Solution

		A	B	Agg. A&B			
	PPI_TL	140.2	140.2	140.2	Dec 19	Prod Price Index for TL	
	PPI_LTL	184.6	184.6	184.6	Dec 19	Prod Price Index for LTL	
	Kwt	25	25.0	25.0	ton	Physical weight capacity	
	Kcu	2750	2750.0	2750.0	ft^3	Effective cube capacity	
	unit cube	6	15		ft^3		
	unit weight	67	80		lb		
	unit value	3015	1000		$		
	s	11.1667	5.3333	9.4449	lb/ft^3	Density	
	d	688	688	688	mi	Distance	
	rTL	2.7303	2.7303	2.7303	$/mi	TL rev per loaded tr-mi	
	MC_TL	61.43	61.43	61.43	$	Min charge TL	
	MC_LTL	96.29	96.29		$	Min charge LTL	
	qmax	15.3542	7.3333	12.9868	ton	Max payload	
	f	150	30	180	ton/yr	Annual demand	
	n	9.769335142	4.090909091	13.86024423	per yr		
(1)	w	26.67304356			$/mi	Monetary weight	
	TC_FTL	18351.05	7684.50	26035.56	$		
	a	1	1	1		Inventory fraction	
	v	90000	25000	79166.66667	$/ton	Value per ton	
	xh	0.57	0.12			Percent reduction in value	
	th	3	1		yr	Reduction time interval	
	hobs	0.19	0.12		1/yr	Obsolesence rate	
	h	0.3	0.23	0.288333333	1/yr	Inv rate (hinv=0.05,hwh=0.06)	
	IC_FTL	414562.5	42166.66667	296441.3852	$		
	TLC_FTL	432913.554	49851.17052	322476.943	$	TLC Full Truckload	
	t_max	0.08			yr/TL	1-month interval constraint	
	n_min	12.00			TL/yr		
	TC_1mo	22541.21			$		
	IC_1mo	337500.00			$		
	TLC_1mo	360041.2113			$	TLC 1-mo interval constraint	
	q*TL	3.2304	3.1306	3.8487	ton	Optimal TL size	
	TC_TL	87221.89411	18000.83088	87852.24428	$		
	IC_TL	87221.89411	18000.83088	87852.24428	$		
	TLC*_TL	174443.7882	36001.66176	175704.4886	$	TLC Optimal TL	
	rLTL	1.349543287	2.259296943		$/ton-mi		
	TC_LTL	139272.8672	46631.8889		$		
	IC_LTL	22666.85	7525.01		$		
	TLC*_LTL	161939.72	54156.89		$	TLC Optimal LTL	
	qLTLmax	3.63	1.73		ton		
	q*LTL	0.839513143	1.308696646		ton	Optimal LTL size	
	Min TLC	161939.72	36001.66	175704.49			
(2)			TL				
	Min TLC A+B		197941.38				
(3)	TLC A+B - A&B			22236.90			

#	C	D	E	F	G	H	
2		PPI_TL	140.2	=E2	=F2	Dec 19 (P)	Prod Price Index for TL
3		PPI_LTL	184.6	=E3	=F3	Dec 19 (P)	Prod Price Index for LTL
4		Kwt	25	=E4	=F4	ton	Physical weight capacity
5		Kcu	2750	=E5	=F5	ft^3	Effective cube capacity
6		unit cube	6	15		ft^3	
7		unit weight	67	80		lb	
8		unit value	=E7*E47/2000	1000		$	
9		s	=E7/E6	=F7/F6	=$G42/(E42/E9+F42/F9)	lb/ft^3	Density
10		d	688	=E10	=F10	mi	Distance
11		rTL	=2*(E2/102.7)	=E11	=F11	$/mi	TL rev per loaded tr-mi
23		MC_TL	=(E11/2)*45	=(F11/2)*45	=(G11/2)*45	$	Min charge TL
24		MC_LTL	=(E3/104.2)*(45+E10^(28/19)/1625)	=(F3/104.2)*(45+F10^(28/19)/1625		$	Min charge LTL
41		qmax	=MIN(E4,E9*E5/2000)	=MIN(F4,F9*F5/2000)	=MIN(G4,G9*G5/2000)	ton	Max payload
42		f	150	30	=E42+F42	ton/yr	Annual demand
43		n	=E42/E41	=F42/F41	=G42/G41	per yr	
45		TC_FTL	=E43*E11*E10	=F43*F11*F10	=G43*G11*G10	$	
46		a	1	=E46	=F46		Inventory fraction
47		v	90000	=2000*F8/F7	=(E42/$G42)*E47+(F42/$G42)*F47	$/ton	Value per ton
48		xh	0.57	0.12			Percent reduction in value
49		th	3	1		yr	Reduction time interval
50		hobs	=E48/E49	=F48/F49		1/yr	Obsolesence rate
51		h	=0.05+0.06*E50	=0.05+0.06*F50	=(E42/$G42)*E51+(F42/$G42)*F51	1/yr	Inv rate (hinv=0.05,hwh=0.06)
52		IC_FTL	=E46*E47*E51*E41	=F46*F47*F51*F41	=G46*G47*G51*G41	$	
53		TLC_FTL	=E45 + E52	=F45 + F52	=G45 + G52	$	TLC Full Truckload
54		t_max	=1/12			yr/TL	1-month interval constraint
55		n_min	=1/E54			TL/yr	
56		TC_1mo	=MAX(E43,E55)*E11*E10			$	
57		IC_1mo	=E46*E47*E51*E42/MAX(E43,E55)			$	
58		TLC_1mo	=E56+E57			$	TLC 1-mo interval constraint
59		q*TL	=MIN(SQRT((E42*MAX(E11*E10,E23))/(E4	=MIN(SQRT((F42*MAX(F11*F10,F	=MIN(SQRT((G42*MAX(G11*G10,G23))/(G46*G47*G51)),G41)	ton	Optimal TL size
60		TC_TL	=(E42/E59)*MAX(E11*E10,E13)	=(F42/F59)*MAX(F11*F10,F13)	=(G42/G59)*MAX(G11*G10,G13)	$	
61		IC_TL	= E46*E51*E47*E59	= F46*F51*F47*F59	=G46*G51*G47*G59	$	
62		TLC*_TL	=E60 + E61	=F60 + F61	=G60 + G61	$	TLC Optimal TL
63		rLTL	=E3*(((E9^2)/8+14)/((E68^(1/7)*E10^(15/29	=F3*(((F9^2)/8+14)/((F68^(1/7)*F1		$/ton-mi	
64		TC_LTL	=E42*MAX(E10*E63,E24/E68)	=F42*MAX(F10*F63,F24/F68)		$	
65		IC_LTL	=E46*E47*E51*E68	=F46*F47*F51*F68		$	
66		TLC*_LTL	=E64+E65	=F64+F65		$	TLC Optimal LTL
67		qLTLmax	=MIN(5,650*E9/2000)	=MIN(5,650*F9/2000)		ton	
68		q*LTL	0.839513143348415	1.30869664581178		ton	Optimal LTL size
69		Min TLC	=MIN(E53,E62,E66)	=MIN(F53,F62,F66)	=MIN(G53,G62,G66)		
70	(2)			TL			
71		Min TLC A+B		=E66+F62			
72	(3)	TLC A+B - A&B			=F71-G69		

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