BUREAU OF RECLAMATION

ESTIMATE WORKSHEET

FEATURE:

Klamath River Dams Removal
Partial Removal Option
Copco No. 1 Dam & Powerplant Removal
Escalation NOT Included
Life Cycle
SUMMARY ESTIMATE

PROJECT: Klamath River, Oregon

WOID: AF652 | **ESTIMATE LEVEL:** Feasibility
REGION MP | **PRICE LEVEL:** Jul-10
FILE: U:\2011 Projects\Klamath\007 Crystal Ball\1\01\without escalation\[01 Copco 1 Crystal Ball Spreadsheet - wo esc.xlsx]SUMMARY 480 FP

PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	MPL QUANTITY	MP QUANTITY	MPH QUANTITY	UNIT	MPL UNIT PRICE	MP UNIT PRICE	MPH UNIT PRICE	MPL TOTAL	MP TOTAL	MPH TOTAL
	PI 1	Periodic Costs - Year 1	86-68130	1	1	1	LS	$81,800.00	$95,000.00	$109,300.00	$81,800.00	$95,000.00	$109,300.00
	PI 2	Periodic Costs - Year 5	86-68130	0	0	1	LS	$43,628.33	$43,628.33	$43,628.33	$0.00	$0.00	$43,628.33
	PI 3	Periodic Costs - Year 8	86-68130	0	1	0	LS	$32,566.50	$32,566.50	$32,566.50	$0.00	$32,566.50	$0.00
	PI 4	Periodic Costs - Year 10	86-68130	0	0	1	LS	$35,644.50	$35,644.50	$35,644.50	$0.00	$0.00	$35,644.50
	PI 5	Periodic Costs - Year 13	86-68130	0	0	1	LS	$11,529.77	$11,529.77	$11,529.77	$0.00	$0.00	$11,529.77
	PI 6	Periodic Costs - Year 15	86-68130	0	0	1	LS	$29,121.69	$29,121.69	$29,121.69	$0.00	$0.00	$29,121.69
	PI 7	Periodic Costs - Year 17	86-68130	1	1	0	LS	$17,906.80	$31,689.00	$31,689.00	$17,906.80	$31,689.00	$0.00
	PI 8	Periodic Costs - Year 20	86-68130	0	0	1	LS	$23,792.37	$23,792.37	$23,792.37	$0.00	$0.00	$23,792.37
	PI 9	Periodic Costs - Year 25	86-68130	1	1	1	LS	$5,460.30	$16,380.90	$26,537.06	$5,460.30	$16,380.90	$26,537.06
	PI 10	Periodic Costs - Year 30	86-68130	0	0	1	LS	$15,881.69	$15,881.69	$15,881.69	$0.00	$0.00	$15,881.69
	PI 11	Periodic Costs - Year 33	86-68130	1	1	0	LS	$9,378.46	$16,596.72	$16,596.72	$9,378.46	$16,596.72	$0.00
	PI 12	Periodic Costs - Year 35	86-68130	0	0	1	LS	$12,975.13	$12,975.13	$12,975.13	$0.00	$0.00	$12,975.13
	PI 13	Periodic Costs - Year 38	86-68130	0	0	1	LS	$4,196.99	$4,196.99	$4,196.99	$0.00	$0.00	$4,196.99
	PI 14	Periodic Costs - Year 40	86-68130	0	0	1	LS	$10,600.97	$10,600.97	$10,600.97	$0.00	$0.00	$10,600.97
	PI 15	Periodic Costs - Year 42	86-68130	0	1	0	LS	$8,239.50	$8,239.50	$8,239.50	$0.00	$8,239.50	$0.00
	PI 16	Periodic Costs - Year 45	86-68130	0	0	1	LS	$8,660.95	$8,660.95	$8,660.95	$0.00	$0.00	$8,660.95
	PI 17	Annual Costs - Maintenance	86-68130	1	1	1	LS	$357,511.00	$525,752.00	$1,514,164.00	$357,511.00	$525,752.00	$1,514,164.00
		Subtotal 1						$472,056.56			$472,056.56	$726,224.62	$1,846,033.45
		Mobilization		1	1	1	LS	$24,000.00	$36,000.00	$92,000.00	$24,000.00	$36,000.00	$92,000.00
		Subtotal 1 w/ mobilization									**$496,056.56**	**$762,224.62**	**$1,938,033.45**
		Escalation to Notice to Proceed (NTP) - None Included									$0.00	$0.00	$0.00
		Design Contingencies		1	1	1	LS	$43,943.44	$77,775.38	$317,391.55	$43,943.44	$77,775.38	$317,391.55
		APS = Allowance for		0	0	1	LS	$0.00	$0.00	$44,575.00	$0.00	$0.00	$44,575.00
		Procurement Strategies (if applicable)											
		CONTRACT COST									**$540,000.00**	**$840,000.00**	**$2,300,000.00**
		Construction Contingencies		1	1	1	LS	$90,000.00	$160,000.00	$500,000.00	$90,000.00	$160,000.00	$500,000.00
		FIELD COST									**$630,000.00**	**$1,000,000.00**	**$2,800,000.00**
		Non-Contract Costs		1	1	1	LS	$160,000.00	$500,000.00	$1,000,000.00	$160,000.00	$500,000.00	$1,000,000.00
		CONSTRUCTION COST									**$790,000.00**	**$1,500,000.00**	**$3,800,000.00**

Notes:
Reference documents RM D&S Cost Estimate (FAC 09-01) and RM D&S CCE and PCE (FAC 09-02)

QUANTITIES			PRICES			
BY	Rick Benik	CHECKED: Stephen Latham	BY	Greg Akins	CHECKED	6/15/11
DATE PREPARED	3/24/2011	PEER REVIEW: Tom Hepler P.E.	DATE PREPARED	06/15/11	PEER REVIEW	6/15/2011

Crystal Ball Report - Full
Simulation started on 6/15/2011 at 10:01:13
Simulation stopped on 6/15/2011 at 10:01:28

Run preferences:	
Number of trials run	10,000
Monte Carlo	
Seed	999
Precision control on	
Confidence level	95.00%
Run statistics:	
Total running time (sec)	14.78
Trials/second (average)	676
Random numbers per sec	29,761
Crystal Ball data:	
Assumptions	44
Correlations	0
Correlated groups	0
Decision variables	0
Forecasts	3

TECHNICAL SERVICE CENTER
ESTIMATING, SPECIFICATIONS
AND VALUE PROGRAM GROUP

UNIT PRICES BY _____

DATE 6/15/11

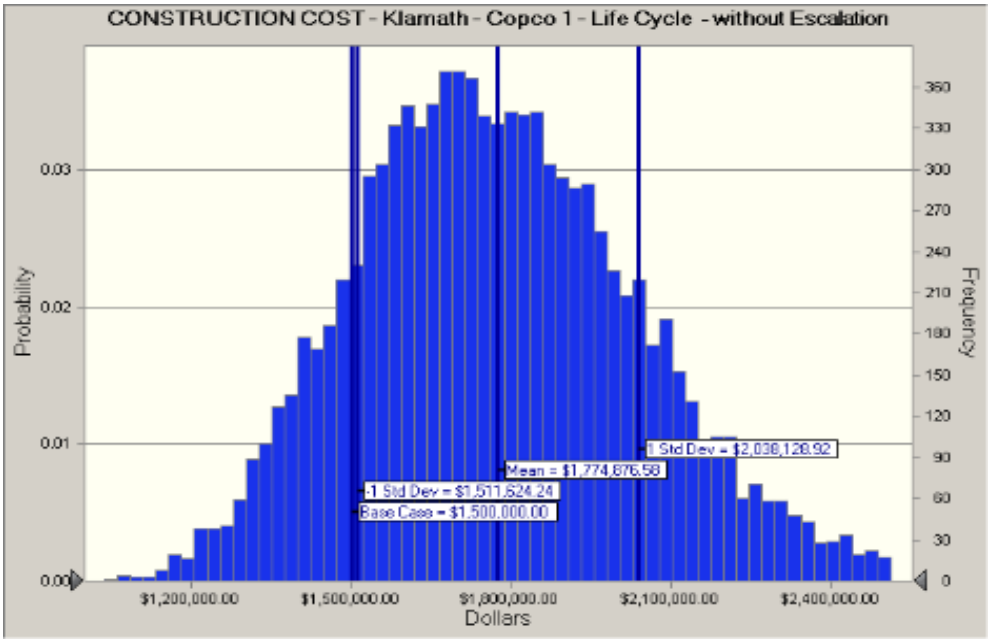
DATE	PEER REVIEWER(S)	CODE
6/15/2011	Signature	86-68170
	Craig A. Grush Printed Name	
	Signature	
	Printed Name	
Author Initials	PEER REVIEW NOT REQUIRED	

Forecasts

Worksheet: [01 Copco 1 Crystal Ball Spreadsheet - wo esc.xlsx]SUMMARY 480 FP

Forecast: CONSTRUCTION COST - Klamath - Copco 1 - Life Cycle – without Escalation Cell: U40

Summary:
Entire range is from $1,019,320.29 to $2,775,567.70
Base case is $1,500,000.00
After 10,000 trials, the std. error of the mean is $2,632.52



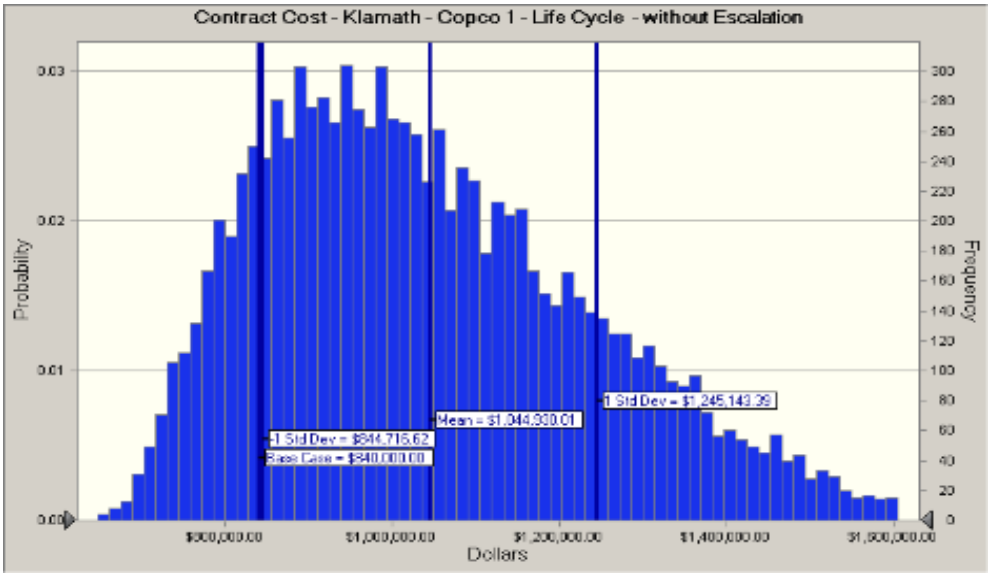
Forecast: CONSTRUCTION COST - Klamath - Copco 1 - Life Cycle – without Escalation (cont'd) **Cell: J40**

Statistics:	Forecast values
Trials	10,000
Mean	$1,774,876.58
Median	$1,757,361.03
Mode	---
Standard Deviation	$263,252.34
Variance	################
Skewness	0.3216
Kurtosis	2.93
Coeff. of Variability	0.1483
Minimum	$1,019,320.29
Maximum	$2,775,567.70
Range Width	$1,756,247.41
Mean Std. Error	$2,632.52

Percentiles:	Forecast values
0%	$1,019,320.29
10%	$1,445,279.54
20%	$1,548,397.17
30%	$1,622,808.45
40%	$1,690,721.40
50%	$1,757,347.47
60%	$1,829,255.46
70%	$1,905,272.32
80%	$1,995,700.06
90%	$2,121,251.65
100%	$2,775,567.70

Forecast: Contract Cost - Klamath - Copco 1 - Life Cycle – without Escalation **Cell: U36**

Summary:
Entire range is from $647,433.20 to $1,866,869.55
Base case is $840,000.00
After 10,000 trials, the std. error of the mean is $2,002.13



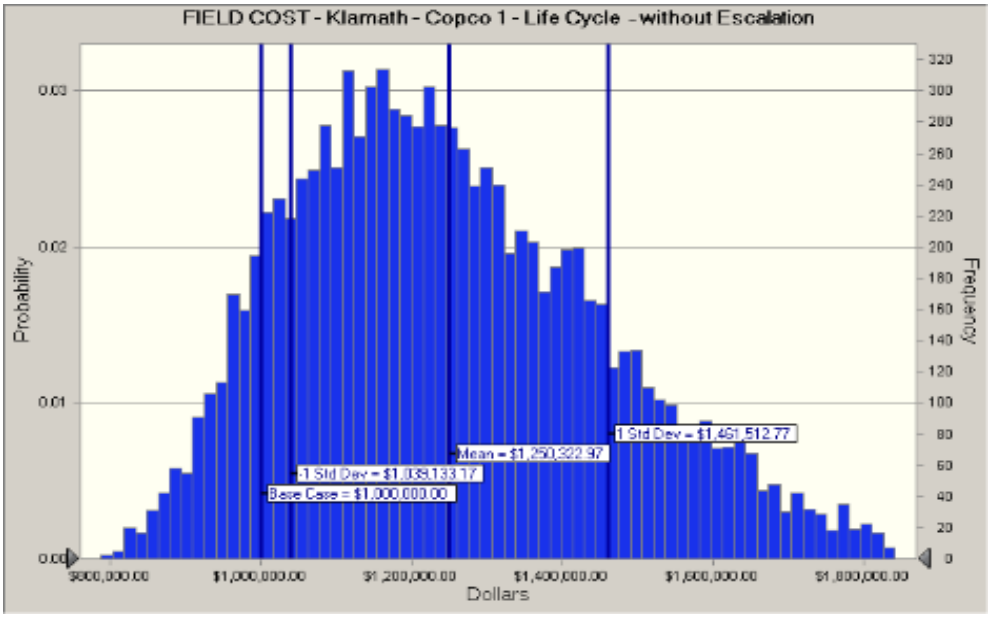
Statistics:	Forecast values
Trials	10,000
Mean	$1,044,930.01
Median	$1,014,193.46
Mode	---
Standard Deviation	$200,213.38
Variance	################
Skewness	0.6348
Kurtosis	2.97
Coeff. of Variability	0.1916
Minimum	$647,433.20
Maximum	$1,866,869.55
Range Width	$1,219,436.35
Mean Std. Error	$2,002.13

Forecast: Contract Cost - Klamath - Copco 1 - Life Cycle – without Escalation (cont'd) **Cell: U36**

Percentiles:	Forecast values
0%	$647,433.20
10%	$808,361.05
20%	$864,927.21
30%	$915,212.81
40%	$964,863.72
50%	$1,014,181.79
60%	$1,070,492.49
70%	$1,136,424.41
80%	$1,216,570.88
90%	$1,327,521.92
100%	$1,866,869.55

Forecast: FIELD COST - Klamath - Copco 1 - Life Cycle – without Escalation **Cell: U38**

Summary:
Entire range is from $786,920.83 to $2,183,728.12
Base case is $1,000,000.00
After 10,000 trials, the std. error of the mean is $2,111.90



Statistics:	Forecast values
Trials	10,000
Mean	$1,250,322.97
Median	$1,223,906.92
Mode	---
Standard Deviation	$211,189.80
Variance	################
Skewness	0.5561
Kurtosis	3.00
Coeff. of Variability	0.1689
Minimum	$786,920.83
Maximum	$2,183,728.12
Range Width	$1,396,807.28
Mean Std. Error	$2,111.90

Forecast: FIELD COST - Klamath - Copco 1 - Life Cycle – without Escalation (cont'd) **Cell: U38**

Percentiles:	Forecast values
0%	$786,920.83
10%	$996,946.93
20%	$1,063,411.60
30%	$1,119,952.56
40%	$1,171,334.37
50%	$1,223,890.48
60%	$1,280,021.32
70%	$1,348,274.27
80%	$1,427,136.75
90%	$1,543,744.97
100%	$2,183,728.12

End of Forecasts

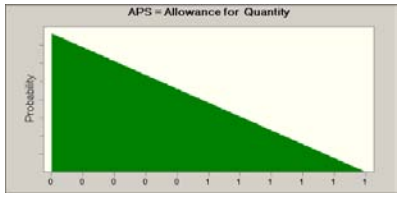
Assumptions

Worksheet: [01 Copco 1 Crystal Ball Spreadsheet - wo esc.xlsx]SUMMARY 480 FP

Assumption: APS = Allowance for Quantity — Cell: L34

Triangular distribution with parameters:

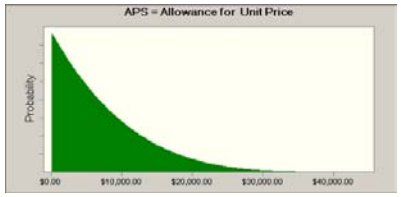
Minimum	0	(=K34)
Likeliest	0	(=L34)
Maximum	1	(=M34)



Assumption: APS = Allowance for Unit Price — Cell: R34

BetaPERT distribution with parameters:

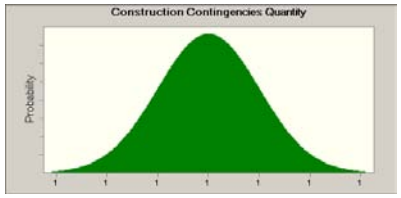
Minimum	$0.00	(=Q34)
Likeliest	$0.00	(=R34)
Maximum	$44,575.00	(=S34)



Assumption: Construction Contingencies Quantity — Cell: L37

Normal distribution with parameters:

Mean	1	(=L37)
Std. Dev.	0	



Assumption: Construction Contingencies Unit Price — Cell: R37

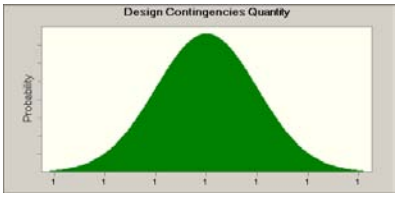
BetaPERT distribution with parameters:

Minimum	$90,000.00	(=Q37)
Likeliest	$160,000.00	(=R37)
Maximum	$500,000.00	(=S37)

Assumption: Design Contingencies Quantity — Cell: L33

Normal distribution with parameters:

Mean	1	(=L33)
Std. Dev.	0	



Assumption: Design Contingencies Unit Price — Cell: R33

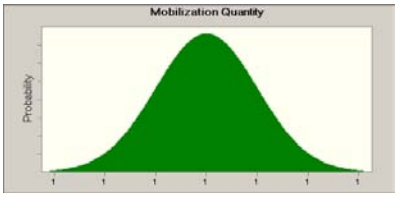
BetaPERT distribution with parameters:

Minimum	$43,943.44	(=Q33)
Likeliest	$77,775.38	(=R33)
Maximum	$317,391.55	(=S33)

Assumption: Mobilization Quantity **Cell: L30**

Normal distribution with parameters:

Mean	1	(=L30)
Std. Dev.	0	



Assumption: Mobilization Unit Price **Cell: R30**

BetaPERT distribution with parameters:

Minimum	$24,000.00	(=Q30)
Likeliest	$36,000.00	(=R30)
Maximum	$92,000.00	(=S30)

Assumption: Non-Contract Costs Quantity **Cell: L39**

Normal distribution with parameters:

Mean	1	(=L39)
Std. Dev.	0	

Assumption: Non-Contract Costs Unit Price **Cell: R39**

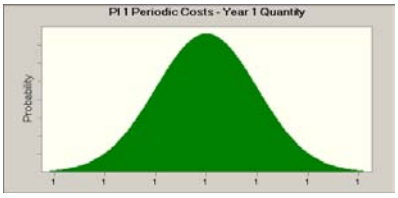
BetaPERT distribution with parameters:

Minimum	$160,000.00	(=Q39)
Likeliest	$500,000.00	(=R39)
Maximum	$1,000,000.00	(=S39)

Assumption: PI 1 Periodic Costs - Year 1 Quantity **Cell: L12**

Normal distribution with parameters:

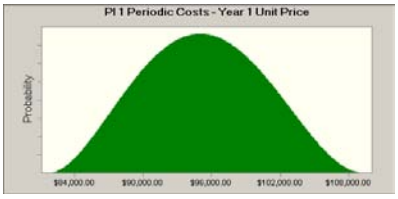
Mean	1	(=L12)
Std. Dev.	0	



Assumption: PI 1 Periodic Costs - Year 1 Unit Price **Cell: R12**

BetaPERT distribution with parameters:

Minimum	$81,800.00	(=Q12)
Likeliest	$95,000.00	(=R12)
Maximum	$109,300.00	(=S12)



Assumption: PI 10 Periodic Costs - Year 30 Quantity **Cell: L21**

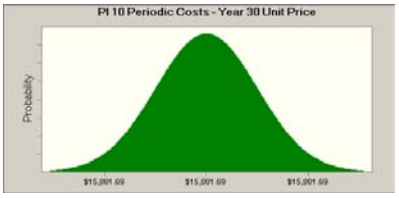
Triangular distribution with parameters:

Minimum	0	(=K21)
Likeliest	0	(=L21)
Maximum	1	(=M21)

Assumption: PI 10 Periodic Costs - Year 30 Unit Price **Cell: R21**

Normal distribution with parameters:

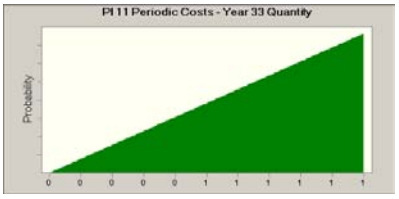
Mean	$15,881.69	(=R21)
Std. Dev.	$0.00	



Assumption: PI 11 Periodic Costs - Year 33 Quantity **Cell: L22**

Triangular distribution with parameters:

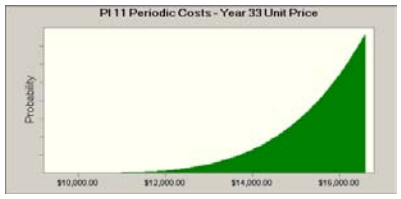
Minimum	0	(=M22)
Likeliest	1	(=K22)
Maximum	1	(=L22)



Assumption: PI 11 Periodic Costs - Year 33 Unit Price **Cell: R22**

BetaPERT distribution with parameters:

Minimum	$9,378.46	(=Q22)
Likeliest	$16,596.72	(=R22)
Maximum	$16,596.72	(=S22)



Assumption: PI 12 Periodic Costs - Year 35 Quantity **Cell: L23**

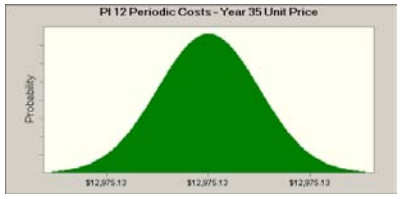
Triangular distribution with parameters:

Minimum	0	(=K23)
Likeliest	0	(=L23)
Maximum	1	(=M23)

Assumption: PI 12 Periodic Costs - Year 35 Unit Price **Cell: R23**

Normal distribution with parameters:

Mean	$12,975.13	(=R23)
Std. Dev.	$0.00	



Assumption: PI 13 Periodic Costs - Year 38 Quantity **Cell: L24**

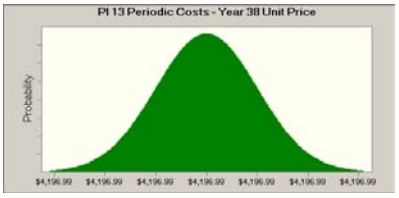
Triangular distribution with parameters:

Minimum	0	(=K24)
Likeliest	0	(=L24)
Maximum	1	(=M24)

Assumption: PI 13 Periodic Costs - Year 38 Unit Price **Cell: R24**

Normal distribution with parameters:

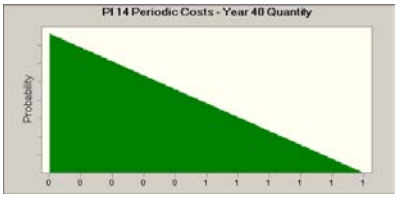
Mean	$4,196.99	(=R24)
Std. Dev.	$0.00	



Assumption: PI 14 Periodic Costs - Year 40 Quantity **Cell: L25**

Triangular distribution with parameters:

Minimum	0	(=K25)
Likeliest	0	(=L25)
Maximum	1	(=M25)



Assumption: PI 14 Periodic Costs - Year 40 Unit Price **Cell: R25**

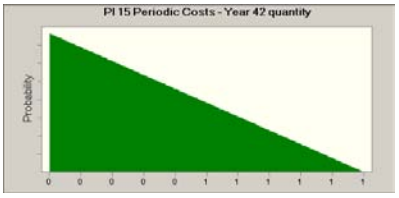
Normal distribution with parameters:

Mean	$10,600.97	(=R25)
Std. Dev.	$0.00	

Assumption: PI 15 Periodic Costs - Year 42 quantity **Cell: L26**

Triangular distribution with parameters:

Minimum	0	(=K26)
Likeliest	0	(=M26)
Maximum	1	(=L26)



Assumption: PI 15 Periodic Costs - Year 42 Unit Price **Cell: R26**

Normal distribution with parameters:

Mean	$8,239.50	(=R26)
Std. Dev.	$0.00	

Assumption: PI 16 Periodic Costs - Year 45 Quantity **Cell: L27**

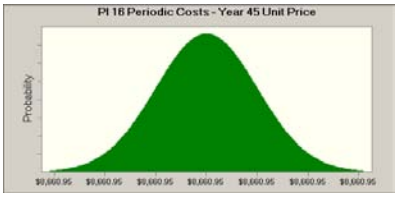
Triangular distribution with parameters:

Minimum	0	(=K27)
Likeliest	0	(=L27)
Maximum	1	(=M27)

Assumption: PI 16 Periodic Costs - Year 45 Unit Price **Cell: R27**

Normal distribution with parameters:

Mean	$8,660.95	(=R27)
Std. Dev.	$0.00	



Assumption: PI 17 Annual Costs - Maintenance Quantity **Cell: L28**

Normal distribution with parameters:

Mean	1	(=L28)
Std. Dev.	0	

Assumption: PI 17 Annual Costs - Maintenance Unit Price

Cell: R28

BetaPERT distribution with parameters:

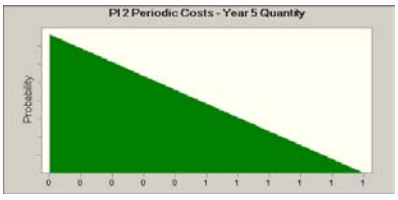
Minimum	$357,511.00	(=Q28)
Likeliest	$525,752.00	(=R28)
Maximum	$1,514,164.00	(=S28)

Assumption: PI 2 Periodic Costs - Year 5 Quantity

Cell: L13

Triangular distribution with parameters:

Minimum	0	(=K13)
Likeliest	0	(=L13)
Maximum	1	(=M13)

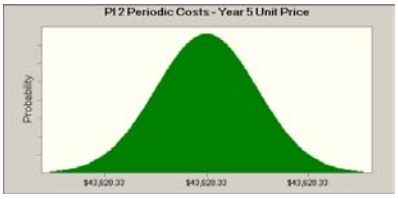


Assumption: PI 2 Periodic Costs - Year 5 Unit Price

Cell: R13

Normal distribution with parameters:

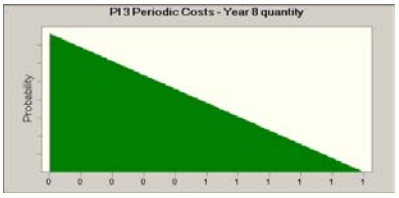
Mean	$43,628.33	(=R13)
Std. Dev.	$0.00	(=0.00001)



Assumption: PI 3 Periodic Costs - Year 8 quantity **Cell: L14**

Triangular distribution with parameters:

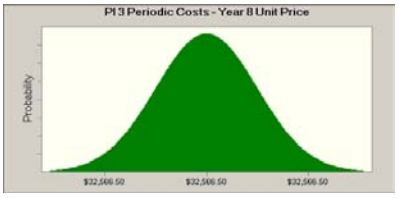
Minimum	0	(=K14)
Likeliest	0	(=M14)
Maximum	1	(=L14)



Assumption: PI 3 Periodic Costs - Year 8 Unit Price **Cell: R14**

Normal distribution with parameters:

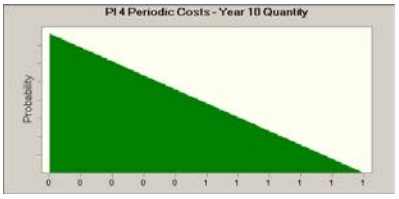
Mean	$32,566.50	(=R14)
Std. Dev.	$0.00	(=0.00001)



Assumption: PI 4 Periodic Costs - Year 10 Quantity **Cell: L15**

Triangular distribution with parameters:

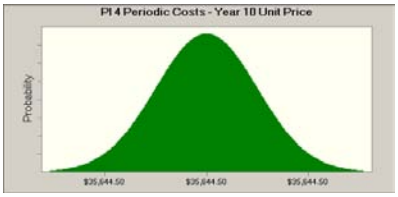
Minimum	0	(=K15)
Likeliest	0	(=L15)
Maximum	1	(=M15)



Assumption: PI 4 Periodic Costs - Year 10 Unit Price **Cell: R15**

Normal distribution with parameters:

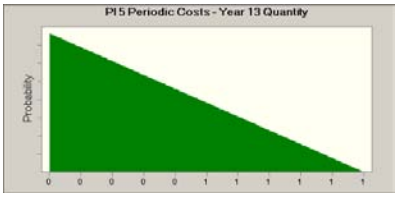
Mean	$35,644.50	(=R15)
Std. Dev.	$0.00	(=0.00001)



Assumption: PI 5 Periodic Costs - Year 13 Quantity **Cell: L16**

Triangular distribution with parameters:

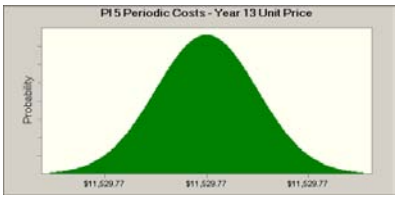
Minimum	0	(=K16)
Likeliest	0	(=L16)
Maximum	1	(=M16)



Assumption: PI 5 Periodic Costs - Year 13 Unit Price **Cell: R16**

Normal distribution with parameters:

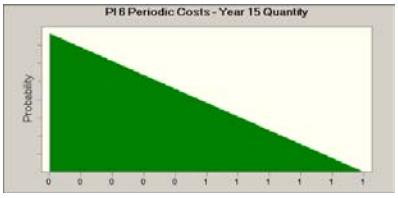
Mean	$11,529.77	(=R16)
Std. Dev.	$0.00	(=0.00001)



Assumption: PI 6 Periodic Costs - Year 15 Quantity **Cell: L17**

Triangular distribution with parameters:

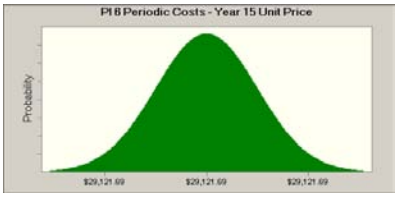
Minimum	0	(=K17)
Likeliest	0	(=L17)
Maximum	1	(=M17)



Assumption: PI 6 Periodic Costs - Year 15 Unit Price **Cell: R17**

Normal distribution with parameters:

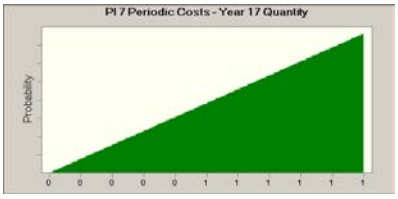
Mean	$29,121.69	(=R17)
Std. Dev.	$0.00	(=0.00001)



Assumption: PI 7 Periodic Costs - Year 17 Quantity **Cell: L18**

Triangular distribution with parameters:

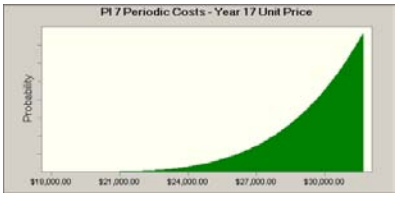
Minimum	0	(=M18)
Likeliest	1	(=K18)
Maximum	1	(=L18)



Assumption: PI 7 Periodic Costs - Year 17 Unit Price **Cell: R18**

BetaPERT distribution with parameters:

Minimum	$17,906.80	(=Q18)
Likeliest	$31,689.00	(=R18)
Maximum	$31,689.00	(=S18)



Assumption: PI 8 Periodic Costs - Year 20 Quantity **Cell: L19**

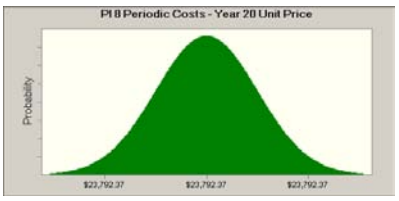
Triangular distribution with parameters:

Minimum	0	(=K19)
Likeliest	0	(=L19)
Maximum	1	(=M19)

Assumption: PI 8 Periodic Costs - Year 20 Unit Price **Cell: R19**

Normal distribution with parameters:

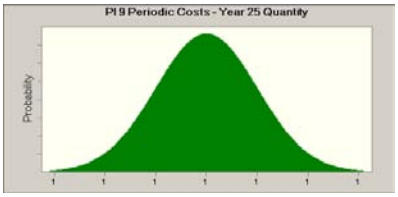
Mean	$23,792.37	(=R19)
Std. Dev.	$0.00	



Assumption: PI 9 Periodic Costs - Year 25 Quantity **Cell: L20**

Normal distribution with parameters:

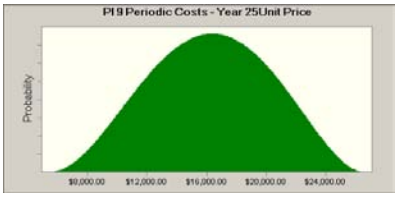
Mean	1	(=L20)
Std. Dev.	0	



Assumption: PI 9 Periodic Costs - Year 25Unit Price **Cell: R20**

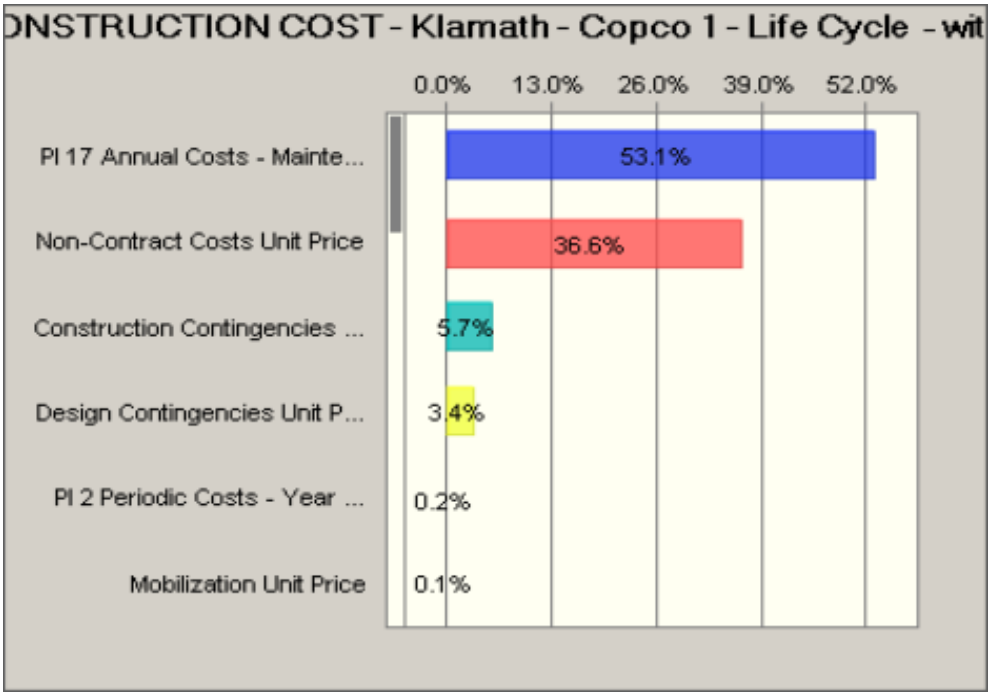
BetaPERT distribution with parameters:

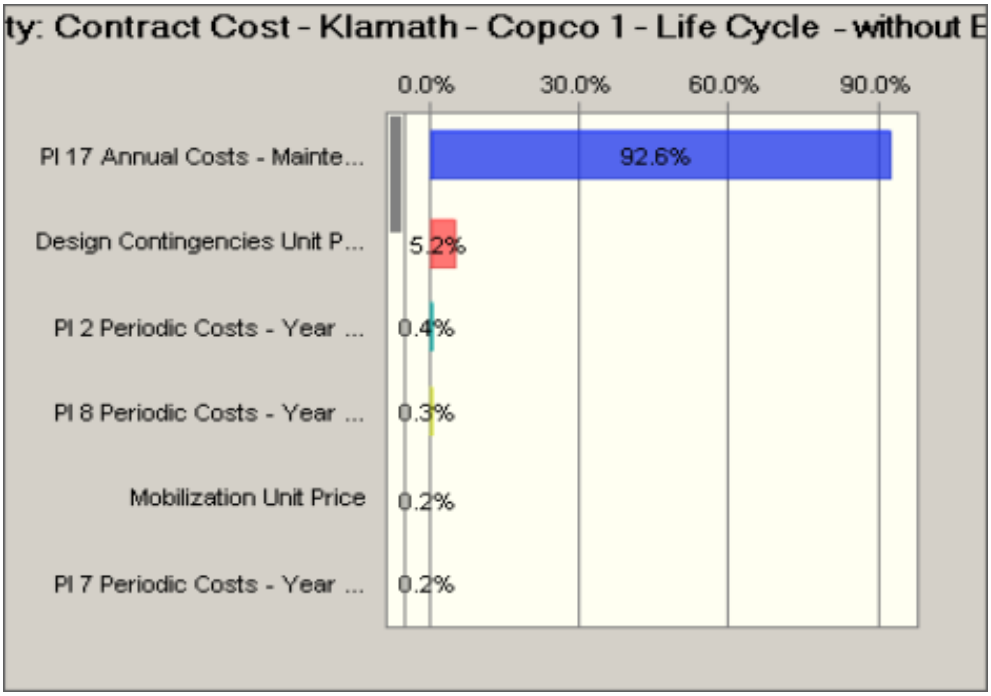
Minimum	$5,460.30	(=Q20)
Likeliest	$16,380.90	(=R20)
Maximum	$26,537.06	(=S20)

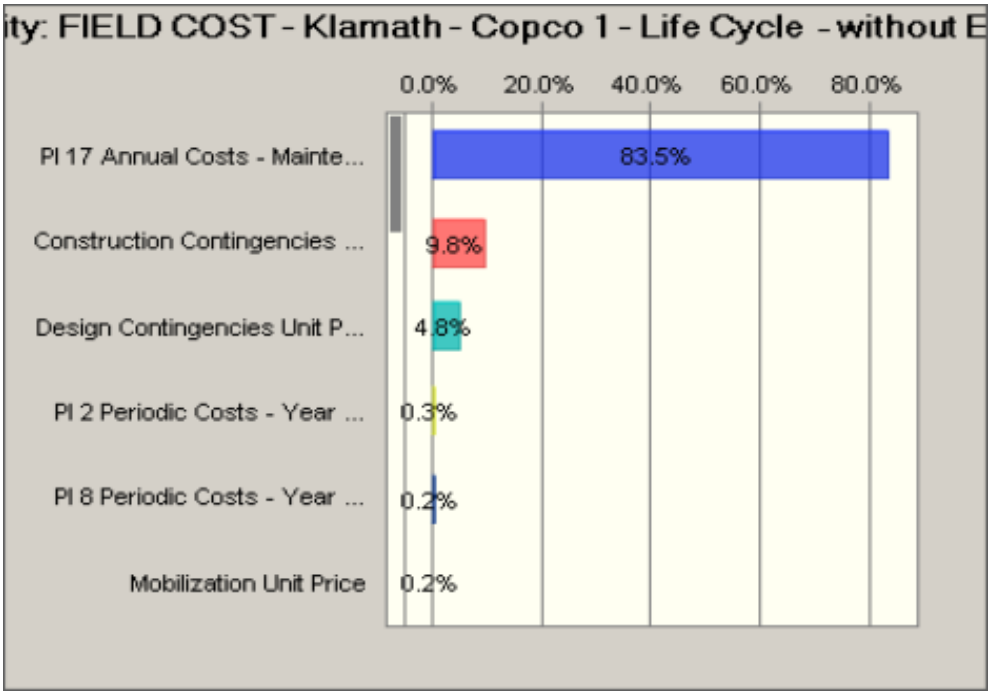


End of Assumptions

Sensitivity Charts




ty: Contract Cost - Klamath - Copco 1 - Life Cycle - without E
0.0%
30.0%
60.0%
90.0%
PI 17 Annual Costs - Mainte...
92.6%
Design Contingencies Unit P...
5.2%
PI 2 Periodic Costs - Year ...
0.4%
PI 8 Periodic Costs - Year ...
0.3%
Mobilization Unit Price
0.2%
PI 7 Periodic Costs - Year ...
0.2%


ity: FIELD COST - Klamath - Copco 1 - Life Cycle - without E
0.0%
20.0%
40.0%
60.0%
80.0%
PI 17 Annual Costs - Mainte...
83.5%
Construction Contingencies ...
9.8%
Design Contingencies Unit P...
4.8%
PI 2 Periodic Costs - Year ...
0.3%
PI 8 Periodic Costs - Year ...
0.2%
Mobilization Unit Price
0.2%

No target forecast has been specified

No target forecast has been specified

End of Sensitivity Charts