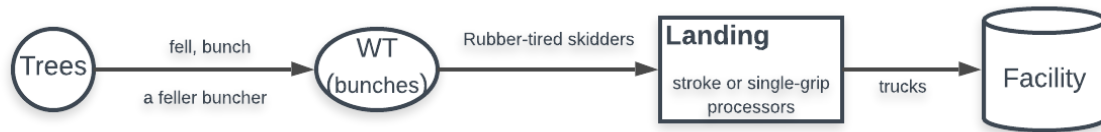


Ground-Based Mech WT



INTERFACE PAGE

Input (test data entered)

Configuration System Type: Ground-Based Mech WT Cut Type: Partial Cut Location (State): California Yard/Skid/Forward Slope Dist (ft): 1325 Percent Slope: 28 Elevation: 0		Change Machine Costs (\$/PMH) Restore Defaults Chainsaw	Residue Handling <input checked="" type="checkbox"/> Include the costs of collecting and chipping residues.																
Loading Costs <input checked="" type="checkbox"/> Include loading costs		Tree Characteristics Documentation																	
Move-In Costs <input checked="" type="checkbox"/> Include move-in costs Area treated: 1 acres One-way move-in distance: 2 miles		<table border="1"> <thead> <tr> <th></th> <th>Chipped</th> <th>Small Log</th> <th>Large Log</th> </tr> </thead> <tbody> <tr> <td>Green wood density (lbs/cf)</td> <td>60</td> <td>58.6235</td> <td>62.1225</td> </tr> <tr> <td>Residue Fraction</td> <td>0</td> <td>0.25</td> <td>0.38</td> </tr> <tr> <td>Hardwood Fraction</td> <td>0.2</td> <td>0</td> <td>0</td> </tr> </tbody> </table>			Chipped	Small Log	Large Log	Green wood density (lbs/cf)	60	58.6235	62.1225	Residue Fraction	0	0.25	0.38	Hardwood Fraction	0.2	0	0
	Chipped	Small Log	Large Log																
Green wood density (lbs/cf)	60	58.6235	62.1225																
Residue Fraction	0	0.25	0.38																
Hardwood Fraction	0.2	0	0																
<input checked="" type="checkbox"/> Enable Batch Mode <input type="checkbox"/> Enable special processing for the Billion-Ton Study																			
Batch Mode Documentation Load Batch Data Process Batch Batch Report View Data Save Results Clear Data																			

Cut Tree Table					
Chip Trees		Small Log Trees		Large Log Trees	
Trees/acre	Vol/tree (ft3)	Trees/acre	Vol/tree (ft3)	Trees/acre	Vol/tree (ft3)
20.0	15.0	20.0	50.0	5.0	80.0

Output

Results List		
\$/CCF	\$/Ton	\$/Acre
Calculate	Clear Data	Report Page
144	41	2,447

INPUTS

Inputs

Inputs		Move-In Inputs	
YardDist, ft one way slope distance	1325	Area, acres	1
Slope, %	28	MoveInDist, mile	2
PartialCut	1	CalcMoveIn	1
CollectOptionalResidues	1		
Elevation, ft	0		

Inputs for Cut Trees

Inputs for Cut Trees					Calculated Values		
		Chip Trees	Small Log Tr	Large Log Tree	Small Trees	All Log Trees	All Trees
			(<=80 ft3)	(>80 ft3)	(<=80 ft3)		
Suffix for related variables:		CT	SLT	LLT	ST	ALT	(none)
Removals, trees/acre		20	20	5	40	25	45
TreeVol, ft3		15	50	80	32.5	56.0	37.8
User-SpecDBH, in							
User-SpecTreeHeight, ft							
User-SpecWoodDensity, green lb/ft3		60	58.6235	62.1225			
User-SpecResidueWt, fraction of bole wt		0	0.25	0.38			
User-SpecHardwoodFraction		0.2	0	0			

All cells highlighted in blue are the inputs entered in interface page.

CT – Chip Trees

SLT – Small Log Trees (<=80 ft3)

LLT – Large Log Trees (>80 ft3)

SL – Small Trees (<=80 ft3)

ALT – All Log Trees

AT – All Trees

Removals – Removals, trees/acre

TreeVol – Tree Volume, ft3

RemovalsST = RemovalsCT + RemovalsSLT

RemovalsALT = RemovalsSLT + RemovalsLLT

Removals = RemovalsCT + RemovalsSLT + RemovalsLLT

Tree Volume Per Acre for Small Trees

TreeVolST = IF(RemovalsST>0,VolPerAcreST/RemovalsST,0)

VolPerAcreST = VolPerAcreCT + VolPerAcreSLT

VolPerAcreCT = RemovalsCT * TreeVolCT

VolPerAcreSLT = RemovalsSLT * TreeVolSLT

Tree Volume Per Acre for All Log Trees

TreeVolALT = IF(RemovalsALT>0,VolPerAcreALT/RemovalsALT,0)

VolPerAcreALT = VolPerAcreSLT + VolPerAcreLLT

VolPerAcreSLT = RemovalsSLT * TreeVolSLT

VolPerAcreLLT = RemovalsLLT * TreeVolLLT

Tree Volume Per Acre for All Trees

TreeVol = IF(Removals>0,VolPerAcre/Removals,0)

$$\text{VolPerAcre} = \text{VolPerAcreCT} + \text{VolPerAcreSLT} + \text{VolPerAcreLLT}$$

Other Assumptions

Other Assumptions	
MaxManualTreeVol, ft3	150
MaxMechTreeVol, ft3	80
MoistureContentFraction, wet basis	0.50
LogLength, ft	32
LoadWeight, green tons (logs)	25
LoadWeight, green tons (chips)	25
CTLTrailSpacing, ft	50
HardwoodCostPremium, fraction	0.20
ResidueRecoveryFraction for WT systems	0.80
ResidueRecoveryFraction for CTL	0.50

Calculated Intermediates

Calculated Intermediates							
DBH, in		9.3	15.8	19.7	12.9	16.6	13.9
TreeHeight, ft		53	75	86	64		67
WoodDensity, green lb/ft3		60.0	58.6	62.1	58.9	59.6	59.7
HardwoodFraction		0.20	0.00	0.00	0.05	0.00	0.04
ButtDiam, in			18.8		15.9		16.9
LogsPerTree		1.00	2.26	2.58	1.63	2.33	1.74
LogVol, ft3					19.93	24.08	21.76
CTLLogsPerTree		3.27			4.02		
CTLLogVol, ft3		4.58			8.09		
BFperCF	5						
VolPerAcre, ft3		300	1000	400	1300	1400	1700
BoleWt, GT/ac		9.0	29.3	12.4	38.3	41.7	50.7
ResidueWt, GT/ac		0.0	7.3	4.7	7.3	12.0	12.0
ManualMachineSize						0.37	0.25
MechMachineSize					0.41		
ChipperSize	0.19						
NonSelfLevelCabDummy	0.35						
CSlopeFB&Harv (Mellgren 90)	0.15						
CRemovalsFB&Harv (Mellgren 90)	0.55						
CSlopeSkidForwLoadSize (Mellgren 90)	0.90						
Chardwood		1.04	1.00	1.00	1.01	1.00	1.01

DBH

DBHCT – DBH for chip trees, in

DBHSLT – DBH for small log trees, in

DBHLLT – DBH for large log trees, in

DBHST – DBH for small trees, in

DBHALT – DBH for all log trees, in

DBH – DBH for all trees, in

DBHCT

$$= \text{IF}(\text{TreeVolCT} > 0, \text{IF}(\text{ISNUMBER}(\text{UserSpecDBHCT}), \text{UserSpecDBHCT}, \text{SQRT}((\text{TreeVolCT} + 3.675) / 0.216)), 0)$$

DBHSLT

=IF(TreeVolSLT>0,IF(ISNUMBER(UserSpecDBHSLT),UserSpecDBHSLT,SQRT((TreeVolSLT+3.675)/0.216)),0)

DBHLLT

=IF(TreeVolLLT>0,IF(ISNUMBER(UserSpecDBHLLT),UserSpecDBHLLT,SQRT((TreeVolLLT+3.675)/0.216)),0)

DBHST = IF(TreeVolST>0,SQRT((RemovalsCT*DBHCT^2+RemovalsSLT*DBHSLT^2)/RemovalsST),0)

DBHALT = IF(TreeVolALT>0,SQRT((RemovalsSLT*DBHSLT^2+RemovalsLLT*DBHLLT^2)/RemovalsALT),0)

DBH= SQRT((RemovalsCT*DBHCT^2+RemovalsALT*DBHALT^2)/Removals)

$$DBHCT = \sqrt{\frac{TreeVolCT + 3.675}{0.216}}$$

$$DBHSLT = \sqrt{\frac{TreeVolSL + 3.675}{0.216}}$$

$$DBHLLT = \sqrt{\frac{TreeVolLLT + 3.675}{0.216}}$$

$$DBHST = \sqrt{\frac{RemovalsCT \times DBHCT^2 + RemovalsSLT \times DBHSLT^2}{RemovalsST}}$$

$$DBHALT = \sqrt{\frac{RemovalsSLT \times DBHSLT^2 + RemovalsLLT \times DBHLLT^2}{RemovalsALT}}$$

$$DBH = \sqrt{\frac{RemovalsCT \times DBHCT^2 + RemovalsALT \times DBHALT^2}{Removals}}$$

Tree Height

HeightCT

=IF(TreeVolCT>0,IF(ISNUMBER(UserSpecHeightCT),UserSpecHeightCT,-20+24*SQRT(DBHCT)),0)

HeightSLT

=IF(TreeVolSLT>0,IF(ISNUMBER(UserSpecHeightSLT),UserSpecHeightSLT,-20+24*SQRT(DBHSLT)),0)

HeightLLT

=IF(TreeVolLLT>0,IF(ISNUMBER(UserSpecHeightLLT),UserSpecHeightLLT,-20+24*SQRT(DBHLLT)),0)

HeightST = IF(TreeVolST>0,(RemovalsCT*HeightCT+RemovalsSLT*HeightSLT)/RemovalsST,0)

HeightALT = IF(TreeVolALT>0,(RemovalsSLT*HeightSLT+RemovalsLLT*HeightLLT)/RemovalsALT,0)

HeightAT = IF(TreeVol>0,(RemovalsCT*HeightCT+RemovalsALT*HeightALT)/RemovalsAT,0)

$$HeightCT = -20 + 24 \times \sqrt{DBHCT}$$

$$HeightSLT = -20 + 24 \times \sqrt{DBHSLT}$$

$$HeightLLT = -20 + 24 \times \sqrt{DBHLLT}$$

$$HeightST = \frac{RemovalsCT \times HeightCT + RemovalsSLT \times HeightSLT}{RemovalsST}$$

$$HeightALT = \frac{RemovalsSLT \times HeightSLT + RemovalsLLT \times HeightLLT}{RemovalsALT}$$

$$HeightALT = \frac{RemovalsCT \times HeightCT + RemovalsALT \times HeightALT}{RemovalsALT}$$

Wood Density

If wood density for chip trees, small log trees or large log trees is not specified by users, then it is 50 lb/ft³ as default.

WoodDensityCT =IF(UserSpecWDCT>0,UserSpecWDCT,50)

WoodDensitySLT =IF(UserSpecWDSLT>0,UserSpecWDSLT,50)

WoodDensityLLT =IF(UserSpecWDLT>0,UserSpecWDLT,50)

WoodDensityST

=IF(VolPerAcreST>0,(WoodDensityCT*VolPerAcreCT+WoodDensitySLT*VolPerAcreSLT)/VolPerAcreST,0)

WoodDensityALT

=IF(VolPerAcreALT>0,(WoodDensitySLT*VolPerAcreSLT+WoodDensityLLT*VolPerAcreLLT)/VolPerAcreALT,0)

WoodDensity =(WoodDensityCT*VolPerAcreCT+WoodDensityALT*VolPerAcreALT)/VolPerAcre

$$WoodDensityST = \frac{WoodDensityCT \times VolPerAcreCT + WoodDensitySLT \times VolPerAcreSLT}{VolPerAcreST}$$

$$WoodDensityALT = \frac{WoodDensitySLT \times VolPerAcreSLT + WoodDensityLLT \times VolPerAcreLLT}{VolPerAcreALT}$$

$$WoodDensity = \frac{WoodDensityCT \times VolPerAcreCT + WoodDensityALT \times VolPerAcreALT}{VolPerAcre}$$

Hardwood Fraction

If hardwood fraction for chip trees, small log trees or large log trees is not specified by users, then it is 0 as default.

HdwdFractionCT =IF(ISNUMBER(User-SpecHFCT), User-SpecHFCT,0)

HdwdFractionSLT =IF(ISNUMBER(User-SpecHFSLT), User-SpecHFSLT,0)

HdwdFractionLLT =IF(ISNUMBER(User-SpecHFLLT), User-SpecHFLLT,0)

HdwdFractionST

=IF(VolPerAcreST>0,(HdwdFractionCT*VolPerAcreCT+HdwdFractionSLT*VolPerAcreSLT)/VolPerAcreST,0)

HdwdFractionALT

=IF(VolPerAcreALT>0,(HdwdFractionSLT*VolPerAcreSLT+HdwdFractionLLT*VolPerAcreLLT)/VolPerAcreALT,0)

HdwdFraction =(HdwdFractionCT*VolPerAcreCT+HdwdFractionALT*VolPerAcreALT)/VolPerAcre

$$HdwdFractionST = \frac{HdwdFractionCT \times VolPerAcreCT + HdwdFractionSLT \times VolPerAcreSLT}{VolPerAcreST}$$

$$HdwdFractionALT = \frac{HdwdFractionSLT \times VolPerAcreSLT + HdwdFractionLLT \times VolPerAcreLLT}{VolPerAcreALT}$$

$$HdwdFraction = \frac{HdwdFractionCT \times VolPerAcreCT + HdwdFractionALT \times VolPerAcreALT}{VolPerAcre}$$

Butt Diameter

$$ButtDiamSLT = DBHSLT + 3$$

$$ButtDiamST = DBHST + 3$$

Logs Per Tree

Logs per chip tree was assumed as 1.

LogsPerTreeCT = 1

LogsPerTreeSLT= (-0.43+0.678*SQRT(DBHSLT))

LogsPerTreeLLT= (-0.43+0.678*SQRT(DBHLLT))

LogsPerTreeST =(LogsPerTreeCT*RemovalsCT+LogsPerTreeSLT*RemovalsSLT)/RemovalsST

LogsPerTreeALT

=IF(RemovalsALT=0,0,((LogsPerTreeSLT*RemovalsSLT+LogsPerTreeLLT*RemovalsLLT)/RemovalsALT))

LogsPerTreeAT =(LogsPerTreeCT*RemovalsCT+LogsPerTreeALT*RemovalsALT)/Removals

$$LogsPerTreeCT = 1$$

$$LogsPerTreeSLT = -0.43 + 0.678 \times \sqrt{DBHSLT}$$

$$LogsPerTreeLLT = -0.43 + 0.678 \times \sqrt{DBHLLT}$$

$$LogsPerTreeST = \frac{LogsPerTreeCT \times RemovalsCT + LogsPerTreeSLT \times RemovalsSLT}{RemovalsST}$$

$$LogsPerTreeALT = \frac{LogsPerTreeSLT \times RemovalsSLT + LogsPerTreeLLT \times RemovalsLLT}{RemovalsALT}$$

$$LogsPerTree = \frac{LogsPerTreeCT \times RemovalsCT + LogsPerTreeALT \times RemovalsALT}{Removals}$$

Log Volume

$$LogVolST = TreeVolST / LogsPerTreeST$$

$$LogVolALT = IF(RemovalsALT=0,0,TreeVolALT/LogsPerTreeALT)$$

$$LogVolAT = TreeVol / LogsPerTree$$

$$LogVolST = \frac{TreeVolST}{LogsPerTreeST}$$

$$LogVolALT = \frac{TreeVolALT}{LogsPerTreeALT}$$

$$LogVol = \frac{TreeVol}{LogsPerTree}$$

CTL Logs Per Tree

For the Mech WT system, no idea about what the following CTL values used for?

$$CTLLogsPerTreeCT = \text{MAX}(1, 2 * (-0.43 + 0.678 * \text{SQRT}(\text{DBHCT})))$$

$$CTLLogsPerTree = \text{MAX}(1, 2 * (-0.43 + 0.678 * \text{SQRT}(\text{DBHST})))$$

CTL Log Volume

$$CTLLogVolCT = TreeVolCT / CTLLogsPerTreeCT$$

$$CTLLogVol = TreeVolST / CTLLogsPerTree$$

BFperCF

$$BFperCF = 5 \text{ (not sure what it is)}$$

Bole Weight

$$BoleWtCT = \text{WoodDensityCT} * \text{VolPerAcreCT} / 2000$$

$$BoleWtSLT = \text{WoodDensitySLT} * \text{VolPerAcreSLT} / 2000$$

$$BoleWtLLT = \text{WoodDensityLLT} * \text{VolPerAcreLLT} / 2000$$

$$BoleWtST = \text{BoleWtCT} + \text{BoleWtSLT}$$

$$\text{BoleWtALT} = \text{BoleWtSLT} + \text{BoleWtLLT}$$

$$\text{BoleWtAT} = \text{BoleWtCT} + \text{BoleWtALT}$$

$$BoleWtCT = \frac{\text{WoodDensityCT} \times \text{VolPerAcreCT}}{2000}$$

$$BoleWtSLT = \frac{\text{WoodDensitySLT} \times \text{VolPerAcreSLT}}{2000}$$

$$BoleWtLLT = \frac{\text{WoodDensityLLT} \times \text{VolPerAcreLLT}}{2000}$$

$$BoleWtST = BoleWtCT + BoleWtSLT$$

$$BoleWtALT = BoleWtSLT + BoleWtLLT$$

$$BoleWtAT = BoleWtCT + BoleWtALT$$

Residue Weight

$$\text{ResidueCT} = \text{UserSpecRFCT} * \text{BoleWtCT}$$

$$\text{ResidueSLT} = \text{UserSpecRFSLT} * \text{BoleWtSLT}$$

$$\text{ResidueLLT} = \text{UserSpecRFLLT} * \text{BoleWtLLT}$$

$$\text{ResidueST} = \text{ResidueCT} + \text{ResidueSLT}$$

$$\text{ResidueALT} = \text{ResidueSLT} + \text{ResidueLLT}$$

$$\text{ResidueAT} = \text{ResidueCT} + \text{ResidueALT}$$

$$BoleWtCT = \text{UserSpecRFCT} + BoleWtCT$$

$$BoleWtSLT = \text{UserSpecRFSLT} + BoleWtSLT$$

$$BoleWtLLT = \text{UserSpecRFLLT} + BoleWtLLT$$

$$BoleWtST = \text{ResidueCT} + \text{ResidueSLT}$$

$$BoleWtALT = \text{ResidueSLT} + \text{ResidueLLT}$$

$$BoleWtAT = \text{ResidueCT} + \text{ResidueALT}$$

Manual Machine Size

$$\text{ManualMachineSizeALT} = \text{MIN}(1, \text{TreeVolALT} / \text{MaxManualTreeVol})$$

$$\text{ManualMachineSize} = \text{MIN}(1, \text{TreeVol} / \text{MaxManualTreeVol})$$

Again, for the Mech WT system, it doesn't make sense that Manual related values were calculated in the FRCS spreadsheet. Perhaps it was just calculated with no meaning and also not involved in the later calculation.

Mechanized Machine Size

$$\text{MechMachineSize} = \text{MIN}(1, \text{TreeVolST} / \text{MaxMechTreeVol})$$

Chipper Size

$$\text{ChipperSize} = \text{MIN}(1, \text{TreeVolCT} / \text{MaxMechTreeVol})$$

NonSelfLevelCabDummy

$$\text{NonSelfLevelCabDummy} = \text{IF}(\text{Slope} < 15, 1, \text{IF}(\text{Slope} < 35, 1.75 - 0.05 * \text{Slope}, 0))$$

$$\text{NonSelfLevelCabDummy}_{\text{slope} < 15} = 1$$

$$\text{NonSelfLevelCabDummy}_{15 < \text{slope} < 35} = 1.75 - 0.05 \times \text{Slope}$$

$$\text{NonSelfLevelCabDummy}_{\text{slope} > 35} = 0$$

I don't know what NonSelfLevelCabDummy means

CSlopeFB&Harv (Mellgren 90)

CSlopeFB_Harv = 0.00015*Slope^2+0.00359*NonSelfLevelCabDummy*Slope

$$CSlopeFB_{Harv} = 0.00015 \times Slope^2 + 0.00359 \times NonSelfLevelCabDummy \times Slope$$

CRemovalsFB&Harv (Mellgren 90)

CRemovalsFB_Harv = MAX(0,0.66-0.001193*RemovalsST*2.47+5.357*10^-7*(RemovalsST*2.47)^2)

$$\begin{aligned} CRemovalsFB_{Harv} \\ &= 0.66 - 0.001193 \times RemovalsST \times 2.47 \\ &\quad + 5.357 \times 10^{-7} \times (RemovalsST \times 2.47)^2 \end{aligned}$$

CSlopeSkidForwLoadSize (Mellgren 90)

CSlopeSkidForwLoadSize = 1-0.000127*Slope^2

$$CSlopeForwLoadSize = 1 - 0.000127 \times Slope^2$$

Chardwood

CHardwoodCT = 1+HdwdCostPremium*HdwdFractionCT

CHardwoodSLT = 1+HdwdCostPremium*HdwdFractionSLT

CHardwoodLLT = 1+HdwdCostPremium*HdwdFractionLLT

CHardwoodST = 1+HdwdCostPremium*HdwdFractionST

CHardwoodALT = 1+HdwdCostPremium*HdwdFractionALT

CHardwoodAT = 1+HdwdCostPremium*HdwdFractionAT

OUTPUTS

System Product Summary

Amounts Recovered Per Acre

	Mech WT
	Ground-Based M
<u>I. System Product Summary</u>	
<u>A. Amounts recovered/ac</u>	
Bole volume, CCF/ac	17.0
Bole weight, GT/ac	50.7
WT residue recovered as part of prima	0.0
Primary Products, GT/ac	50.7
Optional residue recovered, GT/ac	9.6
Total of Primary Products & Optional f	60.4

ResidueRecoveredPrimary – WT residue recovered as part of primary product, GT/ac

ResidueRecoveredOptional – Optional residue recovered, GT/ac

ResidueRecoveredPrimary=ResidueRecovFracWT*ResidueCT

PrimaryProduct=BoleWT+ ResidueRecoveredPrimary

ResidueRecoveredOptional

=IF(CalcResidues=1,(ResidueRecovFracWT*ResidueSLT)+(ResidueRecovFracWT*ResidueLLT),0)

TotalPrimaryAndOptional=PrimaryProduct+ ResidueRecoveredOptional

Amounts Unrecovered and Left within the Stand Per Acre

<u>B. Amounts unrecovered and left within the stand/ac</u>	
Uncut trees >80cf, CCF/ac	
Residues on uncut trees >80cf, GT/ac	
Activity fuels (residues) on the ground, GT/ac	6.2

GroundFuel – Activity fuels (residues) on the ground, GT/ac

PiledFuel – Piled activity fuels (residues), GT/ac

GroundFuel =ResidueLLT+ResidueST*(1-ResidueRecovFracWT)

$$GroundFuel = ResidueLLT + ResidueST \times (1 - ResidueRecovFracWT)$$

ResidueLLT not times 1-ResidueRecovFracWT???

Amounts Unrecovered and Left at the Landing

<u>C. Amounts unrecovered and left at the landing/ac</u>	
Piled activity fuels (residues), GT/ac	0.0
[D. Check calc: total residues, GT/ac]	15.83

PiledFuel=IF(CalcResidues=1,0,ResidueSLT*ResidueRecovFracWT)

No LLT residue Piled?

TotalResidues

=ResidueRecoveredPrimary+ResidueRecoveredOptional+ResidueUncutTrees+GroundFuel+PiledFuel

$$PiledFuel = ResidueSLT \times ResidueRecovFracWT$$

$$TotalResidues = ResidueRecoveredPrimary + ResidueRecoveredOptional \\ + ResidueUncutTrees + GroundFuel + PiledFuel$$

System Cost Elements

For Primary Products (boles & WT residues), \$/CCF of material treated by the activity

Fell&Bunch: trees <=80 cf	12.70
Manual Fell, Limb, Buck: all trees	
Manual Fell, Limb, Buck: all log trees	
Manual Fell, Limb, Buck: trees >80cf	12.78
Manual Fell: trees <=80 cf	
Manual Fell: chip trees	
Harvest: trees <=80 cf	
Skid Bunched: all trees	35.42
Skid Unbunched: all trees	
Forward: trees <=80 cf	
Yard Unbunched: all trees	
Yard CTL: trees <=80 cf	
Process: log trees <=80 cf	8.18
Load: log trees	7.78
Load CTL: log trees <=80 cf	
Chip: chip whole trees	7.76
Chip: chip tree boles	
Chip CTL: chip tree boles	
Primary Product Move-In Costs, \$/CCI	79.06

For Optional Residues, \$/GT of additional residue recovered

B. For Optional Residues, \$/GT of additional residue recovered	
Bundle: CTL Residues	
Forward: CTL Residues	
Chip Loose Residues: from log trees <=80 cf	7.37
Chip Bundled Residues: from all trees <=80 cf	
Onto-Truck for Residues w/o Move-In, \$/GT	7.37
Residue Move-In Costs, \$/GT	0.00
Onto-Truck for Residues w/ Move-In, \$/GT	7.37

Chip Loose Residues: from log trees <=80 cf

=CostChipLooseRes*CollectOption*InLimits1

Residue Move-In Costs, \$/GT = =0*CalcMoveIn*CalcResidues*InLimits1

What is the point of residue move-in costs?

For All Products, \$/ac

C. For All Products, \$/ac	
Fell&Bunch: trees <=80 cf	165
Manual Fell, Limb, Buck: all trees	
Manual Fell, Limb, Buck: all log trees	
Manual Fell, Limb, Buck: trees >80cf	51
Manual Fell: trees <=80 cf	
Manual Fell: chip trees	
Harvest: trees <=80 cf	
Skid Bunched: all trees	602
Skid Unbunched: all trees	
Forward: trees <=80 cf	
Yard Unbunched: all trees	
Yard CTL: trees <=80 cf	
Process: log trees <=80 cf	82
Load: log trees	109
Load CTL: log trees <=80 cf	
Chip: chip whole trees	23
Chip: chip tree boles	
Chip CTL: chip tree boles	
Stump-to-Truck for Primary Products w/o Move-In, \$/ac	1032
Primary Product Move-In Costs, \$/ac	1344
Stump-to-Truck for Primary Products w/ Move-In, \$/ac	2376
Bundle: CTL Residues	
Forward: CTL Residues	
Chip Loose Residues: from log trees <=80 cf	71
Chip Bundled Residues: from all trees <=80 cf	
Onto-Truck for Residues w/o Move-In, \$/ac	71
Residue Move-In Costs, \$/ac	0
Onto-Truck for Residues w/ Move-In, \$/ac	71

Stump2Truck4PrimaryProductWithoutMovein=FellAndBunchTreesLess80cf+ManualFellLimbBuckTreesLarger80cf+SkidBunchedAllTrees+ProcessLogTreesLess80cf+LoadLogTrees+ChipWholeTrees

Movein4PrimaryProduct=MoveInCosts!G39*CalcMoveIn*BoleVol*InLimits1

OntoTruck4ResiduesWoMovein=ChipLooseResiduesFromLogTreesLess80cf==CostChipLooseRes*CalcResidues*ResidueRecoveredOptional*InLimits1

Movein4Residues==0*CalcMoveInOption*CollectOption*ResidueRecoveredOptional*InLimits1

System Cost Summaries

TotalPerAcre=Stump2Truck4PrimaryProductWithoutMovein+Movein4PrimaryProduct+OntoTruck4ResiduesWoMovein+Movein4Residues

TotalPerBoleCCF=TotalPerAcre/BoleVol

TotalPerGT=TotalPerAcre/TotalPrimaryProductsAndOptionalResidues

Limits

Limits	
Maximum LLT/ac	none
Maximum LLT as % of ALT	none
Exceeded (0=no, 1=yes)	0
TreeVol maximums, ft3:	
CT	80
SLT	80
LLT	250
ALT	250
all trees	250
Exceeded (0=no, 1=yes)	0
Slope, %	
maximum	40
Exceeded (0=no, 1=yes)	0
Yarding distance, ft	
maximum	none
Exceeded (0=no, 1=yes)	0
Within all limits (1=yes, #N/A=no)	1

ExceededMaxTreeVol (0=no,1=yes)

=IF(OR(TreeVolCT>AvgTreeSizeLimit4Chipping,TreeVolSLT>AvgTreeSizeLimit4Processing,TreeVolLLT>AvgTreeSizeLimit4ManualFellLimbBuck,TreeVolALT>AvgTreeSizeLimit4loading,TreeVol>AvgTreeSize4GrappleSkidding),1,0)

ExceededMaxSkidSlope (0=no, 1=yes) = =IF(Slope>SkiddingLimit,1,0)

InLimits1=IF(OR(ExceededMaxLLT=1,ExceededMaxTreeVol=1,ExceededMaxSkidSlope=1,ExceededMaxYardingDist=1),NA(),1)