

Exhibit Name: Premium Calculation
 Exhibit Number: P11-13, Plan 16
 Record Name: Acreage
 Record Code: P11

Reinsurance Year: 2017
 Version: Approved
 Release Date: 2/7/2019

Margin Protection (MP)

Insurance Plan Code 16 Margin Protection

Commodity Code 0011 Wheat 0018 Rice 0041 Corn 0081 Soybeans

Calculations

Field Name

Record Number

Field Number

Field Format

Field Rounding

Rules

Section 1: Dollar Amount of Insurance

Dollar Amount of Insurance with base policy:

$$\text{Dollar Amount of Insurance} = \text{Round}(\frac{\text{Expected Margin Amount} * \text{Coverage Level Percent}}{\text{Percent}} + (\text{Approved Yield} * 0.85 * \text{Projected Price}), 2)$$

Dollar Amount of Insurance	Internal			99999999.99	2 decimal places	
Expected Margin Amount	ADM			99999.999999	None	Expected Margin Amount. Edit with ADM Price, "A00810".
Coverage Level Percent	P14	49		9.9999	2 decimal places	Coverage Level Percent in 5% increments as selected for MP.
Approved Yield	P11	42		99999999.99	None	Approved Yield.
Projected Price	ADM			99999.9999	None	Projected Price. Edit with ADM Price, "A00810".

Dollar Amount of Insurance without base policy:

$$\text{Dollar Amount of Insurance} = \text{Round}(\frac{\text{Expected Margin Amount} * \text{Coverage Level Percent}}{\text{Percent}} + (\text{Expected County Yield} * 0.85 * \text{Projected Price}), 2)$$

Dollar Amount of Insurance	Internal			99999999.99	2 decimal places	
Expected Margin Amount	ADM			99999.999999	None	Expected Margin Amount. Edit with ADM Price, "A00810".
Coverage Level Percent	P14	49		9.9999	2 decimal places	Coverage Level Percent in 5% increments as selected for MP.
Expected County Yield	Internal			99999999.99	None	Edit with ADM Area Price, "A00810". Expected County Yield will be stored in Expected Index Value in "A00810".
Projected Price	ADM			99999.9999	None	Projected Price. Edit with ADM Price, "A00810".

Section 2: Liability Calculation

$$\text{Total Guarantee Amount} = \text{Dollar Amount of Insurance} * \text{Reported Acreage}$$

Total Guarantee Amount	P11	100		9999999999	Round to whole number.	
Reported Acreage	P11	48		9999999.99	None	

$$\text{Liability Amount} = \text{Total Guarantee Amount} * \text{Insured Share Percent}$$

Liability Amount	P11	91		9999999999	Round to whole number.	
Insured Share Percent	P11	43		9.9999	None	

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Section 3: Total Premium, Subsidy, and Producer Premium Calculation

Sections 3 and 4 will be used if base (companion) record does not have qualifying information for MP Net Premium.

Preliminary Total Premium Amount = Reported Acreage * Base Rate * Insured Share Percent	Preliminary Total Premium Amount	Internal		9999999999	Round to whole number.	
	Base Rate	ADM		999999.9999	None	Base Rate is Margin Protection Premium Amount Per Acre. Edit with ADM Area Rate, "A01135" and ADM Area Coverage Level, "A01130".
Total Premium Amount = Preliminary Total Premium Amount	Total Premium Amount	P11	92	9999999999	Round to whole number.	
Subsidy Amount = Total Premium Amount * Subsidy Percent	Subsidy Amount	P11	90	9999999999	Round to whole number.	If this record qualifies for Beginning Farmer and Rancher or Native Sod, see Section 4 for subsidy calculations.
	Subsidy Percent	ADM		9.999	None	Edit with ADM Subsidy Percent, "A00070".
Producer Premium Amount = Total Premium Amount - Subsidy Amount	Producer Premium Amount	P11	93	9999999999	Round to whole number.	

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Section 4: Beginning Farmer and Rancher (BFR), Native Sod (NS), and Conservation Compliance (CC) Subsidy Calculations

Base Subsidy Amount = Total Premium Amount * Subsidy Percent	Base Subsidy Amount	Internal		9999999999	Round to whole number	Capped by the standard rule of \$1 if applicable.
	Subsidy Percent	ADM		9.999	None	Edit with ADM Subsidy Percent, "A00070".
BFR Subsidy Amount = Total Premium Amount * 0.10 * (1 - CC Subsidy Reduction Percent)	BFR Subsidy Amount	Internal		9999999999	Round to whole number	Beginning Farmer Rancher Subsidy Amount. If Applicable; else 0. 0.10 (10%).
Native Sod Subsidy Amount = Total Premium Amount * 0.50	Native Sod Subsidy Amount	Internal		9999999999	Round to whole number	If Applicable; else 0. 0.50 (50%). For CAT coverage, Native Sod Subsidy Amount is always 0.
CC Subsidy Reduction Amount = Base Subsidy Amount * CC Subsidy Reduction Percent	CC Subsidy Reduction Percent	P11	76	9.9999	None	If Applicable; else 0.
	CC Subsidy Reduction Amount	P11	108	9999999999	Round to whole number	CC Subsidy Reduction Amount. If Applicable; else 0.
Subsidy Amount = Base Subsidy Amount + BFR Subsidy Amount - Native Sod Subsidy Amount - CC Subsidy Reduction Amount	Subsidy Amount	P11	90	9999999999	Round to whole number	Subsidy Amount cannot exceed Total Premium Amount. Subsidy Amount will be capped at \$0.
Producer Premium Amount = Total Premium Amount - Subsidy Amount	Producer Premium Amount	P11	93	9999999999	Round to whole number	

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Section 5: Premium Credit for MP Policies with Base Policy

MP policy has an associated base (companion) policy. Use Sections 3 and 4 when base (companion) record does not have qualifying information for MP Net Premium.

Simple Average Annual Yield = $\sum \text{Average Annual Yield(s)} / N$	Simple Average Annual Yield	Internal		99999999.99	Round to 2 decimals.	Sum all average annual yields in the APH database for a type/practice unit divide by the number of yields.
	Average Annual Yield	Internal		99999999.99	Round to 2 decimals.	APH average annual yields for each year in the APH database.
	N	Internal		99999	Whole Number	Count of the yields in the APH database.
Simple Average County Yield = $\sum \text{Yield(s)} / N$	Simple Average County Yield	Internal		99999999.99	Round to 2 decimals.	Sum (county) yields for the same years that yields are reported for the unit and divide by the number of yields.
	Yield	ADM		99999999.99	Round to 2 decimals.	Yield(i) found in the ADM Historical Yield Trend, "A01115". Step 7 of Parameter Example Exhibit P15-6.
	N	Internal		99999	Whole Number	Count of the yields in the APH database.

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Calculations	Field Name	Record Number	Field Number	Field Format	Field Rounding	Rules
County Yield Deviation(i) = Yield(i) - Average County Yield	County Yield Deviation(i)	Internal		999999.99	Round to 2 decimals.	
Unit Yield Deviation(i) = Unit Yield(i) - Average Unit Yield	Unit Yield Deviation(i)	Internal		999999.99	Round to 2 decimals.	
Cross Product(i) = County Yield Deviation(i) * Unit Yield Deviation(i)	Cross Product(i)	Internal		999999.9999	Round to 4 decimals	
Squared County Deviation(i) = County Yield Deviation(i) * County Yield Deviation(i)	Squared County Deviation(i)	Internal		999999.9999	Round to 4 decimals	
Beta = $\sum \text{Cross Product}(i) / \sum \text{Squared County Deviation}(i)$	Beta	Internal		999999.9999	Round to 4 decimals	If calculated Beta < 0.3 or if N < 4, set Beta = 0.3 or if calculated Beta > 1.6, set Beta = 1.6. Note: The sum of the cross product ($\sum \text{Cross Product}(i)$) and the sum of the squared county deviation ($\sum \text{Squared County Deviation}(i)$) should be rounded to 2 decimals before performing the beta calculation. When there are zero (0) yield years with an approved actual yield type for MP then the Beta, Alpha, Sigma are NOT calculated for the MP P11 and the MP P11 is treated as a standalone MP P11. Credit will = 1.
Alpha = Average Unit Yield - Beta * Average County Yield	Alpha	Internal		999999.9999	Round to 4 decimals	
Squared Yield Deviation(i) = [Unit Yield - Alpha - Beta * Yield(i)] ²	Squared Yield Deviation(i)	Internal		999999.9999	Round to 4 decimals	
Sigma = $[\sum \text{Squared Yield Deviation}(i) / (N-2)]^{0.5}$	Sigma	Internal		999999.9999	Round to 4 decimals	If N < 4, Sigma = 0.

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Record Number

Field Number

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Field Rounding

Rules

Trigger Margin Calculation:

Simulateed Trigger Margin = Expected Margin * Coverage Level Percent

Simulateed Trigger Margin

Internal

99999999.99

Round to 2 decimals.

Expected Margin

ADM

99999999.99

Round to 2 decimals.

Expected Margin found in the ADM Price, "A00810".

Simulated MP Losses Calculation:

MP Liability Amount = Liability Amount / Insured Share Percent

MP Liability Amount

Internal

9999999999

Round to whole number.

MP Liability Amount is the amount without Insured Share Percent for use in the determination of MP Gross Indemnity.

For t = 1 to 57 and j= 1 to 100
 Margin Draw (t,j) = Detrended Yield(t) * Commodity Price Draw Quantity (t,j) - Input Cost Draw Quantity (t,j)

Margin Draw

Internal

99999999.99

Round to 2 decimals.

Note: The 't' input will increase from 57 to 59 in 2017. In each year after starting with 2018 the 't' will increase by one; 59 will go to 60.

Detrended Yield

ADM

9999999999.99

None

Do not make calculations if Detrended Yields = 0, skip to next value. Detrended Yield found in the ADM Historical Yield Trend, "A01115".

Commodity Price Draw Quantity

ADM

99999.9999999999

None

Commodity Price Draw Quantity found in the ADM Draw Data, "A00615".

Input Cost Draw Quantity

ADM

9999.999999999

None

Input Cost Draw Quantity found in the ADM Draw Data, "A00615".

Counter = Counter + 1

Counter

Internal

99999999.99

Whole Number

Counter is set = 0 to begin the simulation. Do not increment counter when any County Detrended Yield = 0.

MP Gross Indemnity = MIN(MAX[Trigger Margin - Margin Draw(t,j),0], Draw(t,j) / MP Liability Amount)

MP Gross Indemnity Draw(t,j)

Internal

99999999.99

Round to 2 decimals.

MP Gross Indemnity = MP Gross Indemnity + MP Gross Indemnity Draw(t,j)

MP Gross Indemnity

Internal

99999999.99

Round to 2 decimals.

Sum the MP Gross Indemnities for all iterations.

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Simulated Farm Yield Calculation:						
Farm Yield Draw(t,j) = MAX[Alpha + Beta * Detrended Yield(t) + Sigma * Farm Deviation Quantity (j),0]	Farm Yield Draw(t,j)	Internal		99999999.99	Round to 2 decimals.	
	Farm Deviation Quantity (j)	ADM		99999999.9999	None	Farm Deviation Quantity (j) found in the ADM Draw Data, "A00615".
Farm Revenue Draw(t,j) = Farm Yield Draw(t,j) * Commodity Price Draw Quantity (t,j)	Farm Revenue Draw(t,j)	Internal		99999999.99	Round to 2 decimals.	
Simulated Indemnities for Base (Companion) Policy Calculation:						
Coverage Level = Coverage Level for Base (Companion) Policy	Coverage Level	P14	49	9.9999	2 decimal places	Note - this is the Coverage Level for Base (Companion) Policy.
YP Indemnity Draw(t,j) = Projected Price * MAX(Coverage Level * Approved Yield - Farm Yield Draw(t,j),0)	YP Indemnity Draw(t,j)	Internal		99999999.99	2 decimal places	
RP Guarantee Draw(t,j) = Round(Approved Yield * Coverage Level,1) * MAX(Commodity Price Draw Quantity (t,j), Projected Price)	RP Guarantee Draw(t,j)	Internal		99999999.99	2 decimal places	
RP Indemnity Draw(t,j) = MAX(RP Guarantee Draw(t,j) - Farm Revenue Draw(t,j),0)	RP Indemnity Draw(t,j)	Internal		99999999.99	2 decimal places	
RPHPE Indemnity Draw(t,j) = MAX[Coverage Level * Approved Yield * Projected Price - Farm Yield Draw(t,j) * Commodity Price Draw Quantity (t,j),0]	RPHPE Indemnity Draw(t,j)	Internal		99999999.99	2 decimal places	
Net Indemnities:						
YP Net Indemnity Draw(t,j) = MAX[MP Gross Indemnity Draw(t,j) - YP Indemnity Draw(t,j),0]	YP Net Indemnity Draw(t,j)	Internal		99999999.99	2 decimal places	
RP Net Indemnity Draw(t,j) = MAX[MP Gross Indemnity Draw(t,j) - RP Indemnity Draw(t,j),0]	RP Net Indemnity Draw(t,j)	Internal		99999999.99	2 decimal places	
RPHPE Net Indemnity Draw(t,j) = MAX[MP Gross Indemnity Draw(t,j) - RPHPE Indemnity Draw(t,j),0]	RPHPE Net Indemnity Draw(t,j)	Internal		99999999.99	2 decimal places	
Summed Net Indemnities:						
Summed YP Net Indemnity = Σ{YP Net Indemnity Draw} + YP Net Indemnity Draw(t,j)	YP Net Indemnity	Internal		99999999.99	2 decimal places	
Summed RP Net Indemnity = Σ{RP Net Indemnity Draw} + RP Net Indemnity Draw(t,j)	RP Net Indemnity	Internal		99999999.99	2 decimal places	
Summed RPHPE Net Indemnity = Σ{RPHPE Net Indemnity Draw} + RPHPE Net Indemnity Draw(t,j)	RPHPE Net Indemnity	Internal		99999999.99	2 decimal places	

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Gross Premium and Net Premium Per Acre on a 100% share basis:						
Gross Premium = Round(Summed Gross Indemnity / Counter,2)	Gross Premium	Internal		99999999.99	2 decimal places	
YP Net Premium Per Acre = Round(Summed YP Net Indemnity / Counter,2)	YP Net Premium Per Acre	Internal		99999999.99	2 decimal places	
RP Net Premium Per Acre = Round(Summed RP Net Indemnity / Counter,2)	RP Net Premium Per Acre	Internal		99999999.99	2 decimal places	
RPHPE Net Premium Per Acre = Round(Summed RPHPE Net Indemnity / Counter,2)	RPHPE Net Premium Per Acre	Internal		99999999.99	2 decimal places	
Base (Companion) Policy Credit and MP Net Premium:						
YP Base Policy Credit = Gross Premium - YP Net Premium Per Acre	YP Base Policy Credit	Internal		99999999.99	2 decimal places	
RP Base Policy Credit = Gross Premium - RP Net Premium Per Acre	RP Base Policy Credit	Internal		99999999.99	2 decimal places	
RPHPE Base Policy Credit = Gross Premium - RPHPE Net Premium Per Acre	RPHPE Base Policy Credit	Internal		99999999.99	2 decimal places	
MP Net Premium = Base Rate - (YP Base Policy Credit, RP Base Policy Credit, or RPHPE Base Policy Credit)	MP Net Premium	Internal		99999999.99	2 decimal places	
	Base Rate	ADM		999999.9999	None	Base Rate is Margin Protection Premium Amount Per Acre. Edit with ADM Area Rate, "A01135" and ADM Area Coverage Level, "A01130". Use Sections 3 and 4 when base (companion) record does not have qualifying information for MP Net Premium.

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Section 6: Total Premium, Subsidy, and Producer Premium Calculation for MP Policies with Base (Companion) Policy:

$\text{Preliminary Total Premium Amount} = \frac{\text{Reported Acreage} * \text{MP Net Premium} * \text{Insured Share}}{\text{Percent}}$	Preliminary Total Premium Amount	Internal		9999999999	Round to whole number.	
$\text{Total Premium Amount} = \text{Preliminary Total Premium Amount}$	Total Premium Amount	P11	92	9999999999	Round to whole number.	
$\text{Subsidy Amount} = \text{Total Premium Amount} * \text{Subsidy Percent}$	Subsidy Amount	P11	90	9999999999	Round to whole number.	If this record qualifies for Beginning Farmer and Rancher or Native Sod, see Section 4 for subsidy calculations.
	Subsidy Percent	ADM		9.999	None	Edit with ADM Subsidy Percent, "A00070".
$\text{Producer Premium Amount} = \text{Total Premium Amount} - \text{Subsidy Amount}$	Producer Premium Amount	P11	93	9999999999	Round to whole number.	