15.500 V= 12.6 PSI2/MI=	588
N250	N251	331.S	331.S	PB	LEN= 0.622 35.000 15.500 V= 12.6 PSI2/MI=	588
N251	N252	331.S	330.S	PB	LEN= 0.622 35.000 15.500 V= 12.6 PSI2/MI=	588
N252	N253	330.S	330.S	PB	LEN= 0.622 35.000 15.500 V= 12.6 PSI2/MI=	588
N253	N254	330.S	330.S	PB	LEN= 0.622 35.000 15.500 V= 12.6 PSI2/MI=	588
N254	N255	330.S	330.S	PB	LEN= 0.622 35.000 15.500 V= 12.6 PSI2/MI=	588
N255	N256	330.S	329.S	PB	LEN= 0.622 35.000 15.500 V= 12.6 PSI2/MI=	588
N256	N257	329.S	329.S	PB	LEN= 0.622 35.000 15.500 V= 12.6 PSI2/MI=	588
N257	N258	329.S	329.S	PB	LEN= 0.622 35.000 15.500 V= 12.7 PSI2/MI=	588
N258	N259	329.S	328.S	PB	LEN= 0.622 35.000 15.500 V= 12.7 PSI2/MI=	588
N259	N260	328.S	328.S	PB	LEN= 0.622 35.000 15.500 V= 12.7 PSI2/MI=	588
N260	N261	328.S	327.S	PB	LEN= 0.622 35.000 15.500 V= 12.7 PSI2/MI=	588
N261	N262	327.S	327.S	PB	LEN= 0.622 35.000 15.500 V= 12.7 PSI2/MI=	588
N262	N263	327.S	327.S	PB	LEN= 0.622 35.000 15.500 V= 12.7 PSI2/MI=	588
N263	N264	327.S	326.S	PB	LEN= 0.622 35.000 15.500 V= 12.7 PSI2/MI=	588
N264	N265	326.S	326.S	PB	LEN= 0.622 35.000 15.500 V= 12.8 PSI2/MI=	588
N265	N266	326.S	325.S	PB	LEN= 0.622 35.000 15.500 V= 12.8 PSI2/MI=	588
N266	N267	325.S	325.S	PB	LEN= 0.622 35.000 15.500 V= 12.8 PSI2/MI=	588
N267	N268	325.S	325.S	PB	LEN= 0.622 35.000 15.500 V= 12.8 PSI2/MI=	588
N268	N269	325.S	324.S	PB	LEN= 0.622 35.000 15.500 V= 12.8 PSI2/MI=	588
N269	N270	324.S	323.S	PB	LEN= 0.622 35.000 15.500 V= 12.9 PSI2/MI=	588
N270	N271	323.S	323.S	PB	LEN= 0.622 35.000 15.500 V= 12.9 PSI2/MI=	588
N271	N272	323.S	323.S	PB	LEN= 0.622 35.000 15.500 V= 12.9 PSI2/MI=	588
N272	N273	323.S	323.S	PB	LEN= 0.622 35.000 15.500 V= 12.9 PSI2/MI=	588
N273	N274	323.S	322.S	PB	LEN= 0.622 35.000 15.500 V= 12.9 PSI2/MI=	588
N274	N275	322.S	322.S	PB	LEN= 0.622 35.000 15.500 V= 12.9 PSI2/MI=	588

8

3 001 022



COMISION REGULADORA  
DE ENERGIA  
SECRETARIA EJECUTIVA

N275	N276	322.S	322.S	PB	LEN= 0.622	35.000	15.500	V=	12.9	PSI2/MI=	588
N276	N277	322.S	321.S	PB	LEN= 0.622	35.000	15.500	V=	13.0	PSI2/MI=	588
N277	N278	321.S	320.S	PB	LEN= 0.622	35.000	15.500	V=	13.0	PSI2/MI=	588
N278	N279	320.S	320.S	PB	LEN= 0.622	35.000	15.500	V=	13.0	PSI2/MI=	589
N279	N280	320.S	319.S	PB	LEN= 0.622	35.000	15.500	V=	13.0	PSI2/MI=	589
N280	N281	319.S	318.S	PB	LEN= 0.622	35.000	15.500	V=	13.1	PSI2/MI=	589
N281	N282	318.S	318.S	PB	LEN= 0.622	35.000	15.500	V=	13.1	PSI2/MI=	589
N282	N283	318.S	317.S	PB	LEN= 0.622	35.000	15.500	V=	13.1	PSI2/MI=	589
N283	N284	317.S	316.S	PB	LEN= 0.622	35.000	15.500	V=	13.1	PSI2/MI=	589
N284	N285	316.S	316.S	PB	LEN= 0.622	35.000	15.500	V=	13.2	PSI2/MI=	589
N285	N286	316.S	315.S	PB	LEN= 0.622	35.000	15.500	V=	13.2	PSI2/MI=	589
N286	N287	315.S	315.S	PB	LEN= 0.622	35.000	15.500	V=	13.2	PSI2/MI=	589
N287	N288	315.S	315.S	PB	LEN= 0.622	35.000	15.500	V=	13.2	PSI2/MI=	589
N288	N289	315.S	314.S	PB	LEN= 0.622	35.000	15.500	V=	13.2	PSI2/MI=	589
N289	N290	314.S	314.S	PB	LEN= 0.622	35.000	15.500	V=	13.3	PSI2/MI=	589
N290	N291	314.S	313.S	PB	LEN= 0.622	35.000	15.500	V=	13.3	PSI2/MI=	589
N291	N292	313.S	312.S	PB	LEN= 0.622	35.000	15.500	V=	13.3	PSI2/MI=	589
N292	N293	312.S	312.S	PB	LEN= 0.622	35.000	15.500	V=	13.3	PSI2/MI=	589
N293	N294	312.S	311.S	PB	LEN= 0.622	35.000	15.500	V=	13.4	PSI2/MI=	589
N294	N295	311.S	311.S	PB	LEN= 0.622	35.000	15.500	V=	13.4	PSI2/MI=	589
N295	N296	311.S	310.S	PB	LEN= 0.622	35.000	15.500	V=	13.4	PSI2/MI=	589
N296	N297	310.S	310.S	PB	LEN= 0.622	35.000	15.500	V=	13.4	PSI2/MI=	589
N297	N298	310.S	309.S	PB	LEN= 0.622	35.000	15.500	V=	13.4	PSI2/MI=	589
N298	N299	309.S	309.S	PB	LEN= 0.622	35.000	15.500	V=	13.5	PSI2/MI=	589
N299	N300	309.S	309.S	PB	LEN= 0.622	35.000	15.500	V=	13.5	PSI2/MI=	589
N300	N301	309.S	308.S	PB	LEN= 0.622	35.000	15.500	V=	13.5	PSI2/MI=	589
N301	N302	308.S	308.S	PB	LEN= 0.622	35.000	15.500	V=	13.5	PSI2/MI=	589
N302	N303	308.S	307.S	PB	LEN= 0.622	35.000	15.500	V=	13.5	PSI2/MI=	589
N303	N304	307.S	307.S	PB	LEN= 0.622	35.000	15.500	V=	13.6	PSI2/MI=	590
N304	N305	307.S	306.S	PB	LEN= 0.622	35.000	15.500	V=	13.6	PSI2/MI=	590
N305	N306	306.S	306.S	PB	LEN= 0.622	35.000	15.500	V=	13.6	PSI2/MI=	590
N306	N307	306.S	306.S	PB	LEN= 0.622	35.000	15.500	V=	13.6	PSI2/MI=	590
N307	N308	306.S	305.S	PB	LEN= 0.622	35.000	15.500	V=	13.6	PSI2/MI=	590
N308	N309	305.S	305.S	PB	LEN= 0.622	35.000	15.500	V=	13.6	PSI2/MI=	590
N309	N310	305.S	305.S	PB	LEN= 0.622	35.000	15.500	V=	13.6	PSI2/MI=	590

9

3 001 023



COMISION REGULADORA  
DE ENERGIA  
SECRETARIA EJECUTIVA

N310	N311	305.S	304.S	PB	LEN= 0.622	35.000	15.500	V=	13.7	PSI2/MI=	590
					LEN= 0.622						
N311	N312	304.S	304.S	PB	LEN= 0.622	35.000	15.500	V=	13.7	PSI2/MI=	590
					LEN= 0.622						
N312	N313	304.S	303.S	PB	LEN= 0.622	35.000	15.500	V=	13.7	PSI2/MI=	590
					LEN= 0.622						
N313	N314	303.S	303.S	PB	LEN= 0.622	35.000	15.500	V=	13.7	PSI2/MI=	590
					LEN= 0.622						
N314	N315	303.S	302.S	PB	LEN= 0.622	35.000	15.500	V=	13.7	PSI2/MI=	590
					LEN= 0.622						
N315	N316	302.S	302.S	PB	LEN= 0.622	35.000	15.500	V=	13.8	PSI2/MI=	590
					LEN= 0.622						
N316	N317	302.S	302.S	PB	LEN= 0.622	35.000	15.500	V=	13.8	PSI2/MI=	590
					LEN= 0.622						
N317	N318	302.S	301.S	PB	LEN= 0.622	35.000	15.500	V=	13.8	PSI2/MI=	590
					LEN= 0.622						
N318	N319	301.S	301.S	PB	LEN= 0.622	35.000	15.500	V=	13.8	PSI2/MI=	590
					LEN= 0.622						
N319	N320	301.S	301.S	PB	LEN= 0.622	35.000	15.500	V=	13.8	PSI2/MI=	590
					LEN= 0.622						
N320	N321	301.S	300.S	PB	LEN= 0.622	35.000	15.500	V=	13.8	PSI2/MI=	590
					LEN= 0.622						
N321	N322	300.S	300.S	PB	LEN= 0.622	35.000	15.500	V=	13.9	PSI2/MI=	590
					LEN= 0.622						
N322	N323	300.S	299.S	PB	LEN= 0.622	35.000	15.500	V=	13.9	PSI2/MI=	590
					LEN= 0.622						
N323	N324	299.S	299.S	PB	LEN= 0.622	35.000	15.500	V=	13.9	PSI2/MI=	590
					LEN= 0.622						
N324	NYCO	299.S	298.S	PB	LEN= 0.622	35.000	15.500	V=	13.9	PSI2/MI=	590
					LEN= 0.622						
NYCO	N326	298.S	297.S	PB	LEN= 0.622	35.000	15.500	V=	14.0	PSI2/MI=	590
					LEN= 0.622						
N326	N327	297.S	297.S	PB	LEN= 0.622	35.000	15.500	V=	14.0	PSI2/MI=	590
					LEN= 0.622						
N327	N328	297.S	296.S	PB	LEN= 0.622	35.000	15.500	V=	14.0	PSI2/MI=	590
					LEN= 0.622						
N328	N329	296.S	296.S	PB	LEN= 0.622	35.000	15.500	V=	14.0	PSI2/MI=	590
					LEN= 0.622						
N329	N330	296.S	295.S	PB	LEN= 0.622	35.000	15.500	V=	14.1	PSI2/MI=	590
					LEN= 0.622						
N330	N331	295.S	294.S	PB	LEN= 0.622	35.000	15.500	V=	14.1	PSI2/MI=	590
					LEN= 0.622						
N331	N332	294.S	294.S	PB	LEN= 0.622	35.000	15.500	V=	14.1	PSI2/MI=	591
					LEN= 0.622						
N332	N333	294.S	293.S	PB	LEN= 0.622	35.000	15.500	V=	14.2	PSI2/MI=	591
					LEN= 0.622						
N333	N334	293.S	293.S	PB	LEN= 0.622	35.000	15.500	V=	14.2	PSI2/MI=	591
					LEN= 0.622						
N334	N335	293.S	292.S	PB	LEN= 0.622	35.000	15.500	V=	14.2	PSI2/MI=	591
					LEN= 0.622						
N335	N336	292.S	291.S	PB	LEN= 0.622	35.000	15.500	V=	14.2	PSI2/MI=	591
					LEN= 0.622						
N336	N337	291.S	291.S	PB	LEN= 0.622	35.000	15.500	V=	14.3	PSI2/MI=	591
					LEN= 0.622						
N337	N338	291.S	290.S	PB	LEN= 0.622	35.000	15.500	V=	14.3	PSI2/MI=	591
					LEN= 0.622						
N338	HERMOSIL	290.S	290.S	PB	LEN= 0.622	35.000	15.500	V=	14.3	PSI2/MI=	591
					LEN= 0.622						

FULL NODE RESULTS FOR:

PAGE 1

NODE	PRESSURE	FLOW (MMCFD )
NACO	450.00	50.000 S
N1	449.83 S	0.000 F

10

3 001 024



COMISION REGULADORA  
DE ENERGIA  
SECRETARIA EJECUTIVA

N2	448.96 S	0.000 F
N3	448.11 S	0.000 F
N4	446.68 S	0.000 F
N5	445.34 S	0.000 F
N6	444.18 S	0.000 F
N7	443.18 S	0.000 F
N8	442.07 S	0.000 F
N9	441.06 S	0.000 F
N10	439.97 S	0.000 F
N11	438.77 S	0.000 F
N12	437.30 S	0.000 F
N13	435.65 S	0.000 F
N14	433.95 S	0.000 F
N15	432.12 S	0.000 F
N16	430.02 S	0.000 F
N17	428.28 S	0.000 F
N18	427.61 S	0.000 F
N19	426.13 S	0.000 F
N20	425.84 S	0.000 F
N21	425.72 S	0.000 F
N22	425.08 S	0.000 F
N23	424.11 S	0.000 F
N24	424.31 S	0.000 F
N25	424.73 S	0.000 F
N26	424.73 S	0.000 F
N27	423.74 S	0.000 F
N28	423.70 S	0.000 F
N29	423.32 S	0.000 F
N30	423.06 S	0.000 F
N31	422.75 S	0.000 F
N32	421.55 S	0.000 F
N33	421.84 S	0.000 F
N34	420.54 S	0.000 F
N35	419.46 S	0.000 F
N36	418.64 S	0.000 F
N37	418.01 S	0.000 F
N38	417.53 S	0.000 F
N39	416.22 S	0.000 F
N40	415.41 S	0.000 F
N41	414.91 S	0.000 F
N42	414.03 S	0.000 F
N43	413.18 S	0.000 F
N44	413.28 S	0.000 F
N45	412.03 S	0.000 F
N46	410.79 S	0.000 F
N47	409.73 S	0.000 F
N48	408.79 S	0.000 F
N49	407.82 S	0.000 F
N50	406.59 S	0.000 F
N51	405.56 S	0.000 F
N52	404.39 S	0.000 F
N53	403.24 S	0.000 F
N54	402.01 S	0.000 F
N55	401.14 S	0.000 F
CANANEA	399.33 S	-15.000 F
N57	398.13 S	0.000 F
N58	397.07 S	0.000 F
N59	396.05 S	0.000 F
N60	394.88 S	0.000 F
N61	393.86 S	0.000 F
N62	392.78 S	0.000 F
N63	392.99 S	0.000 F
N64	390.36 S	0.000 F
N65	389.55 S	0.000 F
N66	388.14 S	0.000 F
N67	385.83 S	0.000 F
N68	386.34 S	0.000 F
N69	390.30 S	0.000 F
N70	391.73 S	0.000 F
N71	393.89 S	0.000 F



N72	395.18 S	0.000 F
N73	392.92 S	0.000 F
N74	395.98 S	0.000 F
N75	396.22 S	0.000 F
N76	396.35 S	0.000 F
N77	396.41 S	0.000 F
N78	396.68 S	0.000 F
N79	395.21 S	0.000 F
N80	395.71 S	0.000 F
N81	394.29 S	0.000 F
N82	395.51 S	0.000 F
N83	396.10 S	0.000 F
N84	395.99 S	0.000 F
N85	397.40 S	0.000 F
N86	397.17 S	0.000 F
N87	396.91 S	0.000 F
N88	396.49 S	0.000 F
N89	396.41 S	0.000 F
N90	395.72 S	0.000 F
N91	395.23 S	0.000 F
N92	395.24 S	0.000 F
N93	394.62 S	0.000 F
N94	394.13 S	0.000 F
N95	394.13 S	0.000 F
N96	393.82 S	0.000 F
N97	393.15 S	0.000 F
N98	394.08 S	0.000 F
N99	393.73 S	0.000 F
N100	393.56 S	0.000 F
N101	393.36 S	0.000 F
N102	392.88 S	0.000 F
N103	392.43 S	0.000 F
N104	391.99 S	0.000 F
N105	391.54 S	0.000 F
N106	391.09 S	0.000 F
N107	391.90 S	0.000 F
N108	391.62 S	0.000 F
N109	391.17 S	0.000 F
N110	390.72 S	0.000 F
N111	390.28 S	0.000 F
N112	389.83 S	0.000 F
N113	389.38 S	0.000 F
N114	388.53 S	0.000 F
N115	389.19 S	0.000 F
N116	389.65 S	0.000 F
N117	389.42 S	0.000 F
N118	389.07 S	0.000 F
N119	388.65 S	0.000 F
N120	388.30 S	0.000 F
N121	387.95 S	0.000 F
N122	387.56 S	0.000 F
N123	387.02 S	0.000 F
N124	386.75 S	0.000 F
N125	386.46 S	0.000 F
N126	386.74 S	0.000 F
N127	385.45 S	0.000 F
N128	384.79 S	0.000 F
N129	384.16 S	0.000 F
N130	382.97 S	0.000 F
N131	382.09 S	0.000 F
N132	381.85 S	0.000 F
N133	382.03 S	0.000 F
N134	381.66 S	0.000 F
N135	381.33 S	0.000 F
N136	381.33 S	0.000 F
N137	381.45 S	0.000 F
N138	381.36 S	0.000 F
N139	381.17 S	0.000 F
N140	381.20 S	0.000 F
N141	381.28 S	0.000 F



N142	380.22 S	0.000 F
N143	380.20 S	0.000 F
N144	379.84 S	0.000 F
N145	378.72 S	0.000 F
N146	378.87 S	0.000 F
N147	378.59 S	0.000 F
N148	378.59 S	0.000 F
N149	378.04 S	0.000 F
N150	377.80 S	0.000 F
N151	376.62 S	0.000 F
N152	376.58 S	0.000 F
N153	375.72 S	0.000 F
N154	374.27 S	0.000 F
N155	373.47 S	0.000 F
N156	372.43 S	0.000 F
N157	372.49 S	0.000 F
N158	372.94 S	0.000 F
N159	372.85 S	0.000 F
N160	389.01 S	0.000 F
N161	372.09 S	0.000 F
N162	372.28 S	0.000 F
N163	372.49 S	0.000 F
N164	371.65 S	0.000 F
N165	371.70 S	0.000 F
N166	371.12 S	0.000 F
N167	370.98 S	0.000 F
N168	370.66 S	0.000 F
N169	370.20 S	0.000 F
N170	369.70 S	0.000 F
N171	369.27 S	0.000 F
N172	368.45 S	0.000 F
N173	368.01 S	0.000 F
N174	367.41 S	0.000 F
N175	366.85 S	0.000 F
N176	366.25 S	0.000 F
N177	365.83 S	0.000 F
N178	365.42 S	0.000 F
N179	364.94 S	0.000 F
N180	364.52 S	0.000 F
N181	364.19 S	0.000 F
N182	363.77 S	0.000 F
N183	363.44 S	0.000 F
N184	363.07 S	0.000 F
N185	362.60 S	0.000 F
N186	362.24 S	0.000 F
N187	361.81 S	0.000 F
N188	361.50 S	0.000 F
N189	360.87 S	0.000 F
N190	360.27 S	0.000 F
N191	359.64 S	0.000 F
N192	359.02 S	0.000 F
N193	358.44 S	0.000 F
N194	357.82 S	0.000 F
N195	357.26 S	0.000 F
N196	356.66 S	0.000 F
N197	356.09 S	0.000 F
N198	355.42 S	0.000 F
N199	354.77 S	0.000 F
N200	354.37 S	0.000 F
N201	353.87 S	0.000 F
N202	353.38 S	0.000 F
N203	352.82 S	0.000 F
N204	352.33 S	0.000 F
N205	351.87 S	0.000 F
N206	351.42 S	0.000 F
N207	350.99 S	0.000 F
N208	350.67 S	0.000 F
N209	350.38 S	0.000 F
N210	349.99 S	0.000 F
N211	349.60 S	0.000 F



N212	349.15 S	0.000 F
N213	348.54 S	0.000 F
N214	347.89 S	0.000 F
N215	347.21 S	0.000 F
N216	345.52 S	0.000 F
N217	345.50 S	0.000 F
N218	345.33 S	0.000 F
N219	344.81 S	0.000 F
N220	344.55 S	0.000 F
N221	344.32 S	0.000 F
N222	344.14 S	0.000 F
N223	343.76 S	0.000 F
N224	343.14 S	0.000 F
N225	342.75 S	0.000 F
N226	342.24 S	0.000 F
N227	341.53 S	0.000 F
N228	340.77 S	0.000 F
N229	340.20 S	0.000 F
N230	339.45 S	0.000 F
N231	338.97 S	0.000 F
N232	338.55 S	0.000 F
N233	337.91 S	0.000 F
N234	337.78 S	0.000 F
N235	336.27 S	0.000 F
N236	336.28 S	0.000 F
N237	335.96 S	0.000 F
N238	335.60 S	0.000 F
N239	335.18 S	0.000 F
N240	334.91 S	0.000 F
N241	334.58 S	0.000 F
N242	334.25 S	0.000 F
N243	333.86 S	0.000 F
N244	333.54 S	0.000 F
N245	333.14 S	0.000 F
N246	332.79 S	0.000 F
N247	332.53 S	0.000 F
N248	332.28 S	0.000 F
N249	331.75 S	0.000 F
N250	331.28 S	0.000 F
N251	330.81 S	0.000 F
N252	330.38 S	0.000 F
N253	330.19 S	0.000 F
N254	329.84 S	0.000 F
N255	329.51 S	0.000 F
N256	329.20 S	0.000 F
N257	328.95 S	0.000 F
N258	328.58 S	0.000 F
N259	328.19 S	0.000 F
N260	327.91 S	0.000 F
N261	327.49 S	0.000 F
N262	327.11 S	0.000 F
N263	326.74 S	0.000 F
N264	326.31 S	0.000 F
N265	325.85 S	0.000 F
N266	325.43 S	0.000 F
N267	325.03 S	0.000 F
N268	324.53 S	0.000 F
N269	324.00 S	0.000 F
N270	323.49 S	0.000 F
N271	323.18 S	0.000 F
N272	322.92 S	0.000 F
N273	322.70 S	0.000 F
N274	322.34 S	0.000 F
N275	321.89 S	0.000 F
N276	321.51 S	0.000 F
N277	321.00 S	0.000 F
N278	320.26 S	0.000 F
N279	319.77 S	0.000 F
N280	319.09 S	0.000 F
N281	318.49 S	0.000 F







N282	317.98 S	0.000 F
N283	317.26 S	0.000 F
N284	316.49 S	0.000 F
N285	315.82 S	0.000 F
N286	315.23 S	0.000 F
N287	314.94 S	0.000 F
N288	314.54 S	0.000 F
N289	314.30 S	0.000 F
N290	313.54 S	0.000 F
N291	312.94 S	0.000 F
N292	312.47 S	0.000 F
N293	311.96 S	0.000 F
N294	311.30 S	0.000 F
N295	310.73 S	0.000 F
N296	310.23 S	0.000 F
N297	309.86 S	0.000 F
N298	309.49 S	0.000 F
N299	309.06 S	0.000 F
N300	308.59 S	0.000 F
N301	308.10 S	0.000 F
N302	307.52 S	0.000 F
N303	307.12 S	0.000 F
N304	306.77 S	0.000 F
N305	306.46 S	0.000 F
N306	306.09 S	0.000 F
N307	305.63 S	0.000 F
N308	305.28 S	0.000 F
N309	304.95 S	0.000 F
N310	304.55 S	0.000 F
N311	304.22 S	0.000 F
N312	303.80 S	0.000 F
N313	303.37 S	0.000 F
N314	302.83 S	0.000 F
N315	302.40 S	0.000 F
N316	302.10 S	0.000 F
N317	301.74 S	0.000 F
N318	301.32 S	0.000 F
N319	300.95 S	0.000 F
N320	300.56 S	0.000 F
N321	300.14 S	0.000 F
N322	299.59 S	0.000 F
N323	299.07 S	0.000 F
N324	298.56 S	0.000 F
NYCO	298.06 S	0.000 F
N326	297.49 S	0.000 F
N327	296.90 S	0.000 F
N328	296.30 S	0.000 F
N329	295.73 S	0.000 F
N330	295.02 S	0.000 F
N331	294.44 S	0.000 F
N332	293.86 S	0.000 F
N333	293.31 S	0.000 F
N334	292.66 S	0.000 F
N335	292.01 S	0.000 F
N336	291.40 S	0.000 F
N337	290.81 S	0.000 F
N338	290.16 S	0.000 F
HERMOSIL	289.58 S	-35.000 F



TITLE

ZZZZ

UNIT

ENGLISH

ZZZZ

SYSTEM

BASE	PRESSURE	14.2234	TEMP	68.0000	
DEFAULT	GRAVITY	0.602900	TEMP	85.0000	EFFICIEN
0.850000					
DEFAULT	AMBIENT	85.0000			

ZZZZ

NCE

NACO	N1	PB	15.500	0.622
N1	N2	PB	15.500	0.622
N2	N3	PB	15.500	0.622
N3	N4	PB	15.500	0.622
N4	N5	PB	15.500	0.622
N5	N6	PB	15.500	0.622
N6	N7	PB	15.500	0.622
N7	N8	PB	15.500	0.622
N8	N9	PB	15.500	0.622
N9	N10	PB	15.500	0.622
N10	N11	PB	15.500	0.622
N11	N12	PB	15.500	0.622
N12	N13	PB	15.500	0.622
N13	N14	PB	15.500	0.622
N14	N15	PB	15.500	0.622
N15	N16	PB	15.500	0.622
N16	N17	PB	15.500	0.622
N17	N18	PB	15.500	0.622
N18	N19	PB	15.500	0.622
N19	N20	PB	15.500	0.622
N20	N21	PB	15.500	0.622
N21	N22	PB	15.500	0.622
N22	N23	PB	15.500	0.622
N23	N24	PB	15.500	0.622
N24	N25	PB	15.500	0.622
N25	N26	PB	15.500	0.622
N26	N27	PB	15.500	0.622
N27	N28	PB	15.500	0.622
N28	N29	PB	15.500	0.622
N29	N30	PB	15.500	0.622
N30	N31	PB	15.500	0.622
N31	N32	PB	15.500	0.622
N32	N33	PB	15.500	0.622
N33	N34	PB	15.500	0.622
N34	N35	PB	15.500	0.622
N35	N36	PB	15.500	0.622
N36	N37	PB	15.500	0.622
N37	N38	PB	15.500	0.622
N38	N39	PB	15.500	0.622
N39	N40	PB	15.500	0.622
N40	N41	PB	15.500	0.622
N41	N42	PB	15.500	0.622
N42	N43	PB	15.500	0.622
N43	N44	PB	15.500	0.622
N44	N45	PB	15.500	0.622
N45	N46	PB	15.500	0.622



N46	N47	PB	15.500	0.622
N47	N48	PB	15.500	0.622
N48	N49	PB	15.500	0.622
N49	N50	PB	15.500	0.622
N50	N51	PB	15.500	0.622
N51	N52	PB	15.500	0.622
N52	N53	PB	15.500	0.622
N53	N54	PB	15.500	0.622
N54	N55	PB	15.500	0.622
N55	CANANEA	PB	15.500	0.622
CANANEA	N57	PB	15.500	0.622
N57	N58	PB	15.500	0.622
N58	N59	PB	15.500	0.622
N59	N60	PB	15.500	0.622
N60	N61	PB	15.500	0.622
N61	N62	PB	15.500	0.622
N62	N63	PB	15.500	0.622
N63	N64	PB	15.500	0.622
N64	N65	PB	15.500	0.622
N65	N66	PB	15.500	0.622
N66	N67	PB	15.500	0.622
N67	N68	PB	15.500	0.622
N68	N69	PB	15.500	0.622
N69	N70	PB	15.500	0.622
N70	N71	PB	15.500	0.622
N71	N72	PB	15.500	0.622
N72	N73	PB	15.500	0.622
N73	N74	PB	15.500	0.622
N74	N75	PB	15.500	0.622
N75	N76	PB	15.500	0.622
N76	N77	PB	15.500	0.622
N77	N78	PB	15.500	0.622
N78	N79	PB	15.500	0.622
N79	N80	PB	15.500	0.622
N80	N81	PB	15.500	0.622
N81	N82	PB	15.500	0.622
N82	N83	PB	15.500	0.622
N83	N84	PB	15.500	0.622
N84	N85	PB	15.500	0.622
N85	N86	PB	15.500	0.622
N86	N87	PB	15.500	0.622
N87	N88	PB	15.500	0.622
N88	N89	PB	15.500	0.622
N89	N90	PB	15.500	0.622
N90	N91	PB	15.500	0.622
N91	N92	PB	15.500	0.622
N92	N93	PB	15.500	0.622
N93	N94	PB	15.500	0.622
N94	N95	PB	15.500	0.622
N95	N96	PB	15.500	0.622
N96	N97	PB	15.500	0.622
N97	N98	PB	15.500	0.622
N98	N99	PB	15.500	0.622
N99	N100	PB	15.500	0.622
N100	N101	PB	15.500	0.622
N101	N102	PB	15.500	0.622
N102	N103	PB	15.500	0.622
N103	N104	PB	15.500	0.622
N104	N105	PB	15.500	0.622
N105	N106	PB	15.500	0.622
N106	N107	PB	15.500	0.622



N107	N108	PB	15.500	0.622
N108	N109	PB	15.500	0.622
N109	N110	PB	15.500	0.622
N110	N111	PB	15.500	0.622
N111	N112	PB	15.500	0.622
N112	N113	PB	15.500	0.622
N113	N114	PB	15.500	0.622
N114	N115	PB	15.500	0.622
N115	N116	PB	15.500	0.622
N116	N117	PB	15.500	0.622
N117	N118	PB	15.500	0.622
N118	N119	PB	15.500	0.622
N119	N120	PB	15.500	0.622
N120	N121	PB	15.500	0.622
N121	N122	PB	15.500	0.622
N122	N123	PB	15.500	0.622
N123	N124	PB	15.500	0.622
N124	N125	PB	15.500	0.622
N125	N126	PB	15.500	0.622
N126	N127	PB	15.500	0.622
N127	N128	PB	15.500	0.622
N128	N129	PB	15.500	0.622
N129	N130	PB	15.500	0.622
N130	N131	PB	15.500	0.622
N131	N132	PB	15.500	0.622
N132	N133	PB	15.500	0.622
N133	N134	PB	15.500	0.622
N134	N135	PB	15.500	0.622
N135	N136	PB	15.500	0.622
N136	N137	PB	15.500	0.622
N137	N138	PB	15.500	0.622
N138	N139	PB	15.500	0.622
N139	N140	PB	15.500	0.622
N140	N141	PB	15.500	0.622
N141	N142	PB	15.500	0.622
N142	N143	PB	15.500	0.622
N143	N144	PB	15.500	0.622
N144	N145	PB	15.500	0.622
N145	N146	PB	15.500	0.622
N146	N147	PB	15.500	0.622
N147	N148	PB	15.500	0.622
N148	N149	PB	15.500	0.622
N149	N150	PB	15.500	0.622
N150	N151	PB	15.500	0.622
N151	N152	PB	15.500	0.622
N152	N153	PB	15.500	0.622
N153	N154	PB	15.500	0.622
N154	N155	PB	15.500	0.622
N155	N156	PB	15.500	0.622
N156	N157	PB	15.500	0.622
N157	N158	PB	15.500	0.622
N158	N159	PB	15.500	0.622
N159	N160	PB	15.500	0.622
N160	N161	PB	15.500	0.622
N161	N162	PB	15.500	0.622
N162	N163	PB	15.500	0.622
N163	N164	PB	15.500	0.622
N164	N165	PB	15.500	0.622
N165	N166	PB	15.500	0.622
N166	N167	PB	15.500	0.622
N167	N168	PB	15.500	0.622



N168	N169	PB	15.500	0.622
N169	N170	PB	15.500	0.622
N170	N171	PB	15.500	0.622
N171	N172	PB	15.500	0.622
N172	N173	PB	15.500	0.622
N173	N174	PB	15.500	0.622
N174	N175	PB	15.500	0.622
N175	N176	PB	15.500	0.622
N176	N177	PB	15.500	0.622
N177	N178	PB	15.500	0.622
N178	N179	PB	15.500	0.622
N179	N180	PB	15.500	0.622
N180	N181	PB	15.500	0.622
N181	N182	PB	15.500	0.622
N182	N183	PB	15.500	0.622
N183	N184	PB	15.500	0.622
N184	N185	PB	15.500	0.622
N185	N186	PB	15.500	0.622
N186	N187	PB	15.500	0.622
N187	N188	PB	15.500	0.622
N188	N189	PB	15.500	0.622
N189	N190	PB	15.500	0.622
N190	N191	PB	15.500	0.622
N191	N192	PB	15.500	0.622
N192	N193	PB	15.500	0.622
N193	N194	PB	15.500	0.622
N194	N195	PB	15.500	0.622
N195	N196	PB	15.500	0.622
N196	N197	PB	15.500	0.622
N197	N198	PB	15.500	0.622
N198	N199	PB	15.500	0.622
N199	N200	PB	15.500	0.622
N200	N201	PB	15.500	0.622
N201	N202	PB	15.500	0.622
N202	N203	PB	15.500	0.622
N203	N204	PB	15.500	0.622
N204	N205	PB	15.500	0.622
N205	N206	PB	15.500	0.622
N206	N207	PB	15.500	0.622
N207	N208	PB	15.500	0.622
N208	N209	PB	15.500	0.622
N209	N210	PB	15.500	0.622
N210	N211	PB	15.500	0.622
N211	N212	PB	15.500	0.622
N212	N213	PB	15.500	0.622
N213	N214	PB	15.500	0.622
N214	N215	PB	15.500	0.622
N215	N216	PB	15.500	0.622
N216	N217	PB	15.500	0.622
N217	N218	PB	15.500	0.622
N218	N219	PB	15.500	0.622
N219	N220	PB	15.500	0.622
N220	N221	PB	15.500	0.622
N221	N222	PB	15.500	0.622
N222	N223	PB	15.500	0.622
N223	N224	PB	15.500	0.622
N224	N225	PB	15.500	0.622
N225	N226	PB	15.500	0.622
N226	N227	PB	15.500	0.622
N227	N228	PB	15.500	0.622
N228	N229	PB	15.500	0.622

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COMISION REGULADORA  
DE ENERGIA  
SECRETARIA EJECUTIVA

N229	N230	PB	15.500	0.622
N230	N231	PB	15.500	0.622
N231	N232	PB	15.500	0.622
N232	N233	PB	15.500	0.622
N233	N234	PB	15.500	0.622
N234	N235	PB	15.500	0.622
N235	N236	PB	15.500	0.622
N236	N237	PB	15.500	0.622
N237	N238	PB	15.500	0.622
N238	N239	PB	15.500	0.622
N239	N240	PB	15.500	0.622
N240	N241	PB	15.500	0.622
N241	N242	PB	15.500	0.622
N242	N243	PB	15.500	0.622
N243	N244	PB	15.500	0.622
N244	N245	PB	15.500	0.622
N245	N246	PB	15.500	0.622
N246	N247	PB	15.500	0.622
N247	N248	PB	15.500	0.622
N248	N249	PB	15.500	0.622
N249	N250	PB	15.500	0.622
N250	N251	PB	15.500	0.622
N251	N252	PB	15.500	0.622
N252	N253	PB	15.500	0.622
N253	N254	PB	15.500	0.622
N254	N255	PB	15.500	0.622
N255	N256	PB	15.500	0.622
N256	N257	PB	15.500	0.622
N257	N258	PB	15.500	0.622
N258	N259	PB	15.500	0.622
N259	N260	PB	15.500	0.622
N260	N261	PB	15.500	0.622
N261	N262	PB	15.500	0.622
N262	N263	PB	15.500	0.622
N263	N264	PB	15.500	0.622
N264	N265	PB	15.500	0.622
N265	N266	PB	15.500	0.622
N266	N267	PB	15.500	0.622
N267	N268	PB	15.500	0.622
N268	N269	PB	15.500	0.622
N269	N270	PB	15.500	0.622
N270	N271	PB	15.500	0.622
N271	N272	PB	15.500	0.622
N272	N273	PB	15.500	0.622
N273	N274	PB	15.500	0.622
N274	N275	PB	15.500	0.622
N275	N276	PB	15.500	0.622
N276	N277	PB	15.500	0.622
N277	N278	PB	15.500	0.622
N278	N279	PB	15.500	0.622
N279	N280	PB	15.500	0.622
N280	N281	PB	15.500	0.622
N281	N282	PB	15.500	0.622
N282	N283	PB	15.500	0.622
N283	N284	PB	15.500	0.622
N284	N285	PB	15.500	0.622
N285	N286	PB	15.500	0.622
N286	N287	PB	15.500	0.622
N287	N288	PB	15.500	0.622
N288	N289	PB	15.500	0.622
N289	N290	PB	15.500	0.622



N290	N291	PB	15.500	0.622
N291	N292	PB	15.500	0.622
N292	N293	PB	15.500	0.622
N293	N294	PB	15.500	0.622
N294	N295	PB	15.500	0.622
N295	N296	PB	15.500	0.622
N296	N297	PB	15.500	0.622
N297	N298	PB	15.500	0.622
N298	N299	PB	15.500	0.622
N299	N300	PB	15.500	0.622
N300	N301	PB	15.500	0.622
N301	N302	PB	15.500	0.622
N302	N303	PB	15.500	0.622
N303	N304	PB	15.500	0.622
N304	N305	PB	15.500	0.622
N305	N306	PB	15.500	0.622
N306	N307	PB	15.500	0.622
N307	N308	PB	15.500	0.622
N308	N309	PB	15.500	0.622
N309	N310	PB	15.500	0.622
N310	N311	PB	15.500	0.622
N311	N312	PB	15.500	0.622
N312	N313	PB	15.500	0.622
N313	N314	PB	15.500	0.622
N314	N315	PB	15.500	0.622
N315	N316	PB	15.500	0.622
N316	N317	PB	15.500	0.622
N317	N318	PB	15.500	0.622
N318	N319	PB	15.500	0.622
N319	N320	PB	15.500	0.622
N320	N321	PB	15.500	0.622
N321	N322	PB	15.500	0.622
N322	N323	PB	15.500	0.622
N323	N324	PB	15.500	0.622
N324	NYCO	PB	15.500	0.622
NYCO	N326	PB	15.500	0.622
N326	N327	PB	15.500	0.622
N327	N328	PB	15.500	0.622
N328	N329	PB	15.500	0.622
N329	N330	PB	15.500	0.622
N330	N331	PB	15.500	0.622
N331	N332	PB	15.500	0.622
N332	N333	PB	15.500	0.622
N333	N334	PB	15.500	0.622
N334	N335	PB	15.500	0.622
N335	N336	PB	15.500	0.622
N336	N337	PB	15.500	0.622
N337	N338	PB	15.500	0.622
N338	HERMOSIL	PB	15.500	0.622

ZZZZ  
NODE

	FLOW			
NACO	4574.6	450.00	50.000	P
N1	4511.0	449.83	0.000	QF
N2	4520.2	448.96	0.000	QF
N3	4527.3	448.11	0.000	QF
N4	4593.2	446.68	0.000	QF
N5	4651.1	445.34	0.000	QF
N6	4690.0	444.18	0.000	QF
N7	4711.1	443.18	0.000	QF
N8	4744.0	442.07	0.000	QF
N9	4765.9	441.06	0.000	QF



3 001 035

COMISION REGULADORA  
DE ENERGIA  
SECRETARIA EJECUTIVA

N10	4797.0	439.97	0.000	QF
N11	4839.2	438.77	0.000	QF
N12	4910.4	437.30	0.000	QF
N13	4999.6	435.65	0.000	QF
N14	5095.7	433.95	0.000	QF
N15	5204.6	432.12	0.000	QF
N16	5344.2	430.02	0.000	QF
N17	5443.9	428.28	0.000	QF
N18	5426.1	427.61	0.000	QF
N19	5498.2	426.13	0.000	QF
N20	5438.3	425.84	0.000	QF
N21	5360.9	425.72	0.000	QF
N22	5340.0	425.08	0.000	QF
N23	5355.0	424.11	0.000	QF
N24	5241.3	424.31	0.000	QF
N25	5103.2	424.73	0.000	QF
N26	5011.5	424.73	0.000	QF
N27	5029.1	423.74	0.000	QF
N28	4940.9	423.70	0.000	QF
N29	4890.5	423.32	0.000	QF
N30	4826.9	423.06	0.000	QF
N31	4769.5	422.75	0.000	QF
N32	4809.9	421.55	0.000	QF
N33	4685.0	421.84	0.000	QF
N34	4735.9	420.54	0.000	QF
N35	4762.6	419.46	0.000	QF
N36	4760.0	418.64	0.000	QF
N37	4736.4	418.01	0.000	QF
N38	4695.2	417.53	0.000	QF
N39	4747.4	416.22	0.000	QF
N40	4742.4	415.41	0.000	QF
N41	4702.5	414.91	0.000	QF
N42	4705.7	414.03	0.000	QF
N43	4705.5	413.18	0.000	QF
N44	4597.0	413.28	0.000	QF
N45	4641.7	412.03	0.000	QF
N46	4685.4	410.79	0.000	QF
N47	4707.6	409.73	0.000	QF
N48	4716.9	408.79	0.000	QF
N49	4729.1	407.82	0.000	QF
N50	4770.2	406.59	0.000	QF
N51	4788.5	405.56	0.000	QF
N52	4823.8	404.39	0.000	QF
N53	4855.2	403.24	0.000	QF
N54	4896.3	402.01	0.000	QF
N55	4895.1	401.14	0.000	QF
CANANEA	5003.8	399.33	-15.000	QF
N57	5093.3	398.13	0.000	QF
N58	5167.2	397.07	0.000	QF
N59	5235.2	396.05	0.000	QF
N60	5322.1	394.88	0.000	QF
N61	5390.0	393.86	0.000	QF
N62	5465.9	392.78	0.000	QF
N63	5386.5	392.99	0.000	QF
N64	5649.5	390.36	0.000	QF
N65	5693.2	389.55	0.000	QF
N66	5809.4	388.14	0.000	QF
N67	6035.5	385.83	0.000	QF
N68	5917.9	386.34	0.000	QF
N69	5381.3	390.30	0.000	QF
N70	5153.9	391.73	0.000	QF





N71	4841.6	393.89	0.000	QF
N72	4633.7	395.18	0.000	QF
N73	4851.4	392.92	0.000	QF
N74	4432.1	395.98	0.000	QF
N75	4351.1	396.22	0.000	QF
N76	4283.8	396.35	0.000	QF
N77	4224.2	396.41	0.000	QF
N78	4139.3	396.68	0.000	QF
N79	4260.8	395.21	0.000	QF
N80	4149.3	395.71	0.000	QF
N81	4264.4	394.29	0.000	QF
N82	4066.7	395.51	0.000	QF
N83	3943.3	396.10	0.000	QF
N84	3904.0	395.99	0.000	QF
N85	3685.2	397.40	0.000	QF
N86	3660.2	397.17	0.000	QF
N87	3638.7	396.91	0.000	QF
N88	3635.1	396.49	0.000	QF
N89	3592.4	396.41	0.000	QF
N90	3622.3	395.72	0.000	QF
N91	3627.8	395.23	0.000	QF
N92	3573.0	395.24	0.000	QF
N93	3594.8	394.62	0.000	QF
N94	3600.1	394.13	0.000	QF
N95	3546.6	394.13	0.000	QF
N96	3530.1	393.82	0.000	QF
N97	3557.6	393.15	0.000	QF
N98	3392.9	394.08	0.000	QF
N99	3381.8	393.73	0.000	QF
N100	3348.2	393.56	0.000	QF
N101	3319.6	393.36	0.000	QF
N102	3323.2	392.88	0.000	QF
N103	3323.2	392.43	0.000	QF
N104	3323.2	391.99	0.000	QF
N105	3323.2	391.54	0.000	QF
N106	3323.2	391.09	0.000	QF
N107	3172.3	391.90	0.000	QF
N108	3151.7	391.62	0.000	QF
N109	3151.7	391.17	0.000	QF
N110	3151.7	390.72	0.000	QF
N111	3151.7	390.28	0.000	QF
N112	3151.7	389.83	0.000	QF
N113	3151.7	389.38	0.000	QF
N114	3199.9	388.53	0.000	QF
N115	3064.8	389.19	0.000	QF
N116	2954.6	389.65	0.000	QF
N117	2928.4	389.42	0.000	QF
N118	2916.8	389.07	0.000	QF
N119	2912.5	388.65	0.000	QF
N120	2899.7	388.31	0.000	QF
N121	2887.8	387.95	0.000	QF
N122	2880.2	387.56	0.000	QF
N123	2890.8	387.02	0.000	QF
N124	2868.1	386.76	0.000	QF
N125	2848.3	386.46	0.000	QF
N126	2759.8	386.74	0.000	QF
N127	2861.2	385.45	0.000	QF
N128	2885.8	384.79	0.000	QF
N129	2907.8	384.16	0.000	QF
N130	2997.3	382.97	0.000	QF
N131	3049.4	382.09	0.000	QF



N132	3022.7	381.85	0.000	QF
N133	2943.3	382.03	0.000	QF
N134	2932.7	381.66	0.000	QF
N135	2916.7	381.33	0.000	QF
N136	2859.1	381.33	0.000	QF
N137	2787.6	381.45	0.000	QF
N138	2741.7	381.37	0.000	QF
N139	2708.7	381.17	0.000	QF
N140	2648.3	381.20	0.000	QF
N141	2582.1	381.28	0.000	QF
N142	2656.2	380.22	0.000	QF
N143	2601.6	380.20	0.000	QF
N144	2588.4	379.84	0.000	QF
N145	2669.8	378.72	0.000	QF
N146	2594.2	378.87	0.000	QF
N147	2571.3	378.59	0.000	QF
N148	2514.2	378.59	0.000	QF
N149	2524.6	378.04	0.000	QF
N150	2496.1	377.80	0.000	QF
N151	2586.3	376.62	0.000	QF
N152	2533.0	376.58	0.000	QF
N153	2582.1	375.72	0.000	QF
N154	2705.8	374.27	0.000	QF
N155	2746.6	373.47	0.000	QF
N156	2819.5	372.43	0.000	QF
N157	2752.1	372.49	0.000	QF
N158	2634.8	372.94	0.000	QF
N159	2586.6	372.85	0.000	QF
N160	537.1	389.01	0.000	QF
N161	2569.6	372.09	0.000	QF
N162	2485.3	372.28	0.000	QF
N163	2399.1	372.49	0.000	QF
N164	2445.5	371.66	0.000	QF
N165	2379.5	371.70	0.000	QF
N166	2393.5	371.12	0.000	QF
N167	2351.4	370.98	0.000	QF
N168	2331.4	370.66	0.000	QF
N169	2330.6	370.20	0.000	QF
N170	2332.9	369.70	0.000	QF
N171	2327.3	369.27	0.000	QF
N172	2372.0	368.45	0.000	QF
N173	2367.1	368.01	0.000	QF
N174	2383.1	367.41	0.000	QF
N175	2393.0	366.85	0.000	QF
N176	2409.2	366.25	0.000	QF
N177	2401.5	365.83	0.000	QF
N178	2392.6	365.42	0.000	QF
N179	2392.5	364.94	0.000	QF
N180	2384.0	364.52	0.000	QF
N181	2364.2	364.19	0.000	QF
N182	2356.9	363.77	0.000	QF
N183	2336.9	363.44	0.000	QF
N184	2322.5	363.07	0.000	QF
N185	2320.9	362.60	0.000	QF
N186	2304.7	362.24	0.000	QF
N187	2297.4	361.81	0.000	QF
N188	2274.9	361.50	0.000	QF
N189	2293.6	360.87	0.000	QF
N190	2308.1	360.27	0.000	QF
N191	2326.6	359.64	0.000	QF
N192	2344.1	359.02	0.000	QF



N193	2356.1	358.44	0.000	QF
N194	2372.9	357.82	0.000	QF
N195	2382.7	357.26	0.000	QF
N196	2396.5	356.66	0.000	QF
N197	2406.9	356.09	0.000	QF
N198	2431.0	355.42	0.000	QF
N199	2451.4	354.77	0.000	QF
N200	2439.0	354.37	0.000	QF
N201	2439.2	353.87	0.000	QF
N202	2438.9	353.38	0.000	QF
N203	2446.4	352.82	0.000	QF
N204	2446.0	352.33	0.000	QF
N205	2441.1	351.87	0.000	QF
N206	2433.9	351.42	0.000	QF
N207	2424.1	350.99	0.000	QF
N208	2399.8	350.67	0.000	QF
N209	2371.6	350.38	0.000	QF
N210	2356.0	349.99	0.000	QF
N211	2340.8	349.60	0.000	QF
N212	2334.4	349.15	0.000	QF
N213	2348.9	348.54	0.000	QF
N214	2369.2	347.89	0.000	QF
N215	2392.5	347.21	0.000	QF
N216	2555.1	345.52	0.000	QF
N217	2487.6	345.50	0.000	QF
N218	2441.4	345.33	0.000	QF
N219	2442.6	344.81	0.000	QF
N220	2407.8	344.55	0.000	QF
N221	2370.3	344.32	0.000	QF
N222	2324.6	344.14	0.000	QF
N223	2306.4	343.76	0.000	QF
N224	2320.8	343.14	0.000	QF
N225	2305.0	342.75	0.000	QF
N226	2304.2	342.24	0.000	QF
N227	2330.8	341.53	0.000	QF
N228	2365.2	340.77	0.000	QF
N229	2373.2	340.20	0.000	QF
N230	2405.6	339.45	0.000	QF
N231	2400.8	338.97	0.000	QF
N232	2386.8	338.55	0.000	QF
N233	2403.0	337.91	0.000	QF
N234	2348.6	337.78	0.000	QF
N235	2488.9	336.27	0.000	QF
N236	2413.4	336.28	0.000	QF
N237	2384.8	335.96	0.000	QF
N238	2360.7	335.60	0.000	QF
N239	2347.1	335.18	0.000	QF
N240	2310.0	334.91	0.000	QF
N241	2282.8	334.58	0.000	QF
N242	2254.9	334.25	0.000	QF
N243	2236.2	333.86	0.000	QF
N244	2205.9	333.54	0.000	QF
N245	2187.8	333.14	0.000	QF
N246	2163.1	332.79	0.000	QF
N247	2124.6	332.53	0.000	QF
N248	2084.4	332.28	0.000	QF
N249	2084.6	331.75	0.000	QF
N250	2076.8	331.28	0.000	QF
N251	2067.8	330.81	0.000	QF
N252	2052.9	330.38	0.000	QF
N253	2003.8	330.19	0.000	QF



N254	1977.8	329.84	0.000	QF
N255	1949.3	329.51	0.000	QF
N256	1916.2	329.20	0.000	QF
N257	1875.8	328.95	0.000	QF
N258	1852.5	328.58	0.000	QF
N259	1831.5	328.19	0.000	QF
N260	1794.5	327.91	0.000	QF
N261	1777.2	327.49	0.000	QF
N262	1754.5	327.11	0.000	QF
N263	1729.7	326.74	0.000	QF
N264	1715.3	326.31	0.000	QF
N265	1703.2	325.85	0.000	QF
N266	1686.0	325.43	0.000	QF
N267	1665.6	325.03	0.000	QF
N268	1658.9	324.53	0.000	QF
N269	1657.5	324.00	0.000	QF
N270	1652.8	323.49	0.000	QF
N271	1619.5	323.18	0.000	QF
N272	1577.1	322.92	0.000	QF
N273	1530.1	322.70	0.000	QF
N274	1502.6	322.34	0.000	QF
N275	1487.7	321.90	0.000	QF
N276	1464.1	321.51	0.000	QF
N277	1459.2	321.00	0.000	QF
N278	1486.9	320.26	0.000	QF
N279	1478.2	319.77	0.000	QF
N280	1498.8	319.09	0.000	QF
N281	1505.3	318.49	0.000	QF
N282	1500.1	317.98	0.000	QF
N283	1524.7	317.26	0.000	QF
N284	1557.1	316.49	0.000	QF
N285	1575.3	315.82	0.000	QF
N286	1580.1	315.23	0.000	QF
N287	1539.9	314.94	0.000	QF
N288	1515.1	314.54	0.000	QF
N289	1467.4	314.30	0.000	QF
N290	1498.4	313.54	0.000	QF
N291	1503.7	312.94	0.000	QF
N292	1489.6	312.47	0.000	QF
N293	1482.6	311.96	0.000	QF
N294	1496.4	311.31	0.000	QF
N295	1498.4	310.73	0.000	QF
N296	1488.5	310.23	0.000	QF
N297	1457.2	309.87	0.000	QF
N298	1427.5	309.49	0.000	QF
N299	1407.1	309.06	0.000	QF
N300	1391.4	308.59	0.000	QF
N301	1378.6	308.10	0.000	QF
N302	1380.1	307.52	0.000	QF
N303	1354.2	307.12	0.000	QF
N304	1319.4	306.77	0.000	QF
N305	1278.9	306.46	0.000	QF
N306	1247.7	306.09	0.000	QF
N307	1229.6	305.63	0.000	QF
N308	1194.4	305.28	0.000	QF
N309	1156.0	304.95	0.000	QF
N310	1128.6	304.55	0.000	QF
N311	1090.8	304.22	0.000	QF
N312	1065.0	303.80	0.000	QF
N313	1042.1	303.37	0.000	QF
N314	1036.6	302.83	0.000	QF



COMISION REGULADORA  
DE ENERGIA  
SECRETARIA EJECUTIVA

N315	1011.9	302.41	0.000	QF
N316	967.8	302.10	0.000	QF
N317	933.7	301.74	0.000	QF
N318	908.6	301.32	0.000	QF
N319	873.5	300.96	0.000	QF
N320	843.2	300.56	0.000	QF
N321	818.4	300.14	0.000	QF
N322	812.5	299.59	0.000	QF
N323	802.2	299.07	0.000	QF
N324	789.6	298.56	0.000	QF
NYCO	775.6	298.06	-20.000	QF
N326	772.8	297.97	0.000	QF
N327	772.0	297.86	0.000	QF
N328	773.6	297.74	0.000	QF
N329	770.5	297.65	0.000	QF
N330	789.0	297.42	0.000	QF
N331	787.2	297.32	0.000	QF
N332	785.8	297.22	0.000	QF
N333	777.8	297.15	0.000	QF
N334	785.9	296.99	0.000	QF
N335	794.7	296.82	0.000	QF
N336	796.3	296.70	0.000	QF
N337	793.5	296.61	0.000	QF
N338	801.4	296.45	0.000	QF
HERMOSIL	798.5	296.35	-15.000	QF
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COMISION REGULADORA  
DE ENERGIA  
SECRETARIA EJECUTIVA



COMISION REGULADORA DE ENERGIA

**ANEXO 3**

**CARACTERISTICAS DE TECNOLOGIA, DISEÑO, INGENIERIA Y  
CONSTRUCCION**

Apéndice 3.2 Especificaciones y características del sistema de transporte.





COMISION REGULADORA DE ENERGIA

El sistema de transporte tiene las características que se detallan a continuación:

Tramo		Material	Longitud Kilómetros	Diámetro mm (pulg)
Naco	Cananea	API-5L- X52	42	406.4 (16)
Cananea	Hermosillo	API-5L- X52	297	406.4 (16)

3 002 002





COMISION REGULADORA DE ENERGIA

El ducto se diseñó y construyó en conformidad con lo establecido por la norma interna de Pemex 7.3.13 *"Requisitos mínimos de Seguridad para el Diseño, Construcción, Operación, Mantenimiento e Inspección de tuberías de transporte de hidrocarburos"*, toda vez que es un sistema ya construido y operando en forma continua. Por otra parte, el Permisionario se compromete a operarlo y mantenerlo de acuerdo con las especificaciones técnicas establecidas por el Código ASME B-31.8 *"Gas Transmission and Distribution Piping Systems"*, DOT Parte 192 *"Code of Federal 49 Pipeline Safety Regulations"*, Especificación API-5L, *"Specification for line pipe"*, ASTM A-53, *"Standard Specification for Pipe, Steel, Black and Hot-dipped, Zinc coated, Welded and Seamless"* y NACE Estándar RPO 169-92, *"Control of External Corrosion on Underground or Submerged Metallic Piping Systems"*, los cuales se utilizan internacionalmente en las instalaciones de sistemas para la conducción de gas

COMISION REGULADORA  
DE ENERGIA  
SECRETARIA EJECUTIVA

3 003 002





COMISION REGULADORA DE ENERGIA

### ANEXO 3

## CARACTERISTICAS DE TECNOLOGIA, DISEÑO, INGENIERIA Y CONSTRUCCION

Apéndice 3.3 Códigos y normas aplicables.

