

BSEE APD - MASP and MAWHP Calculations (Drilling)

Block **Desoto Canyon 491 #1 ST 1** OCS-G- **23516** Well **1 ST01 BP00**
 Casing **22.000"** Depth (TVD) **11,393'**

Data for Calculations

WD	Water Depth	WD=	8,169 ft
RKB	RKB Elevation	RKB=	84 ft
TVDShoe	Shoe Depth (TVD)	TVDShoe=	11,393 ft
FGShoe	Fracture Gradient at Shoe	FGShoe=	10.85 ppge
TVDBtm	Hole Section TD (TVD)	TVDBtm=	13,780 ft
PP	Pore Pressure at Hole Section TD	PP=	9.38 ppge
MW	Mud Weight in Hole	MW=	9.70 ppge
SeaWtr	Sea Water Density (ppg)	SeaWtr=	8.55 ppg
TVDAj	Adjusted Hole Section TVD (BML) TVDAj = TVDBtm - WD - RKB = 13780 - 8169 - 84	TVDAj=	5,527 ft
MF	Mud Factor (% Column = Mud)	MF=	0.300
GF	Gas Factor (% Column = Gas)	GF=	0.700
GG	Gas Gradient	GG=	0.150 psi/ft

For depth (TVDAj) less than 10,000' the gas column is 70%. Between 10,000' and 12,000' the gas column is 70-60% (Interpolated). Between 12,000' and 15,000' the gas column is 60-50% (Interpolated). For depths greater than 15,000' the gas column is 50%. For depths (TVDBtm) shallower than 9,000' the gas gradient is 0.10. Between 9,000' and 11,000' the gas gradient is 0.10-.015 (Interpolated). For depths greater than 11,000' the gas gradient is 0.15.

MASP Based on Bottom Hole Pressure

BHP	Bottom Hole Pressure BHP = PP x TVDBtm x 0.052 = 9.38 x 13780 x 0.052	BHP=	6,721 psi
GasPr	Overlying Gas Head Pressure GasPr = GF x GG x TVDAj = 0.7 x 0.15 x 5527	GasPr=	580 psi
MudPr	Overlying Mud Head Pressure MudPr = MF x MW x 0.052 x TVDAj = 0.3 x 9.7 x 0.052 x 5527	MudPr=	836 psi
WtrPr	Overlying Seawater Head Pressure WtrPr = (WD + RKB) x 0.052 x Seawater Density = (8169 + 84) x 0.052 x 8.55	WtrPr=	3,669 psi
MASPbhp	MASP Based on Bottom Hole Pressure MASPbhp = BHP - GasPr - MudPr - WtrPr = (6721) - (580) - (836) - (3669)	MASPbhp=	1,635 psi

MASP Based on Shoe Fracture Gradient

TVDFrac	Adjusted Fracture TVD (BML) TVDFrac = TVDShoe - WD - RKB = 11393 - 8169 - 84	TVDFrac=	3,140 ft
FracPr	Fracture Pressure (at Shoe) FracPr = FGShoe x TVDShoe x 0.052 = 10.85 x 11393 x 0.052	FracPr=	6,428 psi
TVDG/M	Gas/Mud Contact Depth (TVD) (BML) TVDG/M = GF x TVDAj = 0.7 x 5527	TVDG/M=	3,869 ft
GasPrFrac	Overlying Gas Head Pressure (from MudLine to G/M Contact Depth) GasPrFrac = TVDFrac x GG = (3140 x 0.15) (Note: TVDG/M is 'Below' Shoe)	GasPrFrac=	471 psi
MudPrFrac	Overlying Mud Head Pressure (from G/M Contact to Shoe) MudPrFrac = 0 (Note: TVDG/M is 'Below' Shoe)	MudPrFrac=	0 psi
MASPFrac	MASP Based on Shoe Fracture Gradient MASPFrac = FracPr - GasPrFrac - MudPrFrac - WtrPr = (6428) - (471) - (0) - (3669)	MASPFrac=	2,288 psi

MASP (Lessor of the Above) and MAWHP

MASP = 1,635 psi
MAWHP = 5,305 psi (MAWHP = MASP + Seawater gradient from surface to MudLine)

BSEE APD - MASP and MAWHP Calculations (Drilling)

Block **Desoto Canyon 491 #1 ST 1** OCS-G- **23516** Well **1 ST01 BP00**
 Casing **22.000"** Depth (TVD) **13,780'**
(with 18" Liner Below) (18" Liner Shoe Depth)

Data for Calculations

WD	Water Depth	WD=	8,169 ft
RKB	RKB Elevation	RKB=	84 ft
TVDShoe	Shoe Depth (TVD)	TVDShoe=	13,780 ft
FGShoe	Fracture Gradient at Shoe	FGShoe=	11.30 ppge
TVDBtm	Hole Section TD (TVD)	TVDBtm=	16,903 ft
PP	Pore Pressure at Hole Section TD	PP=	9.40 ppge
MW	Mud Weight in Hole	MW=	9.80 ppge
SeaWtr	Sea Water Density (ppg)	SeaWtr=	8.55 ppg
TVDAAdj	Adjusted Hole Section TVD (BML) TVDAAdj = TVDBtm - WD - RKB = 16903 - 8169 - 84	TVDAAdj=	8,650 ft
MF	Mud Factor (% Column = Mud)	MF=	0.300
GF	Gas Factor (% Column = Gas)	GF=	0.700
GG	Gas Gradient	GG=	0.150 psi/ft

For depth (TVDAAdj) less than 10,000' the gas column is 70%. Between 10,000' and 12,000' the gas column is 70-60% (Interpolated). Between 12,000' and 15,000' the gas column is 60-50% (Interpolated). For depths greater than 15,000' the gas column is 50%. For depths (TVDBtm) shallower than 9,000' the gas gradient is 0.10. Between 9,000' and 11,000' the gas gradient is 0.10-.015 (Interpolated). For depths greater than 11,000' the gas gradient is 0.15.

MASP Based on Bottom Hole Pressure

BHP	Bottom Hole Pressure BHP = PP x TVDBtm x 0.052 = 9.4 x 16903 x 0.052	BHP=	8,262 psi
GasPr	Overlying Gas Head Pressure GasPr = GF x GG x TVDAAdj = 0.7 x 0.15 x 8650	GasPr=	908 psi
MudPr	Overlying Mud Head Pressure MudPr = MF x MW x 0.052 x TVDAAdj = 0.3 x 9.8 x 0.052 x 8650	MudPr=	1,322 psi
WtrPr	Overlying Seawater Head Pressure WtrPr = (WD + RKB) x 0.052 x Seawater Density = (8169 + 84) x 0.052 x 8.55	WtrPr=	3,669 psi
MASPbhp	MASP Based on Bottom Hole Pressure MASPbhp = BHP - GasPr - MudPr - WtrPr = (8262) - (908) - (1322) - (3669)	MASPbhp=	2,362 psi

MASP Based on Shoe Fracture Gradient

TVDFrac	Adjusted Fracture TVD (BML) TVDFrac = TVDShoe - WD - RKB = 13780 - 8169 - 84	TVDFrac=	5,527 ft
FracPr	Fracture Pressure (at Shoe) FracPr = FGShoe x TVDShoe x 0.052 = 11.3 x 13780 x 0.052	FracPr=	8,097 psi
TVDG/M	Gas/Mud Contact Depth (TVD) (BML) TVDG/M = GF x TVDAAdj = 0.7 x 8650	TVDG/M=	6,055 ft
GasPrFrac	Overlying Gas Head Pressure (from MudLine to G/M Contact Depth) GasPrFrac = TVDFrac x GG = (5527 x 0.15) (Note: TVDG/M is 'Below' Shoe)	GasPrFrac=	829 psi
MudPrFrac	Overlying Mud Head Pressure (from G/M Contact to Shoe) MudPrFrac = 0 (Note: TVDG/M is 'Below' Shoe)	MudPrFrac=	0 psi
MASPFrac	MASP Based on Shoe Fracture Gradient MASPFrac = FracPr - GasPrFrac - MudPrFrac - WtrPr = (8097) - (829) - (0) - (3669)	MASPFrac=	3,599 psi

MASP (Lessor of the Above) and MAWHP

MASP = 2,362 psi
MAWHP = 6,032 psi (MAWHP = MASP + Seawater gradient from surface to MudLine)

BSEE APD - MASP and MAWHP Calculations (Drilling)

Block **Desoto Canyon 491 #1 ST 1** OCS-G- **23516** Well **1 ST01 BP00**
 Casing **22.000"** Depth (TVD) **16,903'**
(with 18" & 16" Liners Below) (16" Liner Shoe Depth)

Data for Calculations

WD	Water Depth	WD=	8,169 ft
RKB	RKB Elevation	RKB=	84 ft
TVDShoe	Shoe Depth (TVD)	TVDShoe=	16,903 ft
FGShoe	Fracture Gradient at Shoe	FGShoe=	12.10 ppge
TVDBtm	Hole Section TD (TVD)	TVDBtm=	19,522 ft
PP	Pore Pressure at Hole Section TD	PP=	10.48 ppge
MW	Mud Weight in Hole	MW=	11.00 ppge
SeaWtr	Sea Water Density (ppg)	SeaWtr=	8.55 ppg
TVDAj	Adjusted Hole Section TVD (BML) TVDAj = TVDBtm - WD - RKB = 19522 - 8169 - 84	TVDAj=	11,269 ft
MF	Mud Factor (% Column = Mud)	MF=	0.363
GF	Gas Factor (% Column = Gas)	GF=	0.637
GG	Gas Gradient	GG=	0.150 psi/ft

For depth (TVDAj) less than 10,000' the gas column is 70%. Between 10,000' and 12,000' the gas column is 70-60% (Interpolated). Between 12,000' and 15,000' the gas column is 60-50% (Interpolated). For depths greater than 15,000' the gas column is 50%. For depths (TVDBtm) shallower than 9,000' the gas gradient is 0.10. Between 9,000' and 11,000' the gas gradient is 0.10-.015 (Interpolated). For depths greater than 11,000' the gas gradient is 0.15.

MASP Based on Bottom Hole Pressure

BHP	Bottom Hole Pressure BHP = PP x TVDBtm x 0.052 = 10.48 x 19522 x 0.052	BHP=	10,639 psi
GasPr	Overlying Gas Head Pressure GasPr = GF x GG x TVDAj = 0.637 x 0.15 x 11269	GasPr=	1,076 psi
MudPr	Overlying Mud Head Pressure MudPr = MF x MW x 0.052 x TVDAj = 0.363 x 11 x 0.052 x 11269	MudPr=	2,343 psi
WtrPr	Overlying Seawater Head Pressure WtrPr = (WD + RKB) x 0.052 x Seawater Density = (8169 + 84) x 0.052 x 8.55	WtrPr=	3,669 psi
MASPbhp	MASP Based on Bottom Hole Pressure MASPbhp = BHP - GasPr - MudPr - WtrPr = (10639) - (1076) - (2343) - (3669)	MASPbhp=	3,551 psi

MASP Based on Shoe Fracture Gradient

TVDFrac	Adjusted Fracture TVD (BML) TVDFrac = TVDShoe - WD - RKB = 16903 - 8169 - 84	TVDFrac=	8,650 ft
FracPr	Fracture Pressure (at Shoe) FracPr = FGShoe x TVDShoe x 0.052 = 12.1 x 16903 x 0.052	FracPr=	10,635 psi
TVDG/M	Gas/Mud Contact Depth (TVD) (BML) TVDG/M = GF x TVDAj = 0.637 x 11269	TVDG/M=	7,173 ft
GasPrFrac	Overlying Gas Head Pressure (from MudLine to G/M Contact Depth) GasPrFrac = TVDG/M x GG = (7173 x 0.15)	GasPrFrac=	1,076 psi
MudPrFrac	Overlying Mud Head Pressure (from G/M Contact to Shoe) MudPrFrac = (TVDFrac - TVDG/M) x MW x 0.052 = (8650 - 7173) x 11 x 0.052	MudPrFrac=	845 psi
MASPFrac	MASP Based on Shoe Fracture Gradient MASPFrac = FracPr - GasPrFrac - MudPrFrac - WtrPr = (10635) - (1076) - (845) - (3669)	MASPFrac=	5,045 psi

MASP (Lessor of the Above) and MAWHP

MASP = 3,551 psi
MAWHP = 7,220 psi (MAWHP = MASP + Seawater gradient from surface to MudLine)

BSEE APD - MASP and MAWHP Calculations (Drilling)

Block **Desoto Canyon 491 #1 ST 1** OCS-G- **23516** Well **1 ST01 BP00**
 Casing **18.000"** Depth (TVD) **13,780'**

Data for Calculations

WD	Water Depth	WD=	8,169 ft
RKB	RKB Elevation	RKB=	84 ft
TVDShoe	Shoe Depth (TVD)	TVDShoe=	13,780 ft
FGShoe	Fracture Gradient at Shoe	FGShoe=	11.30 ppge
TVDBtm	Hole Section TD (TVD)	TVDBtm=	16,903 ft
PP	Pore Pressure at Hole Section TD	PP=	9.40 ppge
MW	Mud Weight in Hole	MW=	9.80 ppge
SeaWtr	Sea Water Density (ppg)	SeaWtr=	8.55 ppg
TVDAj	Adjusted Hole Section TVD (BML) TVDAj = TVDBtm - WD - RKB = 16903 - 8169 - 84	TVDAj=	8,650 ft
MF	Mud Factor (% Column = Mud)	MF=	0.300
GF	Gas Factor (% Column = Gas)	GF=	0.700
GG	Gas Gradient	GG=	0.150 psi/ft

For depth (TVDAj) less than 10,000' the gas column is 70%. Between 10,000' and 12,000' the gas column is 70-60% (Interpolated). Between 12,000' and 15,000' the gas column is 60-50% (Interpolated). For depths greater than 15,000' the gas column is 50%. For depths (TVDBtm) shallower than 9,000' the gas gradient is 0.10. Between 9,000' and 11,000' the gas gradient is 0.10-.015 (Interpolated). For depths greater than 11,000' the gas gradient is 0.15.

MASP Based on Bottom Hole Pressure

BHP	Bottom Hole Pressure BHP = PP x TVDBtm x 0.052 = 9.4 x 16903 x 0.052	BHP=	8,262 psi
GasPr	Overlying Gas Head Pressure GasPr = GF x GG x TVDAj = 0.7 x 0.15 x 8650	GasPr=	908 psi
MudPr	Overlying Mud Head Pressure MudPr = MF x MW x 0.052 x TVDAj = 0.3 x 9.8 x 0.052 x 8650	MudPr=	1,322 psi
WtrPr	Overlying Seawater Head Pressure WtrPr = (WD + RKB) x 0.052 x Seawater Density = (8169 + 84) x 0.052 x 8.55	WtrPr=	3,669 psi
MASPbhp	MASP Based on Bottom Hole Pressure MASPbhp = BHP - GasPr - MudPr - WtrPr = (8262) - (908) - (1322) - (3669)	MASPbhp=	2,362 psi

MASP Based on Shoe Fracture Gradient

TVDFrac	Adjusted Fracture TVD (BML) TVDFrac = TVDShoe - WD - RKB = 13780 - 8169 - 84	TVDFrac=	5,527 ft
FracPr	Fracture Pressure (at Shoe) FracPr = FGShoe x TVDShoe x 0.052 = 11.3 x 13780 x 0.052	FracPr=	8,097 psi
TVDG/M	Gas/Mud Contact Depth (TVD) (BML) TVDG/M = GF x TVDAj = 0.7 x 8650	TVDG/M=	6,055 ft
GasPrFrac	Overlying Gas Head Pressure (from MudLine to G/M Contact Depth) GasPrFrac = TVDFrac x GG = (5527 x 0.15) (Note: TVDG/M is 'Below' Shoe)	GasPrFrac=	829 psi
MudPrFrac	Overlying Mud Head Pressure (from G/M Contact to Shoe) MudPrFrac = 0 (Note: TVDG/M is 'Below' Shoe)	MudPrFrac=	0 psi
MASPFrac	MASP Based on Shoe Fracture Gradient MASPFrac = FracPr - GasPrFrac - MudPrFrac - WtrPr = (8097) - (829) - (0) - (3669)	MASPFrac=	3,599 psi

MASP (Lessor of the Above) and MAWHP

MASP = 2,362 psi
MAWHP = 6,032 psi (MAWHP = MASP + Seawater gradient from surface to MudLine)

BSEE APD - MASP and MAWHP Calculations (Drilling)

Block **Desoto Canyon 491 #1 ST 1** OCS-G- **23516** Well **1 ST01 BP00**
 Casing **16.000"** Depth (TVD) **16,903'**

Data for Calculations

WD	Water Depth	WD=	8,169 ft
RKB	RKB Elevation	RKB=	84 ft
TVDShoe	Shoe Depth (TVD)	TVDShoe=	16,903 ft
FGShoe	Fracture Gradient at Shoe	FGShoe=	12.10 ppge
TVDBtm	Hole Section TD (TVD)	TVDBtm=	19,522 ft
PP	Pore Pressure at Hole Section TD	PP=	10.48 ppge
MW	Mud Weight in Hole	MW=	11.00 ppge
SeaWtr	Sea Water Density (ppg)	SeaWtr=	8.55 ppg
TVDAj	Adjusted Hole Section TVD (BML) TVDAj = TVDBtm - WD - RKB = 19522 - 8169 - 84	TVDAj=	11,269 ft
MF	Mud Factor (% Column = Mud)	MF=	0.363
GF	Gas Factor (% Column = Gas)	GF=	0.637
GG	Gas Gradient	GG=	0.150 psi/ft

For depth (TVDAj) less than 10,000' the gas column is 70%. Between 10,000' and 12,000' the gas column is 70-60% (Interpolated). Between 12,000' and 15,000' the gas column is 60-50% (Interpolated). For depths greater than 15,000' the gas column is 50%. For depths (TVDBtm) shallower than 9,000' the gas gradient is 0.10. Between 9,000' and 11,000' the gas gradient is 0.10-.015 (Interpolated). For depths greater than 11,000' the gas gradient is 0.15.

MASP Based on Bottom Hole Pressure

BHP	Bottom Hole Pressure BHP = PP x TVDBtm x 0.052 = 10.48 x 19522 x 0.052	BHP=	10,639 psi
GasPr	Overlying Gas Head Pressure GasPr = GF x GG x TVDAj = 0.637 x 0.15 x 11269	GasPr=	1,076 psi
MudPr	Overlying Mud Head Pressure MudPr = MF x MW x 0.052 x TVDAj = 0.363 x 11 x 0.052 x 11269	MudPr=	2,343 psi
WtrPr	Overlying Seawater Head Pressure WtrPr = (WD + RKB) x 0.052 x Seawater Density = (8169 + 84) x 0.052 x 8.55	WtrPr=	3,669 psi
MASPbhp	MASP Based on Bottom Hole Pressure MASPbhp = BHP - GasPr - MudPr - WtrPr = (10639) - (1076) - (2343) - (3669)	MASPbhp=	3,551 psi

MASP Based on Shoe Fracture Gradient

TVDFrac	Adjusted Fracture TVD (BML) TVDFrac = TVDShoe - WD - RKB = 16903 - 8169 - 84	TVDFrac=	8,650 ft
FracPr	Fracture Pressure (at Shoe) FracPr = FGShoe x TVDShoe x 0.052 = 12.1 x 16903 x 0.052	FracPr=	10,635 psi
TVDG/M	Gas/Mud Contact Depth (TVD) (BML) TVDG/M = GF x TVDAj = 0.637 x 11269	TVDG/M=	7,173 ft
GasPrFrac	Overlying Gas Head Pressure (from MudLine to G/M Contact Depth) GasPrFrac = TVDG/M x GG = (7173 x 0.15)	GasPrFrac=	1,076 psi
MudPrFrac	Overlying Mud Head Pressure (from G/M Contact to Shoe) MudPrFrac = (TVDFrac - TVDG/M) x MW x 0.052 = (8650 - 7173) x 11 x 0.052	MudPrFrac=	845 psi
MASPFrac	MASP Based on Shoe Fracture Gradient MASPFrac = FracPr - GasPrFrac - MudPrFrac - WtrPr = (10635) - (1076) - (845) - (3669)	MASPFrac=	5,045 psi

MASP (Lessor of the Above) and MAWHP

MASP = 3,551 psi
MAWHP = 7,220 psi (MAWHP = MASP + Seawater gradient from surface to MudLine)

BSEE APD - MASP and MAWHP Calculations (Drilling)

Block **Desoto Canyon 491 #1 ST 1** OCS-G- **23516** Well **1 ST01 BP00**
 Casing **14.000"** Depth (TVD) **15,257'**

Data for Calculations

WD	Water Depth	WD=	8,169 ft
RKB	RKB Elevation	RKB=	84 ft
TVDShoe	Shoe Depth (TVD)	TVDShoe=	15,257 ft
FGShoe	Fracture Gradient at Shoe	FGShoe=	11.70 ppge
TVDBtm	Hole Section TD (TVD)	TVDBtm=	19,000 ft
PP	Pore Pressure at Hole Section TD	PP=	10.70 ppge
MW	Mud Weight in Hole	MW=	11.20 ppge
SeaWtr	Sea Water Density (ppg)	SeaWtr=	8.55 ppg
TVDAAdj	Adjusted Hole Section TVD (BML) TVDAAdj = TVDBtm - WD - RKB = 19000 - 8169 - 84	TVDAAdj=	10,747 ft
MF	Mud Factor (% Column = Mud)	MF=	0.337
GF	Gas Factor (% Column = Gas)	GF=	0.663
GG	Gas Gradient	GG=	0.150 psi/ft

For depth (TVDAAdj) less than 10,000' the gas column is 70%. Between 10,000' and 12,000' the gas column is 70-60% (Interpolated). Between 12,000' and 15,000' the gas column is 60-50% (Interpolated). For depths greater than 15,000' the gas column is 50%. For depths (TVDBtm) shallower than 9,000' the gas gradient is 0.10. Between 9,000' and 11,000' the gas gradient is 0.10-.015 (Interpolated). For depths greater than 11,000' the gas gradient is 0.15.

MASP Based on Bottom Hole Pressure

BHP	Bottom Hole Pressure BHP = PP x TVDBtm x 0.052 = 10.7 x 19000 x 0.052	BHP=	10,572 psi
GasPr	Overlying Gas Head Pressure GasPr = GF x GG x TVDAAdj = 0.663 x 0.15 x 10747	GasPr=	1,068 psi
MudPr	Overlying Mud Head Pressure MudPr = MF x MW x 0.052 x TVDAAdj = 0.337 x 11.2 x 0.052 x 10747	MudPr=	2,111 psi
WtrPr	Overlying Seawater Head Pressure WtrPr = (WD + RKB) x 0.052 x Seawater Density = (8169 + 84) x 0.052 x 8.55	WtrPr=	3,669 psi
MASPbhp	MASP Based on Bottom Hole Pressure MASPbhp = BHP - GasPr - MudPr - WtrPr = (10572) - (1068) - (2111) - (3669)	MASPbhp=	3,723 psi

MASP Based on Shoe Fracture Gradient

TVDFrac	Adjusted Fracture TVD (BML) TVDFrac = TVDShoe - WD - RKB = 15257 - 8169 - 84	TVDFrac=	7,004 ft
FracPr	Fracture Pressure (at Shoe) FracPr = FGShoe x TVDShoe x 0.052 = 11.7 x 15257 x 0.052	FracPr=	9,282 psi
TVDG/M	Gas/Mud Contact Depth (TVD) (BML) TVDG/M = GF x TVDAAdj = 0.663 x 10747	TVDG/M=	7,122 ft
GasPrFrac	Overlying Gas Head Pressure (from MudLine to G/M Contact Depth) GasPrFrac = TVDFrac x GG = (7004 x 0.15) (Note: TVDG/M is 'Below' Shoe)	GasPrFrac=	1,051 psi
MudPrFrac	Overlying Mud Head Pressure (from G/M Contact to Shoe) MudPrFrac = 0 (Note: TVDG/M is 'Below' Shoe)	MudPrFrac=	0 psi
MASPFrac	MASP Based on Shoe Fracture Gradient MASPFrac = FracPr - GasPrFrac - MudPrFrac - WtrPr = (9282) - (1051) - (0) - (3669)	MASPFrac=	4,562 psi

MASP (Lessor of the Above) and MAWHP

MASP = 3,723 psi
MAWHP = 7,392 psi (MAWHP = MASP + Seawater gradient from surface to MudLine)

BSEE APD - MASP and MAWHP Calculations (Drilling)

Block Desoto Canyon 491 #1 ST 1 OCS-G- 23516 Well 1 ST01 BP00
 Casing 14,000" Depth (TVD) 19,000'
 (with 11.875" Liner Below) (11.875" Liner Shoe Depth)

Data for Calculations

WD	Water Depth	WD=	8,169 ft
RKB	RKB Elevation	RKB=	84 ft
TVDShoe	Shoe Depth (TVD)	TVDShoe=	19,000 ft
FGShoe	Fracture Gradient at Shoe	FGShoe=	13.10 ppge
TVDBtm	Hole Section TD (TVD)	TVDBtm=	21,200 ft
PP	Pore Pressure at Hole Section TD	PP=	12.40 ppge
MW	Mud Weight in Hole	MW=	12.50 ppge
SeaWtr	Sea Water Density (ppg)	SeaWtr=	8.55 ppg
TVDAj	Adjusted Hole Section TVD (BML) TVDAj = TVDBtm - WD - RKB = 21200 - 8169 - 84	TVDAj=	12,947 ft
MF	Mud Factor (% Column = Mud)	MF=	0.432
GF	Gas Factor (% Column = Gas)	GF=	0.568
GG	Gas Gradient	GG=	0.150 psi/ft

For depth (TVDAj) less than 10,000' the gas column is 70%. Between 10,000' and 12,000' the gas column is 70-60% (Interpolated). Between 12,000' and 15,000' the gas column is 60-50% (Interpolated). For depths greater than 15,000' the gas column is 50%. For depths (TVDBtm) shallower than 9,000' the gas gradient is 0.10. Between 9,000' and 11,000' the gas gradient is 0.10-.015 (Interpolated). For depths greater than 11,000' the gas gradient is 0.15.

MASP Based on Bottom Hole Pressure

BHP	Bottom Hole Pressure BHP = PP x TVDBtm x 0.052 = 12.4 x 21200 x 0.052	BHP=	13,670 psi
GasPr	Overlying Gas Head Pressure GasPr = GF x GG x TVDAj = 0.568 x 0.15 x 12947	GasPr=	1,104 psi
MudPr	Overlying Mud Head Pressure MudPr = MF x MW x 0.052 x TVDAj = 0.432 x 12.5 x 0.052 x 12947	MudPr=	3,632 psi
WtrPr	Overlying Seawater Head Pressure WtrPr = (WD + RKB) x 0.052 x Seawater Density = (8169 + 84) x 0.052 x 8.55	WtrPr=	3,669 psi
MASPbhp	MASP Based on Bottom Hole Pressure MASPbhp = BHP - GasPr - MudPr - WtrPr = (13670) - (1104) - (3632) - (3669)	MASPbhp=	5,265 psi

MASP Based on Shoe Fracture Gradient

TVDFrac	Adjusted Fracture TVD (BML) TVDFrac = TVDShoe - WD - RKB = 19000 - 8169 - 84	TVDFrac=	10,747 ft
FracPr	Fracture Pressure (at Shoe) FracPr = FGShoe x TVDShoe x 0.052 = 13.1 x 19000 x 0.052	FracPr=	12,943 psi
TVDG/M	Gas/Mud Contact Depth (TVD) (BML) TVDG/M = GF x TVDAj = 0.568 x 12947	TVDG/M=	7,360 ft
GasPrFrac	Overlying Gas Head Pressure (from MudLine to G/M Contact Depth) GasPrFrac = TVDG/M x GG = (7360 x 0.15)	GasPrFrac=	1,104 psi
MudPrFrac	Overlying Mud Head Pressure (from G/M Contact to Shoe) MudPrFrac = (TVDFrac - TVDG/M) x MW x 0.052 = (10747 - 7360) x 12.5 x 0.052	MudPrFrac=	2,202 psi
MASPFrac	MASP Based on Shoe Fracture Gradient MASPFrac = FracPr - GasPrFrac - MudPrFrac - WtrPr = (12943) - (1104) - (2202) - (3669)	MASPFrac=	5,968 psi

MASP (Lessor of the Above) and MAWHP

MASP = 5,265 psi
MAWHP = 8,934 psi (MAWHP = MASP + Seawater gradient from surface to MudLine)

BSEE APD - MASP and MAWHP Calculations (Drilling)

Block **Desoto Canyon 491 #1 ST 1**

OCS-G- **23516**

Well **1 ST01 BP00**

Casing **14.000"**

Depth (TVD) **21,200'**

(with 11.875" & 9.875" Liners Below) (9.875" Liner Shoe Depth)

Data for Calculations

WD	Water Depth	WD=	8,169 ft
RKB	RKB Elevation	RKB=	84 ft
TVDShoe	Shoe Depth (TVD)	TVDShoe=	21,200 ft
FGShoe	Fracture Gradient at Shoe	FGShoe=	14.47 ppge
TVDBtm	Hole Section TD (TVD)	TVDBtm=	22,684 ft
PP	Pore Pressure at Hole Section TD	PP=	11.30 ppge
MW	Mud Weight in Hole	MW=	12.20 ppge
SeaWtr	Sea Water Density (ppg)	SeaWtr=	8.55 ppg
TVDAj	Adjusted Hole Section TVD (BML) TVDAj = TVDBtm - WD - RKB = 22684 - 8169 - 84	TVDAj=	14,431 ft
MF	Mud Factor (% Column = Mud)	MF=	0.481
GF	Gas Factor (% Column = Gas)	GF=	0.519
GG	Gas Gradient	GG=	0.150 psi/ft

For depth (TVDAj) less than 10,000' the gas column is 70%. Between 10,000' and 12,000' the gas column is 70-60% (Interpolated). Between 12,000' and 15,000' the gas column is 60-50% (Interpolated). For depths greater than 15,000' the gas column is 50%. For depths (TVDBtm) shallower than 9,000' the gas gradient is 0.10. Between 9,000' and 11,000' the gas gradient is 0.10-.015 (Interpolated). For depths greater than 11,000' the gas gradient is 0.15.

MASP Based on Bottom Hole Pressure

BHP	Bottom Hole Pressure BHP = PP x TVDBtm x 0.052 = 11.3 x 22684 x 0.052	BHP=	13,329 psi
GasPr	Overlying Gas Head Pressure GasPr = GF x GG x TVDAj = 0.519 x 0.15 x 14431	GasPr=	1,123 psi
MudPr	Overlying Mud Head Pressure MudPr = MF x MW x 0.052 x TVDAj = 0.481 x 12.2 x 0.052 x 14431	MudPr=	4,404 psi
WtrPr	Overlying Seawater Head Pressure WtrPr = (WD + RKB) x 0.052 x Seawater Density = (8169 + 84) x 0.052 x 8.55	WtrPr=	3,669 psi
MASPbhp	MASP Based on Bottom Hole Pressure MASPbhp = BHP - GasPr - MudPr - WtrPr = (13329) - (1123) - (4404) - (3669)	MASPbhp=	4,133 psi

MASP Based on Shoe Fracture Gradient

TVDFrac	Adjusted Fracture TVD (BML) TVDFrac = TVDShoe - WD - RKB = 21200 - 8169 - 84	TVDFrac=	12,947 ft
FracPr	Fracture Pressure (at Shoe) FracPr = FGShoe x TVDShoe x 0.052 = 14.47 x 21200 x 0.052	FracPr=	15,952 psi
TVDG/M	Gas/Mud Contact Depth (TVD) (BML) TVDG/M = GF x TVDAj = 0.519 x 14431	TVDG/M=	7,489 ft
GasPrFrac	Overlying Gas Head Pressure (from MudLine to G/M Contact Depth) GasPrFrac = TVDG/M x GG = (7489 x 0.15)	GasPrFrac=	1,123 psi
MudPrFrac	Overlying Mud Head Pressure (from G/M Contact to Shoe) MudPrFrac = (TVDFrac - TVDG/M) x MW x 0.052 = (12947 - 7489) x 12.2 x 0.052	MudPrFrac=	3,462 psi
MASPFrac	MASP Based on Shoe Fracture Gradient MASPFrac = FracPr - GasPrFrac - MudPrFrac - WtrPr = (15952) - (1123) - (3462) - (3669)	MASPFrac=	7,697 psi

MASP (Lessor of the Above) and MAWHP

MASP = 4,133 psi
MAWHP = 7,802 psi

(MAWHP = MASP + Seawater gradient from surface to MudLine)

BSEE APD - MASP and MAWHP Calculations (Drilling)

Block **Desoto Canyon 491 #1 ST 1** OCS-G- **23516** Well **1 ST01 BP00**
 Casing **11.875"** Depth (TVD) **19,000'**

Data for Calculations

WD	Water Depth	WD=	8,169 ft
RKB	RKB Elevation	RKB=	84 ft
TVDShoe	Shoe Depth (TVD)	TVDShoe=	19,000 ft
FGShoe	Fracture Gradient at Shoe	FGShoe=	13.10 ppge
TVDBtm	Hole Section TD (TVD)	TVDBtm=	21,200 ft
PP	Pore Pressure at Hole Section TD	PP=	12.40 ppge
MW	Mud Weight in Hole	MW=	12.50 ppge
SeaWtr	Sea Water Density (ppg)	SeaWtr=	8.55 ppg
TVDAj	Adjusted Hole Section TVD (BML) TVDAj = TVDBtm - WD - RKB = 21200 - 8169 - 84	TVDAj=	12,947 ft
MF	Mud Factor (% Column = Mud)	MF=	0.432
GF	Gas Factor (% Column = Gas)	GF=	0.568
GG	Gas Gradient	GG=	0.150 psi/ft

For depth (TVDAj) less than 10,000' the gas column is 70%. Between 10,000' and 12,000' the gas column is 70-60% (Interpolated). Between 12,000' and 15,000' the gas column is 60-50% (Interpolated). For depths greater than 15,000' the gas column is 50%. For depths (TVDBtm) shallower than 9,000' the gas gradient is 0.10. Between 9,000' and 11,000' the gas gradient is 0.10-.015 (Interpolated). For depths greater than 11,000' the gas gradient is 0.15.

MASP Based on Bottom Hole Pressure

BHP	Bottom Hole Pressure BHP = PP x TVDBtm x 0.052 = 12.4 x 21200 x 0.052	BHP=	13,670 psi
GasPr	Overlying Gas Head Pressure GasPr = GF x GG x TVDAj = 0.568 x 0.15 x 12947	GasPr=	1,104 psi
MudPr	Overlying Mud Head Pressure MudPr = MF x MW x 0.052 x TVDAj = 0.432 x 12.5 x 0.052 x 12947	MudPr=	3,632 psi
WtrPr	Overlying Seawater Head Pressure WtrPr = (WD + RKB) x 0.052 x Seawater Density = (8169 + 84) x 0.052 x 8.55	WtrPr=	3,669 psi
MASPbhp	MASP Based on Bottom Hole Pressure MASPbhp = BHP - GasPr - MudPr - WtrPr = (13670) - (1104) - (3632) - (3669)	MASPbhp=	5,265 psi

MASP Based on Shoe Fracture Gradient

TVDFrac	Adjusted Fracture TVD (BML) TVDFrac = TVDShoe - WD - RKB = 19000 - 8169 - 84	TVDFrac=	10,747 ft
FracPr	Fracture Pressure (at Shoe) FracPr = FGShoe x TVDShoe x 0.052 = 13.1 x 19000 x 0.052	FracPr=	12,943 psi
TVDG/M	Gas/Mud Contact Depth (TVD) (BML) TVDG/M = GF x TVDAj = 0.568 x 12947	TVDG/M=	7,360 ft
GasPrFrac	Overlying Gas Head Pressure (from MudLine to G/M Contact Depth) GasPrFrac = TVDG/M x GG = (7360 x 0.15)	GasPrFrac=	1,104 psi
MudPrFrac	Overlying Mud Head Pressure (from G/M Contact to Shoe) MudPrFrac = (TVDFrac - TVDG/M) x MW x 0.052 = (10747 - 7360) x 12.5 x 0.052	MudPrFrac=	2,202 psi
MASPFrac	MASP Based on Shoe Fracture Gradient MASPFrac = FracPr - GasPrFrac - MudPrFrac - WtrPr = (12943) - (1104) - (2202) - (3669)	MASPFrac=	5,968 psi

MASP (Lessor of the Above) and MAWHP

MASP = 5,265 psi
MAWHP = 8,934 psi (MAWHP = MASP + Seawater gradient from surface to MudLine)

BSEE APD - MASP and MAWHP Calculations (Drilling)

Block **Desoto Canyon 491 #1 ST 1**

OCS-G- **23516**

Well **1 ST01 BP00**

Casing **11.875"**

Depth (TVD) **21,200'**

(with 9.875" Liner Below)

(9.875" Liner Shoe Depth)

Data for Calculations

WD	Water Depth	WD=	8,169 ft
RKB	RKB Elevation	RKB=	84 ft
TVDShoe	Shoe Depth (TVD)	TVDShoe=	21,200 ft
FGShoe	Fracture Gradient at Shoe	FGShoe=	14.47 ppge
TVDBtm	Hole Section TD (TVD)	TVDBtm=	22,684 ft
PP	Pore Pressure at Hole Section TD	PP=	11.30 ppge
MW	Mud Weight in Hole	MW=	12.20 ppge
SeaWtr	Sea Water Density (ppg)	SeaWtr=	8.55 ppg
TVDAj	Adjusted Hole Section TVD (BML) TVDAj = TVDBtm - WD - RKB = 22684 - 8169 - 84	TVDAj=	14,431 ft
MF	Mud Factor (% Column = Mud)	MF=	0.481
GF	Gas Factor (% Column = Gas)	GF=	0.519
GG	Gas Gradient	GG=	0.150 psi/ft

For depth (TVDAj) less than 10,000' the gas column is 70%. Between 10,000' and 12,000' the gas column is 70-60% (Interpolated). Between 12,000' and 15,000' the gas column is 60-50% (Interpolated). For depths greater than 15,000' the gas column is 50%. For depths (TVDBtm) shallower than 9,000' the gas gradient is 0.10. Between 9,000' and 11,000' the gas gradient is 0.10-.015 (Interpolated). For depths greater than 11,000' the gas gradient is 0.15.

MASP Based on Bottom Hole Pressure

BHP	Bottom Hole Pressure BHP = PP x TVDBtm x 0.052 = 11.3 x 22684 x 0.052	BHP=	13,329 psi
GasPr	Overlying Gas Head Pressure GasPr = GF x GG x TVDAj = 0.519 x 0.15 x 14431	GasPr=	1,123 psi
MudPr	Overlying Mud Head Pressure MudPr = MF x MW x 0.052 x TVDAj = 0.481 x 12.2 x 0.052 x 14431	MudPr=	4,404 psi
WtrPr	Overlying Seawater Head Pressure WtrPr = (WD + RKB) x 0.052 x Seawater Density = (8169 + 84) x 0.052 x 8.55	WtrPr=	3,669 psi
MASPbhp	MASP Based on Bottom Hole Pressure MASPbhp = BHP - GasPr - MudPr - WtrPr = (13329) - (1123) - (4404) - (3669)	MASPbhp=	4,133 psi

MASP Based on Shoe Fracture Gradient

TVDFrac	Adjusted Fracture TVD (BML) TVDFrac = TVDShoe - WD - RKB = 21200 - 8169 - 84	TVDFrac=	12,947 ft
FracPr	Fracture Pressure (at Shoe) FracPr = FGShoe x TVDShoe x 0.052 = 14.47 x 21200 x 0.052	FracPr=	15,952 psi
TVDG/M	Gas/Mud Contact Depth (TVD) (BML) TVDG/M = GF x TVDAj = 0.519 x 14431	TVDG/M=	7,489 ft
GasPrFrac	Overlying Gas Head Pressure (from MudLine to G/M Contact Depth) GasPrFrac = TVDG/M x GG = (7489 x 0.15)	GasPrFrac=	1,123 psi
MudPrFrac	Overlying Mud Head Pressure (from G/M Contact to Shoe) MudPrFrac = (TVDFrac - TVDG/M) x MW x 0.052 = (12947 - 7489) x 12.2 x 0.052	MudPrFrac=	3,462 psi
MASPFrac	MASP Based on Shoe Fracture Gradient MASPFrac = FracPr - GasPrFrac - MudPrFrac - WtrPr = (15952) - (1123) - (3462) - (3669)	MASPFrac=	7,697 psi

MASP (Lessor of the Above) and MAWHP

MASP = 4,133 psi
MAWHP = 7,802 psi

(MAWHP = MASP + Seawater gradient from surface to MudLine)

BSEE APD - MASP and MAWHP Calculations (Drilling)

Block **Desoto Canyon 491 #1 ST 1** OCS-G- **23516** Well **1 ST01 BP00**
 Casing **9.875"** Depth (TVD) **21,200'**

Data for Calculations

WD	Water Depth	WD=	8,169 ft
RKB	RKB Elevation	RKB=	84 ft
TVDShoe	Shoe Depth (TVD)	TVDShoe=	21,200 ft
FGShoe	Fracture Gradient at Shoe	FGShoe=	14.47 ppge
TVDBtm	Hole Section TD (TVD)	TVDBtm=	22,684 ft
PP	Pore Pressure at Hole Section TD	PP=	11.30 ppge
MW	Mud Weight in Hole	MW=	12.20 ppge
SeaWtr	Sea Water Density (ppg)	SeaWtr=	8.55 ppg
TVDAj	Adjusted Hole Section TVD (BML) TVDAj = TVDBtm - WD - RKB = 22684 - 8169 - 84	TVDAj=	14,431 ft
MF	Mud Factor (% Column = Mud)	MF=	0.481
GF	Gas Factor (% Column = Gas)	GF=	0.519
GG	Gas Gradient	GG=	0.150 psi/ft

For depth (TVDAj) less than 10,000' the gas column is 70%. Between 10,000' and 12,000' the gas column is 70-60% (Interpolated). Between 12,000' and 15,000' the gas column is 60-50% (Interpolated). For depths greater than 15,000' the gas column is 50%. For depths (TVDBtm) shallower than 9,000' the gas gradient is 0.10. Between 9,000' and 11,000' the gas gradient is 0.10-.015 (Interpolated). For depths greater than 11,000' the gas gradient is 0.15.

MASP Based on Bottom Hole Pressure

BHP	Bottom Hole Pressure BHP = PP x TVDBtm x 0.052 = 11.3 x 22684 x 0.052	BHP=	13,329 psi
GasPr	Overlying Gas Head Pressure GasPr = GF x GG x TVDAj = 0.519 x 0.15 x 14431	GasPr=	1,123 psi
MudPr	Overlying Mud Head Pressure MudPr = MF x MW x 0.052 x TVDAj = 0.481 x 12.2 x 0.052 x 14431	MudPr=	4,404 psi
WtrPr	Overlying Seawater Head Pressure WtrPr = (WD + RKB) x 0.052 x Seawater Density = (8169 + 84) x 0.052 x 8.55	WtrPr=	3,669 psi
MASPbhp	MASP Based on Bottom Hole Pressure MASPbhp = BHP - GasPr - MudPr - WtrPr = (13329) - (1123) - (4404) - (3669)	MASPbhp=	4,133 psi

MASP Based on Shoe Fracture Gradient

TVDFrac	Adjusted Fracture TVD (BML) TVDFrac = TVDShoe - WD - RKB = 21200 - 8169 - 84	TVDFrac=	12,947 ft
FracPr	Fracture Pressure (at Shoe) FracPr = FGShoe x TVDShoe x 0.052 = 14.47 x 21200 x 0.052	FracPr=	15,952 psi
TVDG/M	Gas/Mud Contact Depth (TVD) (BML) TVDG/M = GF x TVDAj = 0.519 x 14431	TVDG/M=	7,489 ft
GasPrFrac	Overlying Gas Head Pressure (from MudLine to G/M Contact Depth) GasPrFrac = TVDG/M x GG = (7489 x 0.15)	GasPrFrac=	1,123 psi
MudPrFrac	Overlying Mud Head Pressure (from G/M Contact to Shoe) MudPrFrac = (TVDFrac - TVDG/M) x MW x 0.052 = (12947 - 7489) x 12.2 x 0.052	MudPrFrac=	3,462 psi
MASPFrac	MASP Based on Shoe Fracture Gradient MASPFrac = FracPr - GasPrFrac - MudPrFrac - WtrPr = (15952) - (1123) - (3462) - (3669)	MASPFrac=	7,697 psi

MASP (Lessor of the Above) and MAWHP

MASP = 4,133 psi
MAWHP = 7,802 psi (MAWHP = MASP + Seawater gradient from surface to MudLine)

BSEE APD - MASP and MAWHP Calculations (Drilling)

Block **Desoto Canyon 491 #1 ST 1** OCS-G- **23516** Well **1 ST01 BP00**
 Casing **OH** Depth (TVD) **22,684'**

Data for Calculations

WD	Water Depth	WD=	8,169 ft
RKB	RKB Elevation	RKB=	84 ft
TVDShoe	Shoe Depth (TVD)	TVDShoe=	21,200 ft
FGShoe	Fracture Gradient at Shoe	FGShoe=	14.47 ppge
TVDBtm	Hole Section TD (TVD)	TVDBtm=	22,684 ft
PP	Pore Pressure at Hole Section TD	PP=	11.30 ppge
MW	Mud Weight in Hole	MW=	12.20 ppge
SeaWtr	Sea Water Density (ppg)	SeaWtr=	8.55 ppg
TVDAj	Adjusted Hole Section TVD (BML) TVDAj = TVDBtm - WD - RKB = 22684 - 8169 - 84	TVDAj=	14,431 ft
MF	Mud Factor (% Column = Mud)	MF=	0.481
GF	Gas Factor (% Column = Gas)	GF=	0.519
GG	Gas Gradient	GG=	0.150 psi/ft

For depth (TVDAj) less than 10,000' the gas column is 70%. Between 10,000' and 12,000' the gas column is 70-60% (Interpolated). Between 12,000' and 15,000' the gas column is 60-50% (Interpolated). For depths greater than 15,000' the gas column is 50%. For depths (TVDBtm) shallower than 9,000' the gas gradient is 0.10. Between 9,000' and 11,000' the gas gradient is 0.10-.015 (Interpolated). For depths greater than 11,000' the gas gradient is 0.15.

MASP Based on Bottom Hole Pressure

BHP	Bottom Hole Pressure BHP = PP x TVDBtm x 0.052 = 11.3 x 22684 x 0.052	BHP=	13,329 psi
GasPr	Overlying Gas Head Pressure GasPr = GF x GG x TVDAj = 0.519 x 0.15 x 14431	GasPr=	1,123 psi
MudPr	Overlying Mud Head Pressure MudPr = MF x MW x 0.052 x TVDAj = 0.481 x 12.2 x 0.052 x 14431	MudPr=	4,404 psi
WtrPr	Overlying Seawater Head Pressure WtrPr = (WD + RKB) x 0.052 x Seawater Density = (8169 + 84) x 0.052 x 8.55	WtrPr=	3,669 psi
MASPbhp	MASP Based on Bottom Hole Pressure MASPbhp = BHP - GasPr - MudPr - WtrPr = (13329) - (1123) - (4404) - (3669)	MASPbhp=	4,133 psi

MASP Based on Shoe Fracture Gradient

TVDFrac	Adjusted Fracture TVD (BML) TVDFrac = TVDShoe - WD - RKB = 21200 - 8169 - 84	TVDFrac=	12,947 ft
FracPr	Fracture Pressure (at Shoe) FracPr = FGShoe x TVDShoe x 0.052 = 14.47 x 21200 x 0.052	FracPr=	15,952 psi
TVDG/M	Gas/Mud Contact Depth (TVD) (BML) TVDG/M = GF x TVDAj = 0.519 x 14431	TVDG/M=	7,489 ft
GasPrFrac	Overlying Gas Head Pressure (from MudLine to G/M Contact Depth) GasPrFrac = TVDG/M x GG = (7489 x 0.15)	GasPrFrac=	1,123 psi
MudPrFrac	Overlying Mud Head Pressure (from G/M Contact to Shoe) MudPrFrac = (TVDFrac - TVDG/M) x MW x 0.052 = (12947 - 7489) x 12.2 x 0.052	MudPrFrac=	3,462 psi
MASPFrac	MASP Based on Shoe Fracture Gradient MASPFrac = FracPr - GasPrFrac - MudPrFrac - WtrPr = (15952) - (1123) - (3462) - (3669)	MASPFrac=	7,697 psi

MASP (Lessor of the Above) and MAWHP

MASP = 4,133 psi
MAWHP = 7,802 psi (MAWHP = MASP + Seawater gradient from surface to MudLine)

BSEE APD - BOP Test Pressure Calculations (Drilling)

Block Desoto Canyon 491 #1 ST 1

OCS-G- 23516

Well 1 ST01 BP00

Color Codes:

 Required Input
 Linked

Annular BOP Stump Test Pressure

Annular BOP's to be Stump Tested to a Minimum of the Maximum Downhole Pressure (i.e. at BOP) during subsequent subsea Annular BOP tests.

Maximum downhole pressure during subsea Annular BOP tests = 6,909 psi

Annular BOP Stump Test Pressure: = 7,000 psi

Ram BOP Stump Test Pressure

Ram BOP's to be Stump Tested to a Minimum of the Greater of A versus B Below:

A. 500 psi above the maximum MAWHP calculated for the well

Maximum MAWHP (for well) = 9,870 psi

Minimum BOP Stump Test Pressure = $9870 + 500 =$ 10,370 psi

B. Maximum downhole pressure (i.e. at BOP) during subsequent subsea Ram BOP tests

Maximum downhole pressure during subsea Ram BOP tests = 11,665 psi

Ram BOP Stump Test Pressure: = 11,000 psi

BSEE APD - BOP Test Pressure Calculations (Drilling)

Block Desoto Canyon 491 #1 ST 1 OCS-G- 23516 Well 1 ST01 BP00
 Casing 22.000" Depth (TVD) 11,393'

Data for Calculations

WD	Water Depth	WD=	<u>8,169</u> ft
RKB	RKB Elevation	RKB=	<u>84</u> ft
MASPbhp	MASP based on Bottom Hole Pressure	MASPbhp=	<u>1,635</u> psi
MASPFrac	MASP based on Shoe Fracture Gradient	MASPFrac=	<u>2,288</u> psi
MAWHP	MAWHP based on Lessor of MASPbhp and MASPFrac	MAWHP=	<u>5,305</u> psi
SeaWtr	Sea Water Density (ppg)	SeaWtr=	<u>8.55</u> ppg
MWTest	Mud Weight at Time of BOP Test (ppg)	MWTest=	<u>8.55</u> ppg

BOP Test Pressure

Subsea BOP tests to be conducted to a minimum surface pressure of MASP calculated for the next hole section plus 500 psi (adjusted for difference in Mud versus SeaWater Head). If the next hole section is expected to be drilled and cased within the 14 day BOP test cycle consideration should be given to increasing the BOP test pressure of the current interval to be equivalent to the BOP pressure test requirements for the subsequent hole section.

MASP	MASP (Lessor of MASPbhp and MASPFrac)	MASP=	<u>1,635</u> psi
MudHydAdj	Incremental Mud Head versus SeaWater Head (from Surface to BOP) (MWTest - SeaWtr) x 0.052 x (WD + RKB) = (8.55 - 8.55) x 0.052 x (8169 + 84)	MudHydAdj=	<u>0</u> psi
BOPTest	BOP Test Pressure (at Surface) = MASP - MudHydAdj + 500 = 1635 - 0 + 500	BOPTest=	<u>2,135</u> psi
BOPTest (NextEq)	Equivalent BOP Test Pressure of Next Hole Section (at Surface) = MASP - MudHydAdj + 500 = 2362 - 0 + 500	BOPTest (NextEq)=	<u>2,862</u> psi

BOP Test Pressure: (Surface Pressure)	Annular BOP = <u>3,500</u> psi Ram BOP = <u>5,000</u> psi
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Check Downhole Pressure at Ram BOP Test versus MAWHP:

Downhole Pressure = 5000 + (8.55 x 0.052 x (8169 + 84)) = 8,669 psi
 MAWHP = 5,305 psi

**Check Downhole Pressure at Annular BOP Test versus Annular BOP Rating:
 Downhole Pressure Should Not Exceed 70% of Annular BOP Rating.**

Downhole Pressure = 3500 + ((8.55 - 8.55) x 0.052 x (8169 + 84)) = 3,500 psi
 70% of Annular BOP Rating = 10000 x 0.70 = 7,000 psi

BSEE APD - BOP Test Pressure Calculations (Drilling)

Block Desoto Canyon 491 #1 ST 1 OCS-G- 23516 Well 1 ST01 BP00
 Casing 18,000" Depth (TVD) 13,780'

Data for Calculations

WD	Water Depth	WD=	<u>8,169</u> ft
RKB	RKB Elevation	RKB=	<u>84</u> ft
MASPbhp	MASP based on Bottom Hole Pressure	MASPbhp=	<u>2,362</u> psi
MASPFrac	MASP based on Shoe Fracture Gradient	MASPFrac=	<u>3,599</u> psi
MAWHP	MAWHP based on Lessor of MASPbhp and MASPFrac	MAWHP=	<u>6,032</u> psi
SeaWtr	Sea Water Density (ppg)	SeaWtr=	<u>8.55</u> ppg
MWTest	Mud Weight at Time of BOP Test (ppg)	MWTest=	<u>9.70</u> ppg

BOP Test Pressure

Subsea BOP tests to be conducted to a minimum surface pressure of MASP calculated for the next hole section plus 500 psi (adjusted for difference in Mud versus SeaWater Head). If the next hole section is expected to be drilled and cased within the 14 day BOP test cycle consideration should be given to increasing the BOP test pressure of the current interval to be equivalent to the BOP pressure test requirements for the subsequent hole section.

MASP	MASP (Lessor of MASPbhp and MASPFrac)	MASP=	<u>2,362</u> psi
MudHydAdj	Incremental Mud Head versus SeaWater Head (from Surface to BOP) (MWTest - SeaWtr) x 0.052 x (WD + RKB) = (9.7 - 8.55) x 0.052 x (8169 + 84)	MudHydAdj=	<u>494</u> psi
BOPTest	BOP Test Pressure (at Surface) = MASP - MudHydAdj + 500 = 2362 - 494 + 500	BOPTest=	<u>2,369</u> psi
BOPTest (NextEq)	Equivalent BOP Test Pressure of Next Hole Section (at Surface) = MASP - MudHydAdj + 500 = 3551 - 494 + 500	BOPTest (NextEq)=	<u>3,557</u> psi

BOP Test Pressure: (Surface Pressure)	Annular BOP = <u>4,000</u> psi
	Ram BOP = <u>5,000</u> psi

Check Downhole Pressure at Ram BOP Test versus MAWHP:

Downhole Pressure = 5000 + (9.7 x 0.052 x (8169 + 84)) = 9,163 psi
 MAWHP = 6,032 psi

**Check Downhole Pressure at Annular BOP Test versus Annular BOP Rating:
 Downhole Pressure Should Not Exceed 70% of Annular BOP Rating.**

Downhole Pressure = 4000 + ((9.7 - 8.55) x 0.052 x (8169 + 84)) = 4,494 psi
 70% of Annular BOP Rating = 10000 x 0.70 = 7,000 psi

BSEE APD - BOP Test Pressure Calculations (Drilling)

Block Desoto Canyon 491 #1 ST 1 OCS-G- 23516 Well 1 ST01 BP00
 Casing 16.000" Depth (TVD) 16,903'

Data for Calculations

WD	Water Depth	WD=	<u>8,169</u>	ft
RKB	RKB Elevation	RKB=	<u>84</u>	ft
MASPbhp	MASP based on Bottom Hole Pressure	MASPbhp=	<u>3,551</u>	psi
MASPFrac	MASP based on Shoe Fracture Gradient	MASPFrac=	<u>5,045</u>	psi
MAWHP	MAWHP based on Lessor of MASPbhp and MASPFrac	MAWHP=	<u>7,220</u>	psi
SeaWtr	Sea Water Density (ppg)	SeaWtr=	<u>8.55</u>	ppg
MWTest	Mud Weight at Time of BOP Test (ppg)	MWTest=	<u>9.90</u>	ppg

BOP Test Pressure

Subsea BOP tests to be conducted to a minimum surface pressure of MASP calculated for the next hole section plus 500 psi (adjusted for difference in Mud versus SeaWater Head). If the next hole section is expected to be drilled and cased within the 14 day BOP test cycle consideration should be given to increasing the BOP test pressure of the current interval to be equivalent to the BOP pressure test requirements for the subsequent hole section.

MASP	MASP (Lessor of MASPbhp and MASPFrac)	MASP=	<u>3,551</u>	psi
MudHydAdj	Incremental Mud Head versus SeaWater Head (from Surface to BOP) (MWTest - SeaWtr) x 0.052 x (WD + RKB) = (9.9 - 8.55) x 0.052 x (8169 + 84)	MudHydAdj=	<u>579</u>	psi
BOPTest	BOP Test Pressure (at Surface) = MASP - MudHydAdj + 500 = 3551 - 579 + 500	BOPTest=	<u>3,471</u>	psi
BOPTest (NextEq)	Equivalent BOP Test Pressure of Next Hole Section (at Surface) = MASP - MudHydAdj + 500 = 4993 - 579 + 500	BOPTest (NextEq)=	<u>4,914</u>	psi

BOP Test Pressure: (Surface Pressure)	Annular BOP = <u>4,500</u> psi
	Ram BOP = <u>5,000</u> psi

Check Downhole Pressure at Ram BOP Test versus MAWHP:

Downhole Pressure = 5000 + (9.9 x 0.052 x (8169 + 84)) = 9,249 psi
 MAWHP = 7,220 psi

**Check Downhole Pressure at Annular BOP Test versus Annular BOP Rating:
 Downhole Pressure Should Not Exceed 70% of Annular BOP Rating.**

Downhole Pressure = 4500 + ((9.9 - 8.55) x 0.052 x (8169 + 84)) = 5,079 psi
 70% of Annular BOP Rating = 10000 x 0.70 = 7,000 psi

BSEE APD - BOP Test Pressure Calculations (Drilling)

Block Desoto Canyon 491 #1 ST 1 OCS-G- 23516 Well 1 ST01 BP00
 Casing 14.000" Depth (TVD) 15,257'

Data for Calculations

WD	Water Depth	WD=	<u>8,169</u>	ft
RKB	RKB Elevation	RKB=	<u>84</u>	ft
MASPbhp	MASP based on Bottom Hole Pressure	MASPbhp=	<u>3,723</u>	psi
MASPFrac	MASP based on Shoe Fracture Gradient	MASPFrac=	<u>4,562</u>	psi
MAWHP	MAWHP based on Lessor of MASPbhp and MASPFrac	MAWHP=	<u>7,392</u>	psi
SeaWtr	Sea Water Density (ppg)	SeaWtr=	<u>8.55</u>	ppg
MWTest	Mud Weight at Time of BOP Test (ppg)	MWTest=	<u>10.50</u>	ppg

BOP Test Pressure

Subsea BOP tests to be conducted to a minimum surface pressure of MASP calculated for the next hole section plus 500 psi (adjusted for difference in Mud versus SeaWater Head). If the next hole section is expected to be drilled and cased within the 14 day BOP test cycle consideration should be given to increasing the BOP test pressure of the current interval to be equivalent to the BOP pressure test requirements for the subsequent hole section.

MASP	MASP (Lessor of MASPbhp and MASPFrac)	MASP=	<u>3,723</u>	psi
MudHydAdj	Incremental Mud Head versus SeaWater Head (from Surface to BOP) (MWTest - SeaWtr) x 0.052 x (WD + RKB) = (10.5 - 8.55) x 0.052 x (8169 + 84)	MudHydAdj=	<u>837</u>	psi
BOPTest	BOP Test Pressure (at Surface) = MASP - MudHydAdj + 500 = 3723 - 837 + 500	BOPTest=	<u>3,386</u>	psi
BOPTest (NextEq)	Equivalent BOP Test Pressure of Next Hole Section (at Surface) = MASP - MudHydAdj + 500 = 5265 - 837 + 500	BOPTest (NextEq)=	<u>4,928</u>	psi

BOP Test Pressure: (Surface Pressure)	Annular BOP = <u>5,000</u> psi	Ram BOP = <u>5,000</u> psi
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Check Downhole Pressure at Ram BOP Test versus MAWHP:

Downhole Pressure = 5000 + (10.5 x 0.052 x (8169 + 84)) = 9,506 psi
 MAWHP = 7,392 psi

**Check Downhole Pressure at Annular BOP Test versus Annular BOP Rating:
 Downhole Pressure Should Not Exceed 70% of Annular BOP Rating.**

Downhole Pressure = 5000 + ((10.5 - 8.55) x 0.052 x (8169 + 84)) = 5,837 psi
 70% of Annular BOP Rating = 10000 x 0.70 = 7,000 psi

BSEE APD - BOP Test Pressure Calculations (Drilling)

Block Desoto Canyon 491 #1 ST 1 OCS-G- 23516 Well 1 ST01 BP00
 Casing 11.875" Depth (TVD) 19,000'

Data for Calculations

WD	Water Depth	WD=	<u>8,169</u> ft
RKB	RKB Elevation	RKB=	<u>84</u> ft
MASPbhp	MASP based on Bottom Hole Pressure	MASPbhp=	<u>5,265</u> psi
MASPFrac	MASP based on Shoe Fracture Gradient	MASPFrac=	<u>5,968</u> psi
MAWHP	MAWHP based on Lessor of MASPbhp and MASPFrac	MAWHP=	<u>8,934</u> psi
SeaWtr	Sea Water Density (ppg)	SeaWtr=	<u>8.55</u> ppg
MWTest	Mud Weight at Time of BOP Test (ppg)	MWTest=	<u>11.20</u> ppg

BOP Test Pressure

Subsea BOP tests to be conducted to a minimum surface pressure of MASP calculated for the next hole section plus 500 psi (adjusted for difference in Mud versus SeaWater Head). If the next hole section is expected to be drilled and cased within the 14 day BOP test cycle consideration should be given to increasing the BOP test pressure of the current interval to be equivalent to the BOP pressure test requirements for the subsequent hole section.

MASP	MASP (Lessor of MASPbhp and MASPFrac)	MASP=	<u>5,265</u> psi
MudHydAdj	Incremental Mud Head versus SeaWater Head (from Surface to BOP) (MWTest - SeaWtr) x 0.052 x (WD + RKB) = (11.2 - 8.55) x 0.052 x (8169 + 84)	MudHydAdj=	<u>1,137</u> psi
BOPTest	BOP Test Pressure (at Surface) = MASP - MudHydAdj + 500 = 5265 - 1137 + 500	BOPTest=	<u>4,627</u> psi
BOPTest (NextEq)	Equivalent BOP Test Pressure of Next Hole Section (at Surface) = MASP - MudHydAdj + 500 = 4133 - 1137 + 500	BOPTest (NextEq)=	<u>3,495</u> psi

BOP Test Pressure:	Annular BOP = <u>5,000</u> psi
(Surface Pressure)	Ram BOP = <u>5,000</u> psi

Check Downhole Pressure at Ram BOP Test versus MAWHP:

Downhole Pressure = 5000 + (11.2 x 0.052 x (8169 + 84)) = 9,807 psi
 MAWHP = 8,934 psi

**Check Downhole Pressure at Annular BOP Test versus Annular BOP Rating:
 Downhole Pressure Should Not Exceed 70% of Annular BOP Rating.**

Downhole Pressure = 5000 + ((11.2 - 8.55) x 0.052 x (8169 + 84)) = 6,137 psi
 70% of Annular BOP Rating = 10000 x 0.70 = 7,000 psi

BSEE APD - BOP Test Pressure Calculations (Drilling)

Block Desoto Canyon 491 #1 ST 1 OCS-G- 23516 Well 1 ST01 BP00
 Casing 9.875" Depth (TVD) 21,200'

Data for Calculations

WD	Water Depth	WD=	<u>8,169</u> ft
RKB	RKB Elevation	RKB=	<u>84</u> ft
MASPbhp	MASP based on Bottom Hole Pressure	MASPbhp=	<u>4,133</u> psi
MASPFrac	MASP based on Shoe Fracture Gradient	MASPFrac=	<u>7,697</u> psi
MAWHP	MAWHP based on Lessor of MASPbhp and MASPFrac	MAWHP=	<u>7,802</u> psi
SeaWtr	Sea Water Density (ppg)	SeaWtr=	<u>8.55</u> ppg
MWTest	Mud Weight at Time of BOP Test (ppg)	MWTest=	<u>12.50</u> ppg

BOP Test Pressure

Subsea BOP tests to be conducted to a minimum surface pressure of MASP calculated for the next hole section plus 500 psi (adjusted for difference in Mud versus SeaWater Head). If the next hole section is expected to be drilled and cased within the 14 day BOP test cycle consideration should be given to increasing the BOP test pressure of the current interval to be equivalent to the BOP pressure test requirements for the subsequent hole section.

MASP	MASP (Lessor of MASPbhp and MASPFrac)	MASP=	<u>4,133</u> psi
MudHydAdj	Incremental Mud Head versus SeaWater Head (from Surface to BOP) $(MWTest - SeaWtr) \times 0.052 \times (WD + RKB) = (12.5 - 8.55) \times 0.052 \times (8169 + 84)$	MudHydAdj=	<u>1,695</u> psi
BOPTest	BOP Test Pressure (at Surface) $= MASP - MudHydAdj + 500 = 4133 - 1695 + 500$	BOPTest=	<u>2,937</u> psi
BOPTest (NextEq)	Equivalent BOP Test Pressure of Next Hole Section (at Surface) $= MASP - MudHydAdj + 500 = 4133 - 1695 + 500$	BOPTest (NextEq)=	<u>2,937</u> psi

BOP Test Pressure: (Surface Pressure)	Annular BOP = <u>5,000</u> psi	
	Ram BOP = <u>5,000</u> psi	

Check Downhole Pressure at Ram BOP Test versus MAWHP:

Downhole Pressure = $5000 + (12.5 \times 0.052 \times (8169 + 84)) =$	<u>10,364</u> psi
MAWHP =	<u>7,802</u> psi

**Check Downhole Pressure at Annular BOP Test versus Annular BOP Rating:
 Downhole Pressure Should Not Exceed 70% of Annular BOP Rating.**

Downhole Pressure = $5000 + ((12.5 - 8.55) \times 0.052 \times (8169 + 84)) =$	<u>6,695</u> psi
70% of Annular BOP Rating = $10000 \times 0.70 =$	<u>7,000</u> psi

BSEE APD - BOP Test Pressure Calculations (Drilling)

Block Desoto Canyon 491 #1 ST 1 OCS-G- 23516 Well 1 ST01 BP00
 Casing OH Depth (TVD) 22,684'

Data for Calculations

WD	Water Depth	WD=	<u>8,169</u> ft
RKB	RKB Elevation	RKB=	<u>84</u> ft
MASPbhp	MASP based on Bottom Hole Pressure	MASPbhp=	<u>4,133</u> psi
MASPFrac	MASP based on Shoe Fracture Gradient	MASPFrac=	<u>7,697</u> psi
MAWHP	MAWHP based on Lessor of MASPbhp and MASPFrac	MAWHP=	<u>7,802</u> psi
SeaWtr	Sea Water Density (ppg)	SeaWtr=	<u>8.55</u> ppg
MWTest	Mud Weight at Time of BOP Test (ppg)	MWTest=	<u>12.20</u> ppg

BOP Test Pressure

Subsea BOP tests to be conducted to a minimum surface pressure of MASP calculated for the next hole section plus 500 psi (adjusted for difference in Mud versus SeaWater Head). If the next hole section is expected to be drilled and cased within the 14 day BOP test cycle consideration should be given to increasing the BOP test pressure of the current interval to be equivalent to the BOP pressure test requirements for the subsequent hole section.

MASP	MASP (Lessor of MASPbhp and MASPFrac)	MASP=	<u>4,133</u> psi
MudHydAdj	Incremental Mud Head versus SeaWater Head (from Surface to BOP) (MWTest - SeaWtr) x 0.052 x (WD + RKB) = (12.2 - 8.55) x 0.052 x (8169 + 84)	MudHydAdj=	<u>1,566</u> psi
BOPTest	BOP Test Pressure (at Surface) = MASP - MudHydAdj + 500 = 4133 - 1566 + 500	BOPTest=	<u>3,066</u> psi

BOP Test Pressure:	Annular BOP =	<u>5,000</u>	psi
(Surface Pressure)	Ram BOP =	<u>5,000</u>	psi

Check Downhole Pressure at Ram BOP Test versus MAWHP:

Downhole Pressure = 5000 + (12.2 x 0.052 x (8169 + 84)) =	<u>10,236</u> psi
MAWHP =	<u>7,802</u> psi

**Check Downhole Pressure at Annular BOP Test versus Annular BOP Rating:
 Downhole Pressure Should Not Exceed 70% of Annular BOP Rating.**

Downhole Pressure = 5000 + ((12.2 - 8.55) x 0.052 x (8169 + 84)) =	<u>6,566</u> psi
70% of Annular BOP Rating = 10000 x 0.70 =	<u>7,000</u> psi

BSEE APD - Casing Test Pressure Calculations

Block **Desoto Canyon 491 #1 ST 1**

OCS-G- **23516**

Well **1 ST01 BP00**

Color Codes:

 Required Input
 Linked

Casing Test Pressure Basis / Considerations:

Based on the Lessor of A versus B below:

- A. $MYP70 = 70\%$ of Minimum Internal Yield
= (Csg Burst Rating x 0.70) - ((Test Mud Weight - Backup Mud Weight) x (0.052) x (TVD Csg Depth))
- B. MAWHP Less Mud Hydrostatic Head from Surface to Wellhead

Check of Pressure Required for Shoe Test

- C. Expected Shoe Fracture Pressure (+ 0.5 ppge)

Check of Pressure Required for Subsequent Liner(s) Pressure Test(s) and Shoe Test(s)

- D1. Subsequent Liner(s) Pressure Test(s)
- D2. Expected Shoe Fracture Pressure of Subsequent Liner Shoe(s) + 0.5 ppge

Drilling Liner Test Pressure Basis / Considerations:

Based on the Lessor of E versus the Greater of F or G Below:

- E. $MYP70 = 70\%$ of Minimum Internal Yield
= (Csg Burst Rating x 0.70) - ((Test Mud Weight - Backup Mud Weight) x (0.052) x (TVD Csg Depth))
- F. Expected Shoe Fracture Pressure of Liner Shoe and/or Subsequent Liner Shoe(s) + 0.5 ppge
- G. Liner Lap Pressure Test (i.e. 500 psi over previous shoe test)

Production Liner Test Pressure Basis / Considerations:

Based on the Lessor H versus I Below:

- H. $MYP70 = 70\%$ of Minimum Internal Yield
= (Csg Burst Rating x 0.70) - ((Test Mud Weight - Backup Mud Weight) x (0.052) x (TVD Csg Depth))
- I. Liner Lap Pressure Test (i.e. 500 psi over previous shoe test)

BSEE APD - Casing Test Pressure Calculations

Block **Desoto Canyon 491 #1 ST 1**

OCS-G- **23516**

Well **1 ST01 BP00**

22" Surface Casing:

22" 224.21#/ft X-80 Burst Rating:	6,360		psi
Mud Weight at Casing Test:	8.55		ppg
22" 224.21#/ft X-80 Casing Setting Depth- TVD:	11,393		feet
MAWHP:	5,305		psi
Mud Weight at Shoe Test:	9.40		ppg
Shoe LOT:	10.85		ppg
External Fluid (Backup):	8.55		ppg

(70% Yield Criteria) **A.** = $(6360 \times 0.70) - ((8.55 - 8.55) \times (0.052) \times (11393)) = 4,452$ psi

(MAWHP Criteria) **B.** = $5305 - (8.55 \times 0.052 \times 8253) = 1,635$ psi

(Shoe Test Check) **C.** = $((10.85 + 0.5) \times 0.052 \times 11393) - (8.55 \times 0.052 \times 11393) = 1,659$ psi

22" Surface Casing:

22" 224.21#/ft X-80 Burst Rating:	6,360		psi
Mud Weight at Casing Test:	8.55		ppg
22" 224.21#/ft X-80 Casing Setting Depth- TVD:	11,393		feet
MAWHP:	5,305		psi
Mud Weight at Shoe Test:	9.40		ppg
Shoe LOT:	10.85		ppg
External Fluid (Backup):	8.55		ppg

(70% Yield Criteria) **A.** = $(6360 \times 0.70) - ((8.55 - 8.55) \times (0.052) \times (11393)) = 4,452$ psi

(MAWHP Criteria) **B.** = $5305 - (8.55 \times 0.052 \times 8253) = 1,635$ psi

(Shoe Test Check) **C.** = $((10.85 + 0.5) \times 0.052 \times 11393) - (8.55 \times 0.052 \times 11393) = 1,659$ psi

(Subs Liner Test Check) **D1a. 22" Surface Test Press Equivalent to 18" Liner Test Pressure**
 (Note: Applied to Exposed 22" Casing Above 18" TOL)
 = $((2100) + ((9.7 - 8.55) \times (0.052) \times (10409))) = 2,723$ psi

(Subs Shoe Test Check) **D2a. 22" Surface Test Press Equivalent to Estimated 18" Liner Shoe Test**
 (Note: Applied to Exposed 22" Casing Above 18" TOL)
 = $((11.3 - 9.7) \times 0.052 \times 13780) + ((9.7 - 8.55) \times (0.052) \times (10409))) = 1,769$ psi

(Subs Liner Test Check) **D1b. 22" Surface Test Press Equivalent to 16" Liner Test Pressure**
 (Note: Applied to Exposed 22" Casing Above 16" TOL)
 = $((3500) + ((9.8 - 8.55) \times (0.052) \times (9993))) = 4,150$ psi

(Subs Shoe Test Check) **D2b. 22" Surface Test Press Equivalent to Estimated 16" Liner Shoe Test**
 (Note: Applied to Exposed 22" Casing Above 16" TOL)
 = $((12.1 - 9.9) \times 0.052 \times 16903) + ((9.9 - 8.55) \times (0.052) \times (9993))) = 2,635$ psi

Casing Test Pressure = **3,700** psi

BSEE APD - Casing Test Pressure Calculations

Block **Desoto Canyon 491 #1 ST 1**

OCS-G- **23516**

Well **1 ST01 BP00**

18" Liner:

18" 116.09#/ft Q125HP Burst Rating:	8,450	psi
Mud Weight at Casing Test:	9.70	ppg
18" 116.09#/ft Q125HP Liner Top - TVD:	10,409	feet
18" 116.09#/ft Q125HP Liner Setting Depth -TVD:	13,780	feet
MAWHP:	6,032	psi
Mud Weight at Shoe Test:	9.70	ppg
Shoe LOT:	11.30	ppg
External Fluid (Backup):	9.00	ppg

(70% Yield Criteria) **E.** = $(8450 \times 0.70) - ((9.7 - 9) \times (0.052) \times (13780)) = 5,413$ psi

(Shoe Test Criteria) **F.** = $((11.3 + 0.5) \times 0.052 \times 13780) - (9.7 \times 0.052 \times 13780) = 1,505$ psi

(Liner Lap Test Criteria) **G.** = $((10.85 \times 0.052 \times 11393) + 500) - (9.7 \times 0.052 \times 10409) = 1,678$ psi

18" Liner:

18" 116.09#/ft Q125HP Burst Rating:	8,450	psi
Mud Weight at Casing Test:	9.70	ppg
18" 116.09#/ft Q125HP Liner Top - TVD:	13,780	feet
18" 116.09#/ft Q125HP Liner Setting Depth -TVD:	13,780	feet
MAWHP:	6,032	psi
Mud Weight at Shoe Test:	9.70	ppg
Shoe LOT:	11.30	ppg
External Fluid (Backup):	9.00	ppg

(70% Yield Criteria) **E.** = $(8450 \times 0.70) - ((9.7 - 9) \times (0.052) \times (13780)) = 5,413$ psi

(Shoe Test Criteria) **F.** = $((11.3 + 0.5) \times 0.052 \times 13780) - (9.7 \times 0.052 \times 13780) = 1,505$ psi

(Liner Lap Test Criteria) **G.** = $((10.85 \times 0.052 \times 11393) + 500) - (9.7 \times 0.052 \times 10409) = 1,678$ psi

Liner Test Pressure = 2,100 psi
--

Check: 70% of Burst Rating of 22" Surface Casing Exposed at Time of 18" Liner Pressure Test

22" 224.21#/ft X-80 Burst Rating:	6,360	psi
Mud Weight at Test:	9.70	ppg
External Fluid (Backup):	8.60	ppg
Base of 22" 224.21#/ft X-80 (TVD):	10,409	feet
70% of Burst Rating = $(6360 \times 0.70) - ((9.7 - 8.6) \times (0.052) \times (10409)) =$	3,857	psi

Check: 70% of Burst Rating of 22" Surface Casing Exposed at Time of 18" Liner Pressure Test

22" 224.21#/ft X-80 Burst Rating:	6,360	psi
Mud Weight at Test:	9.70	ppg
External Fluid (Backup):	8.60	ppg
Base of 22" 224.21#/ft X-80 (TVD):	NA	feet
70% of Burst Rating = NA (i.e. This Section of Casing is Not Exposed)	NA	psi

BSEE APD - Casing Test Pressure Calculations

Block Desoto Canyon 491 #1 ST 1

OCS-G- 23516

Well 1 ST01 BP00

16" Liner:

16" 97#/ft Q125HP Burst Rating:	8,740	psi
Mud Weight at Casing Test:	9.80	ppg
16" 97#/ft Q125HP Liner Top - TVD:	9,993	feet
16" 97#/ft Q125HP Liner Setting Depth -TVD:	15,257	feet
MAWHP:	7,220	psi
Mud Weight at Shoe Test:	11.80	ppg
Shoe LOT:	12.10	ppg
External Fluid (Backup):	9.00	ppg

(70% Yield Criteria) **E.** = $(8740 \times 0.70) - ((9.8 - 9) \times (0.052) \times (15257)) = 5,483$ psi

(Shoe Test Criteria) **F.** = $((12.1 + 0.5) \times 0.052 \times 15257) - (9.8 \times 0.052 \times 15257) = 2,221$ psi

(Liner Lap Test Criteria) **G.** = $((10.85 \times 0.052 \times 11393) + 500) - (9.8 \times 0.052 \times 9993) = 1,836$ psi

Liner Test Pressure = 1,500 psi
--

Check: 70% of Burst Rating of 22" Surface Casing Exposed at Time of 16" Liner Pressure Test

22" 224.21#/ft X-80 Burst Rating:	6,360	psi
Mud Weight at Test:	9.80	ppg
External Fluid (Backup):	8.60	ppg
Base of 22" 224.21#/ft X-80 (TVD):	9,993	feet
70% of Burst Rating = $(6360 \times 0.70) - ((9.8 - 8.6) \times (0.052) \times (9993)) =$		3,828 psi

BSEE APD - Casing Test Pressure Calculations

Block **Desoto Canyon 491 #1 ST 1**

OCS-G- **23516**

Well **1 ST01 BP00**

14" Intermediate Casing:

	14" 114.48#/ft T95 Burst Rating:	9,920	psi
	Mud Weight at Casing Test:	12.20	ppg
	14" 114.48#/ft T95 Casing Setting Depth -TVD:	15,257	feet
	MAWHP:	7,392	psi
	Mud Weight at Shoe Test:	10.50	ppg
	Shoe LOT:	11.70	ppg
	External Fluid (Backup):	9.00	ppg

(70% Yield Criteria) **A.** = $(9920 \times 0.70) - ((12.2 - 9) \times (0.052) \times (15257))$ = **4,405** psi

(MAWHP Criteria) **B.** = $7392 - (12.2 \times 0.052 \times 8253)$ = **2,156** psi

(Shoe Test Check) **C.** = $((11.7 + 0.5) \times 0.052 \times 15257) - (12.2 \times 0.052 \times 15257)$ = **0** psi

(Subs Liner Test Check) **D1a. 14" Surface Test Pressure Equivalent to 11.875" Liner Test Pressure**
 (Note: Applied to Exposed 14" Casing Above 11.875" TOL)
 = $((2500) + ((11.2 - 12.2) \times (0.052) \times (14947)))$ = **1,723** psi

(Subs Shoe Test Check) **D2a. 14" Surface Test Press Equivalent to Estimated 11.875" Liner Shoe Test**
 (Note: Applied to Exposed 14" Casing Above 11.875" TOL)
 = $((13.1 - 11.2) \times 0.052 \times 19000) + ((11.2 - 12.2) \times (0.052) \times (14947))$ = **1,100** psi

(Subs Liner Test Check) **D1b. 14" Surface Test Pressure Equivalent to 9.875" Liner Test Pressure**
 (Note: Applied to Exposed 14" Casing Above 9.875" TOL)
 = $((3000) + ((12.5 - 12.2) \times (0.052) \times (14947)))$ = **3,233** psi

(Subs Shoe Test Check) **D2b. 14" Surface Test Press Equivalent to Estimated 9.875" Liner Shoe Test**
 (Note: Applied to Exposed 14" Casing Above 9.875" TOL)
 = $((14.47 - 12.5) \times 0.052 \times 21200) + ((12.5 - 12.2) \times (0.052) \times (14947))$ = **2,405** psi

Casing Test Pressure = **2,850** psi

BSEE APD - Casing Test Pressure Calculations

Block Desoto Canyon 491 #1 ST 1

OCS-G- 23516

Well 1 ST01 BP00

11.875" Liner:

11.875" 71.8#/ft Q125CC Burst Rating:	11,910	psi
Mud Weight at Casing Test:	11.20	ppg
11.875" 71.8#/ft Q125CC Liner Top - TVD:	14,947	feet
11.875" 71.8#/ft Q125CC Liner Setting Depth -TVD:	19,000	feet
MAWHP:	8,934	psi
Mud Weight at Shoe Test:	11.20	ppg
Shoe LOT:	13.10	ppg
External Fluid (Backup):	9.00	ppg

(70% Yield Criteria) **E.** = $(11910 \times 0.70) - ((11.2 - 9) \times (0.052) \times (19000)) = 6,163$ psi

(Shoe Test Criteria) **F.** = $((13.1 + 0.5) \times 0.052 \times 19000) - (11.2 \times 0.052 \times 19000) = 2,371$ psi

(Liner Lap Test Criteria) **G.** = $((11.7 \times 0.052 \times 15257) + 500) - (11.2 \times 0.052 \times 14947) = 1,077$ psi

(Subs Liner Test Check) **D1. 11.875" Surface Test Pressure Equivalent to 9.875" Liner Test Pressure**
 (Note: Applied to Exposed 11.875" Casing Above 9.875" TOL)
 = $((3000) + ((12.5 - 11.2) \times (0.052) \times (18434))) = 4,246$ psi

(Subs Shoe Test Check) **D2. 11.875" Surface Test Press Equivalent to Estimated 9.875" Liner Shoe Test**
 (Note: Applied to Exposed 11.875" Casing Above 9.875" TOL)
 = $((14.47 - 12.5) \times 0.052 \times 21200) + ((12.5 - 11.2) \times (0.052) \times (18434))) = 3,418$ psi

Liner Test Pressure = **2,500** psi

Check: 70% of Burst Rating of 14" Intermediate Casing Exposed at Time of 11.875" Liner Pressure Test

14" 114.48#/ft T95 Burst Rating:	9,920	psi
Mud Weight at Test:	11.20	ppg
External Fluid (Backup):	9.00	ppg
Base of 14" 114.48#/ft T95 (TVD):	14,947	feet
70% of Burst Rating = $(9920 \times 0.70) - ((11.2 - 9) \times (0.052) \times (14947)) =$		5,234 psi

BSEE APD - Casing Test Pressure Calculations

Block Desoto Canyon 491 #1 ST 1

OCS-G- 23516

Well 1 ST01 BP00

9.875" Liner:

9.875" 62.8#/ft Q125HP Burst Rating:	14,960	psi
Mud Weight at Casing Test:	12.50	ppg
9.875" 62.8#/ft Q125HP Liner Top - TVD:	18,434	feet
9.875" 62.8#/ft Q125HP Liner Setting Depth -TVD:	21,200	feet
MAWHP:	7,802	psi
Mud Weight at Shoe Test:	12.50	ppg
Shoe LOT:	14.47	ppg
External Fluid (Backup):	9.00	ppg

(70% Yield Criteria) **E.** = $(14960 \times 0.70) - ((12.5 - 9) \times (0.052) \times (21200)) = 6,614$ psi

(Shoe Test Criteria) **F.** = $((14.47 + 0.5) \times 0.052 \times 21200) - (12.5 \times 0.052 \times 21200) = 2,723$ psi

(Liner Lap Test Criteria) **G.** = $((13.1 \times 0.052 \times 19000) + 500) - (12.5 \times 0.052 \times 18434) = 1,461$ psi

Liner Test Pressure = 3,000 psi
--

Check: 70% of Burst Rating of 14" Intermediate Casing Exposed at Time of 9.875" Liner Pressure Test

14" 114.48#/ft T95 Burst Rating:	9,920	psi
Mud Weight at Test:	12.50	ppg
External Fluid (Backup):	9.00	ppg
Base of 14" 114.48#/ft T95 (TVD):	14,947	feet
70% of Burst Rating = $(9920 \times 0.70) - ((12.5 - 9) \times (0.052) \times (14947)) =$		4,224 psi

Check: 70% of Burst Rating of 11.875" Liner Exposed at Time of 9.875" Liner Pressure Test

11.875" 71.8#/ft Q125CC Burst Rating:	11,910	psi
Mud Weight at Test:	12.50	ppg
External Fluid (Backup):	9.00	ppg
Base of 11.875" 71.8#/ft Q125CC (TVD):	18,434	feet
70% of Burst Rating = $(11910 \times 0.70) - ((12.5 - 9) \times (0.052) \times (18434)) =$		4,982 psi

BSEE APD - Casing Design Safety Factor Calculations

Block Desoto Canyon 491 #1 ST 1

OCS-G- 23516

Well 1 ST01 BP00

Water Depth 8,169'

RKB Elevation 84'

Design Calculation Basis:

Color Codes:

Linked

Required Input

Burst Load:

Conductor Casing (i.e. Riserless = BOP Not Installed)
No BOP installed, therefore Not Applicable

Surface and Intermediate Casings/Liners (i.e. BOP Installed)

Burst Loading and Design Evaluation Based on Pressure and Fluid Profiles from MAWHP Calculation

Internal Load Basis = MAWHP Hydrocarbon Column Ratio (i.e. % Gas over % Mud)

Internal Load = MAWHP + (Gas Column Height x Gas Grad) + (Mud Column Height x 0.052 x Mud Wt)

External Load Basis = Fluid Gradient Equivalent to Pore Pressure at Previous Casing Shoe

External Load = Depth x 0.052 x External Backup Pore Pressure Gradient (ppge)

Net Burst Load = Internal Load - External Load

Production Casing/Liner

MASP Based on Bottom Hole Pressure Less a Gas Gradient to Surface

Burst Load = MASP + (Packer Fluid Density - 8.6)(0.052)(Shoe TVD)

Collapse Load:

Conductor Casing (i.e. Riserless = BOP Not Installed)
No BOP installed, therefore Not Applicable

Surface Casing (i.e. Casing Set 'Riserless', BOP Subsequently Installed)

External Load Basis:

External Fluid Weight: Above Wellhead = Seawater; Below Wellhead = Mud Weight Casing Set In

External Load = ((Water Depth) x (Weight Seawater)) + ((Depth Below Mudline) x (Mud Weight Casing Set In))

Internal Load Basis:

Assume Casing Shoe Supports an 8.6 ppge Equivalent Mud Weight on Lost Circulation.

Internal Fluid Weight = Heaviest Mud Weight Used to Drill Below

Internal Fluid Level = Shoe Depth - [(Shoe Depth x 8.60 x 0.052)/(Internal Mud ppge x 0.052)]

Internal Load = (Internal Fluid Column Above Depth of Interest) x (Internal Mud Weight)

Net Burst Load = External Load - Internal Load

Intermediate Casing/Liners

External Load Basis:

External Fluid Weight = Mud Weight Casing Set In

External Load = ((Depth of Interest) x (Mud Weight Casing Set In))

Internal Load Basis:

Assume Casing Shoe Supports a Given Equivalent Mud Weight on Lost Circulation.

Internal Fluid Weight = Heaviest Mud Weight Used to Drill Below

Internal Fluid Level = Shoe Depth - [(Shoe Depth x Support ppge x 0.052)/(Internal Mud ppge x 0.052)]

Internal Load = (Internal Fluid Column Above Depth of Interest) x (Internal Mud Weight)

Net Burst Load = External Load - Internal Load

Production Casing/Liner

Assumes an Internal Backup of Gas Gradient to Surface

Maximum Collapse Load @ Shoe TVD

Collapse Load = (Shoe TVD)(Mud Weight Casing Set In)(0.052) - (Shoe TVD)(Gas Gradient)

Tensile Load:

All Casings

Based on Buoyed String Weight

Tensile Load = String Length, TVD x Casing Weight, lb/ft x Buoyancy Factor

BSEE APD - Casing Design Safety Factor Calculations

Block Desoto Canyon 491 #1 ST 1

OCS-G- 23516

Well 1 ST01 BP00

28" Conductor Casing:

MAWHP:	<u>NA</u>	psi	Top (TVD):	<u>8,253</u>	feet
Frac Grad @ Shoe:	<u>NA</u>	ppge	Bottom (TVD):	<u>9,186</u>	feet
Casing Shoe Depth (TVD):	<u>9,186</u>	feet	Size:	<u>28.000</u>	inches
Mud Weight (below shoe):	<u>NA</u>	ppg	Weight:	<u>218.48</u>	lb/ft
External Fluid (Burst Backup):	<u>NA</u>	ppg	Grade:	<u>X-56</u>	
Gas Gradient:	<u>NA</u>	psi / ft	Thread:	<u>S60 MT</u>	
Shoe Support for Lost Circ:	<u>NA</u>	ppge	Joint Strength:	<u>2,370,000</u>	lbs
Mud Weight (Casing Set In):	<u>8.90</u>	ppg	Burst Rating:	<u>2,630</u>	psi
Buoyancy Factor:	<u>0.864</u>		Collapse Rating:	<u>950</u>	psi

Burst: Not Applicable. Riserless = No BOP Installed
Burst Design Factor = **NA**

Collapse: Not Applicable. Riserless = No BOP Installed
Collapse Design Factor = **NA**

Tensile: Buoyed String Weight (Vertical) = $(9186 - 8253) \times (218.48) \times (0.864)$
 $= 176,119$ lbs
 Tensile Design Factor = $(2370000) / (176119)$
 $= 13.46$

BSEE APD - Casing Design Safety Factor Calculations

Block **Desoto Canyon 491 #1 ST 1**

OCS-G- **23516**

Well **1 ST01 BP00**

22" Surface Casing:

MAWHP (bhp):	5,305	psi
Frac Grad @ Shoe:	10.85	ppge
Casing Shoe Depth (TVD):	11,393	feet
Mud Weight (below shoe):	9.70	ppg
External Fluid (Burst Backup):	8.70	ppg
Gas Gradient:	0.15	psi / ft
Shoe Support for Lost Circ:	8.60	ppge
Mud Weight (Casing Set In):	9.10	ppg
Buoyancy Factor:	0.861	
MASPBhp:	1,635	psi
MASPFrac:	2,288	psi
RKB - ML:	8,253	feet

	Top Section	Btm Section	
Top (TVD):	8,253	11,393	feet
Bottom (TVD):	11,393	11,393	feet
Size:	22.000	22.000	inches
Weight:	224.21	224.21	lb/ft
Grade:	X-80	X-80	
Thread:	S90 MMT	S90 MMT	
Joint Strength:	2,120,000	2,120,000	lbs
Burst Rating:	6,360	6,360	psi
Collapse Rating:	3,870	3,870	psi
Gas Column Factor:	0.700		% Column = Gas (% of ML to TD)
Gas/Mud Contact Depth (BML):	3,869		feet (TVD) (BML)
Gas/Mud Contact Depth (TVD):	12,122		feet (TVD)

Burst: Burst Loading and Design Evaluation Based on Pressure and Fluid Profiles from MAWHP Calculation
 Internal Load Basis = MAWHP Hydrocarbon Column Ratio (i.e. % Gas over % Mud)
 External Load Basis = Fluid Gradient Equivalent to Pore Pressure at Casing Shoe

Top Section Burst Load at Top of Section
 = (5305) - (8253 x 8.7 x 0.052)
 = 1,571 psi
Burst Load at Gas/Mud Contact Depth
 = NA as Gas/Mud Contact is Not Within Casing Section
 = NA psi
Burst Load at Bottom of Section
 = (5305) + (11393 - 8253) x (0.15) - (11393 x 8.7 x 0.052)
 = 621 psi
Burst Design Factor = (6360) / (1571)
 = **4.05**

Bottom Section Burst Load at Top of Section
 = (5305) + ((11393 - 8253) x 0.15) - (11393 x 8.7 x 0.052)
 = 621 psi
Burst Load at Gas/Mud Contact Depth
 = NA as Gas/Mud Contact is Not Within Casing Section
 = NA psi
Burst Load at Bottom of Section
 = (5305) + (11393 - 8253) x (0.15) - (11393 x 8.7 x 0.052)
 = 621 psi
Burst Design Factor = (6360) / (621)
 = 10.23

Collapse: Internal Fluid Level = Shoe TVD - ((Shoe TVD) x (8.60)/(Mud ppg))
 = 11393 - ((11393) x (8.60)/(9.7))
 Fluid Level = 1,292' Feet From Surface

Top Section Collapse Load at Top of Section
 = (8253 - 84)(8.55)(0.052) - (8253 - 1292)(9.7)(0.052)
 = 121 psi
Collapse Load at Fluid Level Depth
 = NA as Fluid Level is Not Within Casing Section
 = NA psi
Collapse Load at Bottom of Section
 = (8253 - 84)(8.55)(0.052) + (11393 - 8253)(9.1)(0.052) - (11393 - 1292)(9.7)(0.052)
 = 23 psi
Collapse Design Factor = (3870) / (121)
 = **32.03**

Bottom Section Collapse Load at Top of Section
 = (8253 - 84)(8.55)(0.052) + (11393 - 8253)(9.1)(0.052) - (11393 - 1292)(9.7)(0.052)
 = 23 psi
Collapse Load at Fluid Level Depth
 = NA as Fluid Level is Not Within Casing Section
 = NA psi
Collapse Load at Bottom of Section
 = (8253 - 84)(8.55)(0.052) + (11393 - 8253)(9.1)(0.052) - (11393 - 1292)(9.7)(0.052)
 = 23 psi
Collapse Design Factor = (3870) / (23)
 = 99.99

Tensile:

Top Section Buoyed String Weight (Vertical) = ((11393 - 8253) x (224.21) x (0.861))
 = 606,161 lbs
Tensile Design Factor = (2120000) / (606161)
 = **3.50**

Bottom Section Buoyed String Weight (Vertical) = (11393 - 11393) x (224.21) x (0.861)
 = 0 lbs
Tensile Design Factor = (2120000) / (0)
 = **#DIV/0!**

BSEE APD - Casing Design Safety Factor Calculations

Block **Desoto Canyon 491 #1 ST 1**

OCS-G- **23516**

Well **1 ST01 BP00**

22" Surface Casing: (with 18" Liner Below)

MAWHP (bhp):	6,032	psi
Frac Grad @ Shoe:	11.30	ppge
Casing Shoe Depth (TVD):	13,780	feet
Mud Weight (below shoe):	9.80	ppg
External Fluid (Burst Backup):	8.70	ppg
Gas Gradient:	0.15	psi / ft
Shoe Support for Lost Circ:	9.00	ppge
Mud Weight (Casing Set In):	9.10	ppg
Buoyancy Factor:	0.861	
MASPBhp:	2,362	psi
MASPFrac:	3,599	psi
RKB - ML:	8,253	feet

	Top Section	Btm Section	
Top (TVD):	8,253	Not Exposed	feet
Bottom (TVD):	10,409	Not Exposed	feet
Size:	22.000	22.000	inches
Weight:	224.21	224.21	lb/ft
Grade:	X-80	X-80	
Thread:	S90 MMT	S90 MMT	
Joint Strength:	2,120,000	2,120,000	lbs
Burst Rating:	6,360	6,360	psi
Collapse Rating:	3,870	3,870	psi
Gas Column Factor:	0.700		% Column = Gas (% of ML to TD)
Gas/Mud Contact Depth (BML):	6,055		feet (TVD) (BML)
Gas/Mud Contact Depth (TVD):	14,308		feet (TVD)

Burst: Burst Loading and Design Evaluation Based on Pressure and Fluid Profiles from MAWHP Calculation
 Internal Load Basis = MAWHP Hydrocarbon Column Ratio (i.e. % Gas over % Mud)
 External Load Basis = Fluid Gradient Equivalent to Pore Pressure at Casing Shoe

Top Section Burst Load at Top of Section
 = (6032) - (8253 x 8.7 x 0.052)
 = 2,298 psi
Burst Load at Gas/Mud Contact Depth
 = NA as Gas/Mud Contact is Not Within Casing Section
 = NA psi
Burst Load at Bottom of Section
 = (6032) + (10409 - 8253) x (0.15) - (10409 x 8.7 x 0.052)
 = 1,646 psi
Burst Design Factor = (6360) / (2298)
 = **2.77**

Bottom Section Burst Load at Top of Section
 = Not Exposed
 = NA psi
Burst Load at Gas/Mud Contact Depth
 = Not Exposed
 = NA psi
Burst Load at Bottom of Section
 = Not Exposed
 = NA psi
Burst Design Factor = NA
 = 99.99

Collapse: Internal Fluid Level = Shoe TVD - ((Shoe TVD) x (Support ppg)/(Mud ppg))
 = 13780 - ((13780) x (9)/(9.8))
 Fluid Level = 1,125' From Surface

Top Section Collapse Load at Top of Section
 = (8253 - 84)(8.55)(0.052) - (8253 - 1125)(9.8)(0.052)
 = -1 psi
Collapse Load at Fluid Level Depth
 = NA as Fluid Level is Not Within Casing Section
 = NA psi
Collapse Load at Bottom of Section
 = (8253 - 84)(8.55)(0.052) + (10409 - 8253)(9.1)(0.052) - (10409 - 1125)(9.8)(0.052)
 = -79 psi
Collapse Design Factor = (3870) / (-1)
 = **99.99**

Bottom Section Collapse Load at Top of Section
 = Not Exposed
 = NA psi
Collapse Load at Fluid Level Depth
 = Not Exposed
 = NA psi
Collapse Load at Bottom of Section
 = Not Exposed
 = NA psi
Collapse Design Factor = NA
 = NA

BSEE APD - Casing Design Safety Factor Calculations

Block **Desoto Canyon 491 #1 ST 1**

OCS-G- **23516**

Well **1 ST01 BP00**

22" Surface Casing: (with 18" & 16" Liners Below)

MAWHP (bhp):	7,220	psi
Frac Grad @ Shoe:	12.10	ppge
Casing Shoe Depth (TVD):	16,903	feet
Mud Weight (below shoe):	11.00	ppg
External Fluid (Burst Backup):	8.70	ppg
Gas Gradient:	0.15	psi / ft
Shoe Support for Lost Circ:	9.00	ppge
Mud Weight (Casing Set In):	9.10	ppg
Buoyancy Factor:	0.861	
MASPBhp:	3,551	psi
MASPFrac:	5,045	psi
RKB - ML:	8,253	feet

	Top Section	Btm Section	
Top (TVD):	8,253	Not Exposed	feet
Bottom (TVD):	9,993	Not Exposed	feet
Size:	22.000	22.000	inches
Weight:	224.21	224.21	lb/ft
Grade:	X-80	X-80	
Thread:	S90 MMT	S90 MMT	
Joint Strength:	2,120,000	2,120,000	lbs
Burst Rating:	6,360	6,360	psi
Collapse Rating:	3,870	3,870	psi
Gas Column Factor:	0.637		% Column = Gas (% of ML to TD)
Gas/Mud Contact Depth (BML):	7,173		feet (TVD) (BML)
Gas/Mud Contact Depth (TVD):	15,426		feet (TVD)

Burst: Burst Loading and Design Evaluation Based on Pressure and Fluid Profiles from MAWHP Calculation
 Internal Load Basis = MAWHP Hydrocarbon Column Ratio (i.e. % Gas over % Mud)
 External Load Basis = Fluid Gradient Equivalent to Pore Pressure at Casing Shoe

Top Section Burst Load at Top of Section
 = (7220) - (8253 x 8.7 x 0.052)
 = 3,486 psi
Burst Load at Gas/Mud Contact Depth
 = NA as Gas/Mud Contact is Not Within Casing Section
 = NA psi
Burst Load at Bottom of Section
 = (7220) + (9993 - 8253) x (0.15) - (9993 x 8.7 x 0.052)
 = 2,960 psi
Burst Design Factor = (6360) / (3486)
 = **1.82**

Bottom Section Burst Load at Top of Section
 = Not Exposed
 = NA psi
Burst Load at Gas/Mud Contact Depth
 = Not Exposed
 = NA psi
Burst Load at Bottom of Section
 = Not Exposed
 = NA psi
Burst Design Factor = NA
 = 99.99

Collapse: Internal Fluid Level = Shoe TVD - ((Shoe TVD) x (Support ppg)/(Mud ppg))
 = 16903 - ((16903) x (9)/(11))
 Fluid Level = 3,073' From Surface

Top Section Collapse Load at Top of Section
 = (8253 - 84)(8.55)(0.052) - (8253 - 3073)(11)(0.052)
 = 669 psi
Collapse Load at Fluid Level Depth
 = NA as Fluid Level is Not Within Casing Section
 = NA psi
Collapse Load at Bottom of Section
 = (8253 - 84)(8.55)(0.052) + (9993 - 8253)(9.1)(0.052) - (9993 - 3073)(11)(0.052)
 = 497 psi
Collapse Design Factor = (3870) / (669)
 = **5.78**

Bottom Section Collapse Load at Top of Section
 = Not Exposed
 = NA psi
Collapse Load at Fluid Level Depth
 = Not Exposed
 = NA psi
Collapse Load at Bottom of Section
 = Not Exposed
 = NA psi
Collapse Design Factor = NA
 = NA

BSEE APD - Casing Design Safety Factor Calculations

Block **Desoto Canyon 491 #1 ST 1**

OCS-G- **23516**

Well **1 ST01 BP00**

18" Liner:

			Top	Btm		
			Section	Section		
MAWHP (bhp):	6,032	psi	Top (TVD):	10,409	13,780	feet
Frac Grad @ Shoe:	11.30	ppge	Bottom (TVD):	13,780	13,780	feet
Casing Shoe Depth (TVD):	13,780	feet	Size:	18,000	18,000	inches
Mud Weight (below shoe):	9.80	ppg	Weight:	116.09	116.09	lb/ft
External Fluid (Burst Backup):	9.08	ppg	Grade:	Q125HP	Q125HP	
Gas Gradient:	0.15	psi / ft	Thread:	HYD511	HYD511	
Shoe Support for Lost Circ:	9.00	ppge	Joint Strength:	2,861,000	2,861,000	lbs
Mud Weight (Casing Set In):	9.70	ppg	Burst Rating:	8,450	8,450	psi
Buoyancy Factor:	0.852		Collapse Rating:	2,860	2,860	psi
MASPBhp:	2,362	psi				
MASPFrac:	3,599	psi	Gas Column Factor:	0.700	% Column = Gas (% of ML to TD)	
RKB - ML:	8,253	feet	Gas/Mud Contact Depth (BML):	6,055	feet (TVD) (BML)	
			Gas/Mud Contact Depth (TVD):	14,308	feet (TVD)	

Burst: Burst Loading and Design Evaluation Based on Pressure and Fluid Profiles from MAWHP Calculation
 Internal Load Basis = MAWHP Hydrocarbon Column Ratio (i.e. % Gas over % Mud)
 External Load Basis = Fluid Gradient Equivalent to Pore Pressure at Casing Shoe

Top Section Burst Load at Top of Section
 = (6032) + (10409 - 8253) x (0.15) - (10409 x 9.08 x 0.052)
 = 1,440 psi
Burst Load at Gas/Mud Contact Depth
 = NA as Gas/Mud Contact is Not Within Casing Section
 = NA psi
Burst Load at Bottom of Section
 = (6032) + (13780 - 8253) x (0.15) - (13780 x 9.08 x 0.052)
 = 354 psi
Burst Design Factor = (8450) / (1440)
 = **5.87**

Bottom Section Burst Load at Top of Section
 = (6032) + ((13780 - 8253) x 0.15) - (13780 x 9.08 x 0.052)
 = 354 psi
Burst Load at Gas/Mud Contact Depth
 = NA as Gas/Mud Contact is Not Within Casing Section
 = NA psi
Burst Load at Bottom of Section
 = (6032) + (13780 - 8253) x (0.15) - (13780 x 9.08 x 0.052)
 = 354 psi
Burst Design Factor = (8450) / (354)
 = 23.86

Collapse: Internal Fluid Level = Shoe TVD - ((Shoe TVD) x (Support ppg)/(Mud ppg))
 = 13780 - ((13780) x (9)/(9.8))
 Fluid Level = 1,125' From Surface

Top Section Collapse Load at Top of Section
 = (10409)(9.7)(0.052) - (10409 - 1125)(9.8)(0.052)
 = 519 psi
Collapse Load at Fluid Level Depth
 = NA as Fluid Level is Not Within Casing Section
 = NA psi
Collapse Load at Bottom of Section
 = (13780)(9.7)(0.052) - (13780 - 1125)(9.8)(0.052)
 = 502 psi
Collapse Design Factor = (2860) / (519)
 = **5.51**

Bottom Section Collapse Load at Top of Section
 = (13780)(9.7)(0.052) - (13780 - 1125)(9.8)(0.052)
 = 502 psi
Collapse Load at Fluid Level Depth
 = NA as Fluid Level is Not Within Casing Section
 = NA psi
Collapse Load at Bottom of Section
 = (13780)(9.7)(0.052) - (13780 - 1125)(9.8)(0.052)
 = 502 psi
Collapse Design Factor = (2860) / (502)
 = 5.70

Tensile:

Top Section Buoyed String Weight (Vertical) = ((13780 - 10409) x (116.09) x (0.852))
 = 333,421 lbs
Tensile Design Factor = (2861000) / (333421)
 = **8.58**

Bottom Section Buoyed String Weight (Vertical) = (13780 - 13780) x (116.09) x (0.852)
 = 0 lbs
Tensile Design Factor = (2861000) / (0)
 = **#DIV/0!**

BSEE APD - Casing Design Safety Factor Calculations

Block **Desoto Canyon 491 #1 ST 1**

OCS-G- **23516**

Well **1 ST01 BP00**

16" Liner:

		Top Section	Btm Section			
MAWHP (bhp):	7,220	psi	Top (TVD):	9,993	16,903	feet
Frac Grad @ Shoe:	12.10	ppge	Bottom (TVD):	16,903	16,903	feet
Casing Shoe Depth (TVD):	16,903	feet	Size:	16.000	16.000	inches
Mud Weight (below shoe):	11.00	ppg	Weight:	97.00	97.00	lb/ft
External Fluid (Burst Backup):	9.38	ppg	Grade:	Q125HP	Q125HP	
Gas Gradient:	0.15	psi / ft	Thread:	HYD513	HYD513	
Shoe Support for Lost Circ:	9.00	ppge	Joint Strength:	2,355,000	2,355,000	lbs
Mud Weight (Casing Set In):	9.80	ppg	Burst Rating:	8,740	8,740	psi
Buoyancy Factor:	0.850		Collapse Rating:	3,150	3,150	psi
MASPBhp:	3,551	psi	Gas Column Factor:	0.637	% Column = Gas (% of ML to TD)	
MASPFrac:	5,045	psi	Gas/Mud Contact Depth (BML):	7,173	feet (TVD) (BML)	
RKB - ML:	8,253	feet	Gas/Mud Contact Depth (TVD):	15,426	feet (TVD)	

Burst: Burst Loading and Design Evaluation Based on Pressure and Fluid Profiles from MAWHP Calculation
 Internal Load Basis = MAWHP Hydrocarbon Column Ratio (i.e. % Gas over % Mud)
 External Load Basis = Fluid Gradient Equivalent to Pore Pressure at Casing Shoe

Top Section Burst Load at Top of Section

$$= (7220) + (9993 - 8253) \times (0.15) - (9993 \times 9.38 \times 0.052)$$

$$= 2,607 \text{ psi}$$
Burst Load at Gas/Mud Contact Depth

$$= (7220) + ((15426 - 8253) \times 0.15) - (15426 \times 9.38 \times 0.052)$$

$$= 772 \text{ psi}$$
Burst Load at Bottom of Section

$$= (7220) + ((15426 - 8253) \times 0.15) + ((16903 - 15426) \times 11 \times 0.052) - (16903 \times 9.38 \times 0.052)$$

$$= 896 \text{ psi}$$
Burst Design Factor = $(8740) / (2607)$

$$= 3.35$$

Bottom Section Burst Load at Top of Section

$$= (7220) + ((15426 - 8253) \times 0.15) \times 0.052 + ((16903 - 15426) \times 11) - (16903 \times 9.38 \times 0.052)$$

$$= 896 \text{ psi}$$
Burst Load at Gas/Mud Contact Depth
 = NA as Gas/Mud Contact is Not Within Casing Section
 = NA psi
Burst Load at Bottom of Section

$$= (7220) + ((15426 - 8253) \times 0.15) + ((16903 - 15426) \times 11 \times 0.052) - (16903 \times 9.38 \times 0.052)$$

$$= 896 \text{ psi}$$
Burst Design Factor = $(8740) / (896)$

$$= 9.75$$

Collapse: Internal Fluid Level = $\text{Shoe TVD} - ((\text{Shoe TVD}) \times (\text{Support ppg}) / (\text{Mud ppg}))$

$$= 16903 - ((16903) \times (9) / (11))$$
Fluid Level = 3,073' From Surface

Top Section Collapse Load at Top of Section

$$= (9993)(9.8)(0.052) - (9993 - 3073)(11)(0.052)$$

$$= 1,134 \text{ psi}$$
Collapse Load at Fluid Level Depth
 = NA as Fluid Level is Not Within Casing Section
 = NA psi
Collapse Load at Bottom of Section

$$= (16903)(9.8)(0.052) - (16903 - 3073)(11)(0.052)$$

$$= 703 \text{ psi}$$
Collapse Design Factor = $(3150) / (1134)$

$$= 2.78$$

Bottom Section Collapse Load at Top of Section

$$= (16903)(9.8)(0.052) - (16903 - 3073)(11)(0.052)$$

$$= 703 \text{ psi}$$
Collapse Load at Fluid Level Depth
 = NA as Fluid Level is Not Within Casing Section
 = NA psi
Collapse Load at Bottom of Section

$$= (16903)(9.8)(0.052) - (16903 - 3073)(11)(0.052)$$

$$= 703 \text{ psi}$$
Collapse Design Factor = $(3150) / (703)$

$$= 4.48$$

Tensile:
Top Section Buoyed String Weight (Vertical) = $((16903 - 9993) \times (97) \times (0.85))$

$$= 569,730 \text{ lbs}$$
Tensile Design Factor = $(2355000) / (569730)$

$$= 4.13$$

BSEE APD - Casing Design Safety Factor Calculations

Block Desoto Canyon 491 #1 ST 1

OCS-G- 23516

Well 1 ST01 BP00

14" Intermediate Casing:

MAWHP (bhp):	<u>7,392</u>	psi	Top (TVD):	<u>8,253</u>	feet
Frac Grad @ Shoe:	<u>11.70</u>	ppge	Bottom (TVD):	<u>15,257</u>	feet
Casing Shoe Depth (TVD):	<u>15,257</u>	feet	Size:	<u>14,000</u>	inches
Mud Weight (below shoe):	<u>11.20</u>	ppg	Weight:	<u>114.48</u>	lb/ft
External Fluid (Burst Backup):	<u>9.40</u>	ppg	Grade:	<u>T95</u>	
Gas Gradient:	<u>0.15</u>	psi / ft	Thread:	<u>SLSF</u>	
Shoe Support for Lost Circ:	<u>9.00</u>	ppge	Joint Strength:	<u>1,682,000</u>	lbs
Mud Weight (Casing Set In):	<u>11.00</u>	ppg	Burst Rating:	<u>9,920</u>	psi
Buoyancy Factor:	<u>0.832</u>		Collapse Rating:	<u>9,180</u>	psi
MASPBhp:	<u>3,723</u>	psi	Gas Column Factor:	<u>0.663</u>	% Column = Gas (% of ML to TD)
MASPFrac:	<u>4,562</u>	psi	Gas/Mud Contact Depth (BML):	<u>7,122</u>	feet (TVD) (BML)
RKB - ML:	<u>8,253</u>	feet	Gas/Mud Contact Depth (TVD):	<u>15,375</u>	feet (TVD)

Burst: Burst Loading and Design Evaluation Based on Pressure and Fluid Profiles from MAWHP Calculation
 Internal Load Basis = MAWHP Hydrocarbon Column Ratio (i.e. % Gas over % Mud)
 External Load Basis = Fluid Gradient Equivalent to Pore Pressure at Casing Shoe

Burst Load at Top of Section
 = (7392) - (8253 x 9.4 x 0.052)
 = 3,358 psi

Burst Load at Gas/Mud Contact Depth
 = NA as Gas/Mud Contact is Not Within Casing Section
 = NA psi

Burst Load at Bottom of Section
 = (7392) + (15257 - 8253) x (0.15) - (15257 x 9.4 x 0.052)
 = 985 psi

Burst Design Factor = (9920) / (3358)
 = **2.95**

Collapse: Internal Fluid Level = Shoe TVD - ((Shoe TVD) x (Support ppg)/(Mud ppg))
 = 15257 - ((15257) x (9)/(11.2))
 Fluid Level = 2,997' From Surface

Collapse Load at Top of Section
 = (8253)(11)(0.052) - (8253 - 2997)(11.2)(0.052)
 = 1,660 psi

Collapse Load at Fluid Level Depth
 = NA as Fluid Level is Not Within Casing Section
 = NA psi

Collapse Load at Bottom of Section
 = (15257)(11)(0.052) - (15257 - 2997)(11.2)(0.052)
 = 1,587 psi

Collapse Design Factor = (9180) / (1660)
 = **5.53**

Tensile:

Buoyed String Weight (Vertical) = ((15257 - 8253) x (114.48) x (0.832))
 = 667,113 lbs

Tensile Design Factor = (1682000) / (667113)
 = **2.52**

BSEE APD - Casing Design Safety Factor Calculations

Block Desoto Canyon 491 #1 ST 1

OCS-G- 23516

Well 1 ST01 BP00

14" Intermediate Casing: (with 11.875" Liner Below)

MAWHP (bhp):	8,934	psi	Top (TVD):	8,253	feet
Frac Grad @ Shoe:	13.10	ppge	Bottom (TVD):	14,947	feet
Casing Shoe Depth (TVD):	19,000	feet	Size:	14.000	inches
Mud Weight (below shoe):	12.50	ppg	Weight:	114.48	lb/ft
External Fluid (Burst Backup):	9.40	ppg	Grade:	T95	
Gas Gradient:	0.15	psi / ft	Thread:	SLSF	
Shoe Support for Lost Circ:	9.00	ppge	Joint Strength:	1,682,000	lbs
Mud Weight (Casing Set In):	11.00	ppg	Burst Rating:	9,920	psi
Buoyancy Factor:	0.832		Collapse Rating:	9,180	psi
MASPBhp:	5,265	psi	Gas Column Factor:	0.568	% Column = Gas (% of ML to TD)
MASPFrac:	5,968	psi	Gas/Mud Contact Depth (BML):	7,360	feet (TVD) (BML)
RKB - ML:	8,253	feet	Gas/Mud Contact Depth (TVD):	15,613	feet (TVD)

Burst: Burst Loading and Design Evaluation Based on Pressure and Fluid Profiles from MAWHP Calculation
 Internal Load Basis = MAWHP Hydrocarbon Column Ratio (i.e. % Gas over % Mud)
 External Load Basis = Fluid Gradient Equivalent to Pore Pressure at Casing Shoe

Burst Load at Top of Section
 = (8934) - (8253 x 9.4 x 0.052)
 = 4,900 psi

Burst Load at Gas/Mud Contact Depth
 = NA as Gas/Mud Contact is Not Within Casing Section
 = NA psi

Burst Load at Bottom of Section
 = (8934) + (14947 - 8253) x (0.15) - (14947 x 9.4 x 0.052)
 = 2,632 psi

Burst Design Factor = (9920) / (4900)
 = **2.02**

Collapse: Internal Fluid Level = Shoe TVD - ((Shoe TVD) x (Support ppg)/(Mud ppg))
 = 19000 - ((19000) x (9)/(12.5))
 Fluid Level = 5,320' From Surface

Collapse Load at Top of Section
 = (8253)(11)(0.052) - (8253 - 5320)(12.5)(0.052)
 = 2,814 psi

Collapse Load at Fluid Level Depth
 = NA as Fluid Level is Not Within Casing Section
 = NA psi

Collapse Load at Bottom of Section
 = (14947)(11)(0.052) - (14947 - 5320)(12.5)(0.052)
 = 2,292 psi

Collapse Design Factor = (9180) / (2814)
 = **3.26**

BSEE APD - Casing Design Safety Factor Calculations

Block Desoto Canyon 491 #1 ST 1

OCS-G- 23516

Well 1 ST01 BP00

14" Intermediate Casing: (with 11.875" & 9.875" Liners Below)

MAWHP (bhp):	7,802	psi	Top (TVD):	8,253	feet
Frac Grad @ Shoe:	14.47	ppge	Bottom (TVD):	14,947	feet
Casing Shoe Depth (TVD):	21,200	feet	Size:	14,000	inches
Mud Weight (below shoe):	12.20	ppg	Weight:	114.48	lb/ft
External Fluid (Burst Backup):	9.40	ppg	Grade:	T95	
Gas Gradient:	0.15	psi / ft	Thread:	SLSF	
Shoe Support for Lost Circ:	9.00	ppge	Joint Strength:	1,682,000	lbs
Mud Weight (Casing Set In):	11.00	ppg	Burst Rating:	9,920	psi
Buoyancy Factor:	0.832		Collapse Rating:	9,180	psi
MASPBhp:	4,133	psi	Gas Column Factor:	0.519	% Column = Gas (% of ML to TD)
MASPFrac:	7,697	psi	Gas/Mud Contact Depth (BML):	7,489	feet (TVD) (BML)
RKB - ML:	8,253	feet	Gas/Mud Contact Depth (TVD):	15,742	feet (TVD)

Burst: Burst Loading and Design Evaluation Based on Pressure and Fluid Profiles from MAWHP Calculation
 Internal Load Basis = MAWHP Hydrocarbon Column Ratio (i.e. % Gas over % Mud)
 External Load Basis = Fluid Gradient Equivalent to Pore Pressure at Casing Shoe

Burst Load at Top of Section

$$= (7802) - (8253 \times 9.4 \times 0.052)$$

$$= 3,768 \text{ psi}$$
Burst Load at Gas/Mud Contact Depth
 = NA as Gas/Mud Contact is Not Within Casing Section
 = NA psi
Burst Load at Bottom of Section

$$= (7802) + (14947 - 8253) \times (0.15) - (14947 \times 9.4 \times 0.052)$$

$$= 1,500 \text{ psi}$$
Burst Design Factor = $(9920) / (3768)$
 = **2.63**

Collapse: Internal Fluid Level = Shoe TVD - ((Shoe TVD) x (Support ppg)/(Mud ppg))

$$= 21200 - ((21200) \times (9)/(12.2))$$
 Fluid Level = 5,561' From Surface

Collapse Load at Top of Section

$$= (8253)(11)(0.052) - (8253 - 5561)(12.2)(0.052)$$

$$= 3,013 \text{ psi}$$
Collapse Load at Fluid Level Depth
 = NA as Fluid Level is Not Within Casing Section
 = NA psi
Collapse Load at Bottom of Section

$$= (14947)(11)(0.052) - (14947 - 5561)(12.2)(0.052)$$

$$= 2,595 \text{ psi}$$
Collapse Design Factor = $(9180) / (3013)$
 = **3.05**

BSEE APD - Casing Design Safety Factor Calculations

Block Desoto Canyon 491 #1 ST 1

OCS-G- 23516

Well 1 ST01 BP00

11.875" Liner:

MAWHP (bhp):	<u>8,934</u>	psi	Top (TVD):	<u>14,947</u>	feet
Frac Grad @ Shoe:	<u>13.10</u>	ppge	Bottom (TVD):	<u>19,000</u>	feet
Casing Shoe Depth (TVD):	<u>19,000</u>	feet	Size:	<u>11.875</u>	inches
Mud Weight (below shoe):	<u>12.50</u>	ppg	Weight:	<u>71.80</u>	lb/ft
External Fluid (Burst Backup):	<u>10.48</u>	ppg	Grade:	<u>Q125CC</u>	
Gas Gradient:	<u>0.15</u>	psi / ft	Thread:	<u>HYD513</u>	
Shoe Support for Lost Circ:	<u>9.00</u>	ppge	Joint Strength:	<u>1,723,000</u>	lbs
Mud Weight (Casing Set In):	<u>11.20</u>	ppg	Burst Rating:	<u>11,910</u>	psi
Buoyancy Factor:	<u>0.829</u>		Collapse Rating:	<u>7,190</u>	psi
MASPBhp:	<u>5,265</u>	psi	Gas Column Factor:	<u>0.568</u>	% Column = Gas (% of ML to TD)
MASPFrac:	<u>5,968</u>	psi	Gas/Mud Contact Depth (BML):	<u>7,360</u>	feet (TVD) (BML)
RKB - ML:	<u>8,253</u>	feet	Gas/Mud Contact Depth (TVD):	<u>15,613</u>	feet (TVD)

Burst: Burst Loading and Design Evaluation Based on Pressure and Fluid Profiles from MAWHP Calculation
 Internal Load Basis = MAWHP Hydrocarbon Column Ratio (i.e. % Gas over % Mud)
 External Load Basis = Fluid Gradient Equivalent to Pore Pressure at Casing Shoe

Burst Load at Top of Section

$$= (8934) + (14947 - 8253) \times (0.15) - (14947 \times 10.48 \times 0.052)$$

$$= 1,793 \text{ psi}$$
Burst Load at Gas/Mud Contact Depth

$$= (8934) + ((15613 - 8253) \times 0.15) - (15613 \times 10.48 \times 0.052)$$

$$= 1,530 \text{ psi}$$
Burst Load at Bottom of Section

$$= (8934) + ((15613 - 8253) \times 0.15) + ((19000 - 15613) \times 12.5 \times 0.052) - (19000 \times 10.48 \times 0.052)$$

$$= 1,886 \text{ psi}$$
Burst Design Factor = $(11910) / (1886)$

$$= 6.32$$

Collapse: Internal Fluid Level = $\text{Shoe TVD} - ((\text{Shoe TVD}) \times (\text{Support ppg}) / (\text{Mud ppg}))$

$$= 19000.01 - ((19000.01) \times (9) / (12.5))$$
 Fluid Level = 5,320' From Surface

Collapse Load at Top of Section

$$= (14947)(11.2)(0.052) - (14947 - 5320)(12.5)(0.052)$$

$$= 2,448 \text{ psi}$$
Collapse Load at Fluid Level Depth
 = NA as Fluid Level is Not Within Casing Section
 = NA psi
Collapse Load at Bottom of Section

$$= (19000)(11.2)(0.052) - (19000 - 5320)(12.5)(0.052)$$

$$= 2,174 \text{ psi}$$
Collapse Design Factor = $(7190) / (2448)$

$$= 2.94$$

Tensile:
Buoyed String Weight (Vertical) = $((19000 - 14947) \times (71.8) \times (0.829))$

$$= 241,243 \text{ lbs}$$
Tensile Design Factor = $(1723000) / (241243)$

$$= 7.14$$

BSEE APD - Casing Design Safety Factor Calculations

Block Desoto Canyon 491 #1 ST 1

OCS-G- 23516

Well 1 ST01 BP00

11.875" Liner: (with 9.875" Liner Below)

MAWHP (bhp):	<u>7,802</u>	psi
Frac Grad @ Shoe:	<u>14.47</u>	ppge
Casing Shoe Depth (TVD):	<u>21,200</u>	feet
Mud Weight (below shoe):	<u>12.20</u>	ppg
External Fluid (Burst Backup):	<u>10.48</u>	ppg
Gas Gradient:	<u>0.15</u>	psi / ft
Shoe Support for Lost Circ:	<u>9.00</u>	ppge
Mud Weight (Casing Set In):	<u>11.20</u>	ppg
Buoyancy Factor:	<u>0.829</u>	
MASPBhp:	<u>4,133</u>	psi
MASPFrac:	<u>7,697</u>	psi
RKB - ML:	<u>8,253</u>	feet

Top (TVD):	<u>14,947</u>	feet
Bottom (TVD):	<u>18,434</u>	feet
Size:	<u>11.875</u>	inches
Weight:	<u>71.80</u>	lb/ft
Grade:	<u>Q125CC</u>	
Thread:	<u>HYD513</u>	
Joint Strength:	<u>1,723,000</u>	lbs
Burst Rating:	<u>11,910</u>	psi
Collapse Rating:	<u>7,190</u>	psi

Gas Column Factor:	<u>0.519</u>	% Column = Gas (% of ML to TD)
Gas/Mud Contact Depth (BML):	<u>7,489</u>	feet (TVD) (BML)
Gas/Mud Contact Depth (TVD):	<u>15,742</u>	feet (TVD)

Burst: Burst Loading and Design Evaluation Based on Pressure and Fluid Profiles from MAWHP Calculation
 Internal Load Basis = MAWHP Hydrocarbon Column Ratio (i.e. % Gas over % Mud)
 External Load Basis = Fluid Gradient Equivalent to Pore Pressure at Casing Shoe

Burst Load at Top of Section
 = (7802) + (14947 - 8253) x (0.15) - (14947 x 10.48 x 0.052)
 = 660 psi

Burst Load at Gas/Mud Contact Depth
 = (7802) + ((15742 - 8253) x 0.15) - (15742 x 10.48 x 0.052)
 = 346 psi

Burst Load at Bottom of Section
 = (7802) + ((15742 - 8253) x 0.15) + ((18434 - 15742) x 12.2 x 0.052) - (18434 x 10.48 x 0.052)
 = 587 psi

Burst Design Factor = (11910) / (660)
 = **18.03**

Collapse: Internal Fluid Level = Shoe TVD - ((Shoe TVD) x (Support ppg)/(Mud ppg))
 = 21200.01 - ((21200.01) x (9)/(12.2))
 Fluid Level = 5,561' From Surface

Collapse Load at Top of Section
 = (14947)(11.2)(0.052) - (14947 - 5561)(12.2)(0.052)
 = 2,750 psi

Collapse Load at Fluid Level Depth
 = NA as Fluid Level is Not Within Casing Section
 = NA psi

Collapse Load at Bottom of Section
 = (18434)(11.2)(0.052) - (18434 - 5561)(12.2)(0.052)
 = 2,569 psi

Collapse Design Factor = (7190) / (2750)
 = **2.61**

BSEE APD - Casing Design Safety Factor Calculations

Block Desoto Canyon 491 #1 ST 1

OCS-G- 23516

Well 1 ST01 BP00

9.875" Liner:

MAWHP (bhp):	7,802	psi	Top (TVD):	18,434	feet
Frac Grad @ Shoe:	14.47	ppge	Bottom (TVD):	21,200	feet
Casing Shoe Depth (TVD):	21,200	feet	Size:	9.875	inches
Mud Weight (below shoe):	12.20	ppg	Weight:	62.80	lb/ft
External Fluid (Burst Backup):	10.70	ppg	Grade:	Q125HP	
Gas Gradient:	0.15	psi / ft	Thread:	HYD523	
Shoe Support for Lost Circ:	9.00	ppge	Joint Strength:	1,817,000	lbs
Mud Weight (Casing Set In):	12.50	ppg	Burst Rating:	14,960	psi
Buoyancy Factor:	0.809		Collapse Rating:	12,910	psi
MASPBhp:	4,133	psi	Gas Column Factor:	0.519	% Column = Gas (% of ML to TD)
MASPFrac:	7,697	psi	Gas/Mud Contact Depth (BML):	7,489	feet (TVD) (BML)
RKB - ML:	8,253	feet	Gas/Mud Contact Depth (TVD):	15,742	feet (TVD)

Burst: Burst Loading and Design Evaluation Based on Pressure and Fluid Profiles from MAWHP Calculation
 Internal Load Basis = MAWHP Hydrocarbon Column Ratio (i.e. % Gas over % Mud)
 External Load Basis = Fluid Gradient Equivalent to Pore Pressure at Casing Shoe

Burst Load at Top of Section

$$= (7802) + ((15742 - 8253) \times 0.15) + ((18434 - 15742) \times 12.2 \times 0.052) - (18434 \times 10.7 \times 0.052)$$

$$= 376 \text{ psi}$$
Burst Load at Gas/Mud Contact Depth

$$= (7802) + ((15742 - 8253) \times 0.15) - (15742 \times 10.7 \times 0.052)$$

$$= 166 \text{ psi}$$
Burst Load at Bottom of Section

$$= (7802) + ((15742 - 8253) \times 0.15) + ((21200 - 15742) \times 12.2 \times 0.052) - (21200 \times 10.7 \times 0.052)$$

$$= 592 \text{ psi}$$
Burst Design Factor = $(14960) / (592)$

$$= 25.27$$

Collapse: Internal Fluid Level = Shoe TVD - ((Shoe TVD) x (Support ppg)/(Mud ppg))

$$= 21200.01 - ((21200.01) \times (9)/(12.2))$$
 Fluid Level = 5,561' From Surface

Collapse Load at Top of Section

$$= (18434)(12.5)(0.052) - (18434 - 5561)(12.2)(0.052)$$

$$= 3,815 \text{ psi}$$
Collapse Load at Fluid Level Depth
 = NA as Fluid Level is Not Within Casing Section
 = NA psi
Collapse Load at Bottom of Section

$$= (21200)(12.5)(0.052) - (21200 - 5561)(12.2)(0.052)$$

$$= 3,858 \text{ psi}$$
Collapse Design Factor = $(12910) / (3858)$

$$= 3.35$$

Tensile:
Buoyed String Weight (Vertical) = $((21200 - 18434) \times (62.8) \times (0.809))$

$$= 140,527 \text{ lbs}$$
Tensile Design Factor = $(1817000) / (140527)$

$$= 12.93$$

CEMENT VOLUME CALCULATIONS

WELL NAME: **Desoto Canyon 491 #1 ST01 BP00**

BY: **Ryan Smith**
DATE: **6/21/2013**

DRIVE/STRUCTURAL PIPE:	O.D. (IN): <input type="text" value="36"/>			
	I.D. (IN): <input type="text" value="33.2319925"/>		Linked	
	DEPTH: <input type="text" value="8.576"/>		Required Input	
CONDUCTOR CASING:	O.D. (IN): <input type="text" value="28"/>	% EXCESS IN OPEN HOLE: <input type="text" value="22"/>	CAPACITY FACTORS	
	I.D. (IN): <input type="text" value="26.5"/>	% EXCESS IN CASSED HOLE: <input type="text" value="0"/>	FT3 / FT	
	DEPTH: <input type="text" value="9.186"/>	CASED HOLE FILL (FT): <input type="text" value="323"/>	CASED HOLE: <input type="text" value="1.7471643"/>	
	HOLE SIZE (IN): <input type="text" value="32"/>	OPEN HOLE FILL (FT): <input type="text" value="610"/>	OPEN HOLE: <input type="text" value="1.30887896"/>	
		SHOE TRACK LENGTH (FT): <input type="text" value="40"/>	SHOE JOINT: <input type="text" value="3.82983437"/>	
	CASED HOLE FILL VOLUME: <input type="text" value="564"/> FT3		TOTAL CMT VOL: <input type="text" value="1,692"/> FT3	
	OPEN HOLE FILL VOLUME: <input type="text" value="1,127"/> FT3		CALC. TOC: <input type="text" value="8,253"/> FT	
			APD CMT VOL: 1,700 FT3	
SURFACE CASING:	O.D. (IN): <input type="text" value="22"/>	% EXCESS IN OPEN HOLE: <input type="text" value="10"/>	CAPACITY FACTORS	
	I.D. (IN): <input type="text" value="20"/>	% EXCESS IN CASSED HOLE: <input type="text" value="0"/>	FT3 / FT	
	DEPTH: <input type="text" value="11.393"/>	CASED HOLE FILL (FT): <input type="text" value="1,000"/>	CASED HOLE: <input type="text" value="1.1902618"/>	
	HOLE SIZE (IN): <input type="text" value="26"/>	OPEN HOLE FILL (FT): <input type="text" value="2,207"/>	OPEN HOLE: <input type="text" value="1.04710317"/>	
		SHOE TRACK LENGTH (FT): <input type="text" value="40"/>	SHOE JOINT: <input type="text" value="2.18146493"/>	
	CASED HOLE FILL VOLUME: <input type="text" value="1,190"/> FT3		TOTAL CMT VOL: <input type="text" value="3,820"/> FT3	
	OPEN HOLE FILL VOLUME: <input type="text" value="2,629"/> FT3		CALC. TOC: <input type="text" value="8,186"/> FT	
			APD CMT VOL: 3,820 FT3	
1ST INT CASING:	O.D. (IN): <input type="text" value="18"/>	% EXCESS IN OPEN HOLE: <input type="text" value="10"/>	CAPACITY FACTORS	
	I.D. (IN): <input type="text" value="16.75"/>	% EXCESS IN CASSED HOLE: <input type="text" value="0"/>	FT3 / FT	
	DEPTH: <input type="text" value="13.780"/>	CASED HOLE FILL (FT): <input type="text" value="0"/>	CASED HOLE: <input type="text" value="0.41447834"/>	
	HOLE SIZE (IN): <input type="text" value="21"/>	OPEN HOLE FILL (FT): <input type="text" value="1,500"/>	OPEN HOLE: <input type="text" value="0.63807849"/>	
		SHOE TRACK LENGTH (FT): <input type="text" value="80"/>	SHOE JOINT: <input type="text" value="1.53009314"/>	
	CASED HOLE FILL VOLUME: <input type="text" value="0"/> FT3		TOTAL CMT VOL: <input type="text" value="1,175"/> FT3	
	OPEN HOLE FILL VOLUME: <input type="text" value="1,175"/> FT3		CALC. TOC: <input type="text" value="12,280"/> FT	
			APD CMT VOL: 1,180 FT3	
2ND INT CASING:	O.D. (IN): <input type="text" value="16"/>	% EXCESS IN OPEN HOLE: <input type="text" value="10"/>	CAPACITY FACTORS	
	I.D. (IN): <input type="text" value="14.85"/>	% EXCESS IN CASSED HOLE: <input type="text" value="0"/>	FT3 / FT	
	DEPTH: <input type="text" value="16.903"/>	CASED HOLE FILL (FT): <input type="text" value="0"/>	CASED HOLE: <input type="text" value="0.13395558"/>	
	HOLE SIZE (IN): <input type="text" value="19"/>	OPEN HOLE FILL (FT): <input type="text" value="1,500"/>	OPEN HOLE: <input type="text" value="0.57263454"/>	
		SHOE TRACK LENGTH (FT): <input type="text" value="80"/>	SHOE JOINT: <input type="text" value="1.20265525"/>	
	CASED HOLE FILL VOLUME: <input type="text" value="0"/> FT3		TOTAL CMT VOL: <input type="text" value="1,041"/> FT3	
	OPEN HOLE FILL VOLUME: <input type="text" value="1,041"/> FT3		CALC. TOC: <input type="text" value="16,403"/> FT	
			APD CMT VOL: 1,050 FT3	
3RD INT CASING:	O.D. (IN): <input type="text" value="14"/>	% EXCESS IN OPEN HOLE: <input type="text" value="10"/>	CAPACITY FACTORS	
	I.D. (IN): <input type="text" value="12.376"/>	% EXCESS IN CASSED HOLE: <input type="text" value="0"/>	FT3 / FT	
	DEPTH: <input type="text" value="19.522"/>	CASED HOLE FILL (FT): <input type="text" value="0"/>	CASED HOLE: <input type="text" value="0.13373743"/>	
	HOLE SIZE (IN): <input type="text" value="16.5"/>	OPEN HOLE FILL (FT): <input type="text" value="1,500"/>	OPEN HOLE: <input type="text" value="0.41584175"/>	
		SHOE TRACK LENGTH (FT): <input type="text" value="80"/>	SHOE JOINT: <input type="text" value="0.83531224"/>	
	CASED HOLE FILL VOLUME: <input type="text" value="0"/> FT3		TOTAL CMT VOL: <input type="text" value="753"/> FT3	
	OPEN HOLE FILL VOLUME: <input type="text" value="753"/> FT3		CALC. TOC: <input type="text" value="18,022"/> FT	
			APD CMT VOL: 760 FT3	
4TH INT CASING:	O.D. (IN): <input type="text" value="11.875"/>	% EXCESS IN OPEN HOLE: <input type="text" value="10"/>	CAPACITY FACTORS	
	I.D. (IN): <input type="text" value="10.711"/>	% EXCESS IN CASSED HOLE: <input type="text" value="0"/>	FT3 / FT	
	DEPTH: <input type="text" value="20.081"/>	CASED HOLE FILL (FT): <input type="text" value="0"/>	CASED HOLE: <input type="text" value="0.06626064"/>	
	HOLE SIZE (IN): <input type="text" value="14"/>	OPEN HOLE FILL (FT): <input type="text" value="1,500"/>	OPEN HOLE: <input type="text" value="0.29986621"/>	
		SHOE TRACK LENGTH (FT): <input type="text" value="120"/>	SHOE JOINT: <input type="text" value="0.62567425"/>	
	CASED HOLE FILL VOLUME: <input type="text" value="0"/> FT3		TOTAL CMT VOL: <input type="text" value="570"/> FT3	
	OPEN HOLE FILL VOLUME: <input type="text" value="570"/> FT3		CALC. TOC: <input type="text" value="18,881"/> FT	
			APD CMT VOL: 570 FT3	
5TH INT CASING:	O.D. (IN): <input type="text" value="9.875"/>	% EXCESS IN OPEN HOLE: <input type="text" value="10"/>	CAPACITY FACTORS	
	I.D. (IN): <input type="text" value="8.625"/>	% EXCESS IN CASSED HOLE: <input type="text" value="0"/>	FT3 / FT	
	DEPTH: <input type="text" value="22.743"/>	CASED HOLE FILL (FT): <input type="text" value="0"/>	CASED HOLE: <input type="text" value="0.09385696"/>	
	HOLE SIZE (IN): <input type="text" value="12.25"/>	OPEN HOLE FILL (FT): <input type="text" value="2,962"/>	OPEN HOLE: <input type="text" value="0.28657291"/>	
		SHOE TRACK LENGTH (FT): <input type="text" value="120"/>	SHOE JOINT: <input type="text" value="0.40570135"/>	
	CASED HOLE FILL VOLUME: <input type="text" value="0"/> FT3		TOTAL CMT VOL: <input type="text" value="982"/> FT3	
	OPEN HOLE FILL VOLUME: <input type="text" value="982"/> FT3		CALC. TOC: <input type="text" value="19,781"/> FT	
			APD CMT VOL: 990 FT3	
PRODUCTION CASING:	O.D. (IN): <input type="text" value=""/>	% EXCESS IN OPEN HOLE: <input type="text" value=""/>	CAPACITY FACTORS	
	I.D. (IN): <input type="text" value=""/>	% EXCESS IN CASSED HOLE: <input type="text" value=""/>	FT3 / FT	
	DEPTH: <input type="text" value=""/>	CASED HOLE FILL (FT): <input type="text" value=""/>	CASED HOLE: <input type="text" value="0.62567425"/>	
	HOLE SIZE (IN): <input type="text" value=""/>	OPEN HOLE FILL (FT): <input type="text" value=""/>	OPEN HOLE: <input type="text" value="0"/>	
		SHOE TRACK LENGTH (FT): <input type="text" value=""/>	SHOE JOINT: <input type="text" value="0"/>	
	CASED HOLE FILL VOLUME: <input type="text" value="0"/> FT3		TOTAL CMT VOL: <input type="text" value="0"/> FT3	
	OPEN HOLE FILL VOLUME: <input type="text" value="0"/> FT3		CALC. TOC: <input type="text" value="0"/> FT	
			APD CMT VOL: 0 FT3	