Exhibit Name: Premium Calculation						
Exhibit Number: P11-13, Plans 16, 17			**Reinsurance Year:** 2023			
Record Name: Acreage			**Version:** Approved			
Record Code: P11			**Release Date:** 7/1/2022			

Margin Protection (MP)						
Insurance Plan Code	16 Margin Protection		17 Margin Protection with Harvest Price Option			
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 = Expected Revenue * Coverage Level Percent * Price Election Percent	Dollar Amount of Insurance	Internal		99999999.99	2 decimal places	
	Coverage Level Percent	P14	34	9.99	2 decimal places	Coverage Level Percent in 5% increments as selected for MP.
	Price Election Percent	P14	35	9.99	2 decimal places	Protection Factor
	Expected Revenue	ADM		99999999.99	None	Expected Revenue. Edit with ADM Price, "A00810."
Section 2: Liability Calculation						
Total Guarantee Amount = Dollar Amount of Insurance * Reported Acreage	Total Guarantee Amount	P11	110	9999999999	Round to whole number.	
	Reported Acreage	P11	48	9999999.99	None	
Liability Amount = Total Guarantee Amount * Insured Share Percent	Liability Amount	P11	101	9999999999	Round to whole number.	Cup at $1.
	Insured Share Percent	P11	43	9.9999	None	
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 * Price Election Percent * 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	102	9999999999	Round to whole number.	
Subsidy Amount = Total Premium Amount * Subsidy Percent	Subsidy Amount	P11	100	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	103	9999999999	Round to whole number.	

Exhibit Name: Premium Calculation **Exhibit Number:** P11-13, Plans 16, 17 **Record Name:** Acreage **Record Code:** P11				**Reinsurance Year:** 2023 **Version:** Approved **Release Date:** 7/1/2022		

Margin Protection (MP)						

Insurance Plan Code	16 Margin Protection		17 Margin Protection with Harvest Price Option			

Commodity Code	0011 Wheat		0018 Rice		0041 Corn	0081 Soybeans

Calculations	**Field Name**	**Record Number**	**Field Number**	**Field Format**	**Field Rounding**	**Rules**
Section 4: 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 $= \Sigma_{i=1,...,N}$ Average Annual Yield(i) / 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(i)	Internal		99999999.99	Round to 2 decimals.	APH average annual yields for each year in the APH database. For Corn "0041" Type Silage "026", convert each Average Annual Yield (measured in tons) to bushels by dividing by 0.15 and rounding to the nearest whole number.
	N	Internal		99999	Whole Number	Count of the yields in the APH database.
Simple Average County Yield $= \Sigma_{i=1,...,N}$ Yield(i) / 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(i)	ADM		99999999.99	Round to 2 decimals.	Yield(i) is the "Yield Amount" found in the ADM Historical Yield Trend, "A01115".
	N	Internal		99999	Whole Number	Count of the yields in the APH database.
County Yield Deviation(i) = Yield(i) - Simple Average County Yield	County Yield Deviation(i)	Internal		999999.99	Round to 2 decimals.	
Unit Yield Deviation(i) = Average Annual Yield(i) - Simple Average Annual 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	

Exhibit Name:	Premium Calculation		
Exhibit Number:	P11-13, Plans 16, 17	**Reinsurance Year:**	2023
Record Name:	Acreage	**Version:**	Approved
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Margin Protection (MP)

Insurance Plan Code	16 Margin Protection	17 Margin Protection with Harvest Price Option		

Commodity Code	0011 Wheat	0018 Rice	0041 Corn	0081 Soybeans

Calculations	Field Name	Record Number	Field Number	Field Format	Field Rounding	Rules
Beta = ∑Cross Product(i) / ∑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. Step 13 of Parameter Example Exhibit P15-6. *Note: The sum of the cross product (∑Cross Product(i)) and the sum of the squared county deviation(∑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 = Simple Average Annual Yield - Beta * Simple Average County Yield	Alpha	Internal		999999.9999	Round to 4 decimals	
Squared Yield Deviation(i) = [Average Annual Yield(i) - Alpha - Beta * Yield(i)]^2	Squared Yield Deviation(i)	Internal		999999.9999	Round to 4 decimals	
Sigma = [∑$_{i=1,...,N}$Squared Yield Deviation(i) / (N-2)]$^{0.5}$	Sigma	Internal		999999.9999	Round to 4 decimals	If N < 4, Sigma = 0.
Trigger Margin Calculation:						
Trigger Margin = Expected Margin - (1 * (Expected Revenue * (1 - Coverage Level Percent))	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".

Exhibit Name: Premium Calculation				**Reinsurance Year:** 2023		
Exhibit Number: P11-13, Plans 16, 17				**Version:** Approved		
Record Name: Acreage				**Release Date:** 7/1/2022		
Record Code: P11						

Margin Protection (MP)						
Insurance Plan Code	16 Margin Protection		17 Margin Protection with Harvest Price Option			
Commodity Code	0011 Wheat	0018 Rice		0041 Corn		0081 Soybeans

Calculations	Field Name	Record Number	Field Number	Field Format	Field Rounding	Rules
Simulated MP Losses Calculation:						
	Margin Draw	Internal		99999999.99	Round to 2 decimals.	Note: Starting in 2018, the 't' is defined as 60 and will increase by one each year.
	n	ADM		99999999.99	None	Beginning in 2018 'n' is defined as 60 and will increase by one each year going forward.
For $t = 1$ to n and $j = 1$ to 100 Margin Draw(t,j) = Detrended Yield(t) * Commodity Price Draw Quantity (t,j) - Input Cost Draw Quantity (t,j)	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		9999.99999999	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 or missing from ADM data.
When Insurance Plan Code Equals 16: MP Gross Indemnity Draw(t,j) = MIN(MAX[Trigger Margin - Margin Draw(t,j),0] * Price Election Percent, Dollar Amount of Insurance)	MP Gross Indemnity Draw(t,j)	Internal		99999999.99	Round to 2 decimals.	
When Insurance Plan Code equals 17: MP Gross Indemnity Draw(t,j) = MIN(MAX(Coverage Level Percent * Expected County Yield * MAX(Projected Price, Commodity Price Draw Quantity(t,j)) – Expected Revenue + Expected Margin– Margin Draw(t,j), 0) * Price Election Percent, Dollar Amount of Insurance)	Projected Price	ADM		99999.9999		Edit with ADM Price, "A00810". The Projected Price to be used in MP will be stored in Projected Price in "A00810" in the applicable record for either Insurance Plan Code 16 or 17.
	Expected County Yield	ADM		99999999.99	None	Edit with ADM Price, 'A00810'. Expected County Yield = Expected Index Value.
MP Gross Indemnity = $\Sigma_{t=1,\ldots,n}\Sigma_{j=1,\ldots,100}$ [MP Gross Indemnity Draw(t,j)]	MP Gross Indemnity	Internal		99999999.99	Round to 2 decimals.	Sum the MP Gross Indemnities for all iterations.

Exhibit Name: Premium Calculation			**Reinsurance Year:** 2023		
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Record Name: Acreage			**Release Date:** 7/1/2022		
Record Code: P11					

Margin Protection (MP)			
Insurance Plan Code	16 Margin Protection	17 Margin Protection with Harvest Price Option	
Commodity Code	0011 Wheat	0018 Rice	0041 Corn	0081 Soybeans

Calculations	Field Name	Record Number	Field Number	Field Format	Field Rounding	Rules
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	34	9.99	2 decimal places	**Note** - this is the Coverage Level for Base (Companion) Policy.
Guarantee Per Acre = Approved Yield * Coverage Level	Approved Yield	P11	42	99999999.99	None	
	Guarantee Per Acre	Internal			If Unit of Measure equals Pounds "LBS", then round to whole number. If Unit of Measure equals Tons "TONS", then round to 2 decimals. Otherwise, round to 1 decimal.	
YP Indemnity Draw(t,j) = Projected Price * MAX(Guarantee Per Acre - Farm Yield Draw(t,j),0)	YP Indemnity Draw(t,j)	Internal		99999999.99	2 decimal places	The Projected Price to be used in MP will be stored in Projected Price in "A00810" in the applicable record for either Insurance Plan Code 16 or 17. For Corn "0041" Type Silage "026", convert Approved Yield (measured in tons) to bushels by dividing by 0.15 and rounding to the nearest whole number.
RP Guarantee Draw(t,j) = Guarantee Per Acre * MAX(Commodity Price Draw Quantity (t,j), Projected Price)	RP Guarantee Draw(t,j)	Internal		99999999.99	2 decimal places	The Projected Price to be used in MP will be stored in Projected Price in "A00810" in the applicable record for either Insurance Plan Code 16 or 17. For Corn "0041" Type Silage "026", convert Approved Yield (measured in tons) to bushels by dividing by 0.15 and rounding to the nearest whole number.

Exhibit Name: Premium Calculation							
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Margin Protection (MP)							
Insurance Plan Code	16 Margin Protection		17 Margin Protection with Harvest Price Option				
Commodity Code	0011 Wheat		0018 Rice		0041 Corn		0081 Soybeans

	Calculations	Field Name	Record Number	Field Number	Field Format	Field Rounding	Rules
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[Guarantee Per Acre * Projected Price - Farm Revenue Draw(t,j), 0]	RPHPE Indemnity Draw(t,j)	Internal		99999999.99	2 decimal places	The Projected Price to be used in MP will be stored in Projected Price in "A00810" in the applicable record for either Insurance Plan Code 16 or 17. For Corn "0041" Type Silage "026", convert Approved Yield (measured in tons) to bushels by dividing by 0.15 and rounding to the nearest whole number.
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	

Exhibit Name: Premium Calculation			
Exhibit Number: P11-13, Plans 16, 17		**Reinsurance Year:** 2023	
Record Name: Acreage		**Version:** Approved	
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Margin Protection (MP)			
Insurance Plan Code	16 Margin Protection	17 Margin Protection with Harvest Price Option	
Commodity Code	0011 Wheat	0018 Rice	0041 Corn 0081 Soybeans

Calculations	Field Name	Record Number	Field Number	Field Format	Field Rounding	Rules
Summed Net Indemnities:						
YP Net Indemnity = $\Sigma_{t=1,\ldots,n}\Sigma_{j=1,\ldots,100}$ [YP Net Indemnity Draw(t,j)]	YP Net Indemnity	Internal		99999999.99	2 decimal places	
RP Net Indemnity = $\Sigma_{t=1,\ldots,n}\Sigma_{j=1,\ldots,100}$ [RP Net Indemnity Draw(t,j)]	RP Net Indemnity	Internal		99999999.99	2 decimal places	
RPHPE Net Indemnity = $\Sigma_{t=1,\ldots,n}\Sigma_{j=1,\ldots,100}$ [RPHPE Net Indemnity Draw(t,j)]	RPHPE Net Indemnity	Internal		99999999.99	2 decimal places	
Gross Premium and Net Premium Per Acre on a 100% share basis:						
Gross Premium = Round(MP Gross Indemnity / Counter,2)	Gross Premium	Internal		99999999.99	2 decimal places	
YP Net Premium Per Acre = Round(YP Net Indemnity / Counter,2)	YP Net Premium Per Acre	Internal		99999999.99	2 decimal places	
RP Net Premium Per Acre = Round(RP Net Indemnity / Counter,2)	RP Net Premium Per Acre	Internal		99999999.99	2 decimal places	
RPHPE Net Premium Per Acre = Round(RPHPE Net Indemnity / Counter,2)	RPHPE Net Premium Per Acre	Internal		99999999.99	2 decimal places	

Exhibit Name: Premium Calculation					
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Margin Protection (MP)

Insurance Plan Code	16 Margin Protection	17 Margin Protection with Harvest Price Option			
Commodity Code	0011 Wheat	0018 Rice	0041 Corn	0081 Soybeans	

Calculations	Field Name	Record Number	Field Number	Field Format	Field Rounding	Rules
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	
	Preliminary MP Net Premium	Internal		99999999.99	2 decimal places	
Preliminary MP Net Premium = Base Rate * Price Election Percent - (YP Base Policy Credit, RP Base Policy Credit, or RPHPE Base Policy Credit)	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.
Base Policy Premium = Base Policy Total Premium Amount / Insured Share Percent / Reported Acreage	Base Policy Total Premium Amount	P11	102	99999999.99	2 decimal places	Edit with YP, RP, RPHPE Total Premium Amount from P11 Insurance Plan Code 01, 02, or 03.
	Base Policy Premium	Internal	93	99999999.99	2 decimal places	Converts Base Policy Total Premium to dollars per 100 percent share acre.
MP Net Premium = MAX(Preliminary MP Net Premium, 0.50, 0.30 * Base Rate * Price Election Percent , (Base Rate * Price Election Percent) - (0.70 * Base Policy Premium))	MP Net Premium	Internal		99999999.99	2 decimal places	0.50 = 50 cent minimum cost per acre 0.30 * Base Rate * Price Election Percent limits subsidy to 70% of the calculated amount (Base Rate * Price Election Percent) - (0.70 * Base Policy Premium) limits credit to 70% of the premium per acre of the base policy.
Section 5: Total Premium, Subsidy, and Producer Premium Calculation for MP Policies with Base (Companion) Policy:						
Preliminary Total Premium Amount = Reported Acreage * MP Net Premium * Insured Share Percent	Preliminary Total Premium Amount	Internal		9999999999	Round to whole number.	
Total Premium Amount = Preliminary Total Premium Amount	Total Premium Amount	P11	102	9999999999	Round to whole number.	
Subsidy Amount = Total Premium Amount * Subsidy Percent	Subsidy Amount	P11	100	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	103	9999999999	Round to whole number.	

		Exhibit Name:	Premium Calculation				
		Exhibit Number:	P11-13, Plans 16, 17	Reinsurance Year:	2023		
		Record Name:	Acreage	Version:	Approved		
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Margin Protection (MP)

Insurance Plan Code	16 Margin Protection	17 Margin Protection with Harvest Price Option		

Commodity Code	0011 Wheat	0018 Rice	0041 Corn	0081 Soybeans

Calculations		Field Name	Record Number	Field Number	Field Format	Field Rounding	Rules
Section 6: Beginning Farmer and Rancher (BFR), Veteran Farmer Rancher (VFR), 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	Cupped by the standard rule of $1 if applicable.
		Subsidy Percent	ADM		9.999	None	Edit with ADM Subsidy Percent, "A00070".
BFR/VFR Subsidy Amount =	Total Premium Amount * 0.10 * (1 - CC Subsidy Reduction Percent)	CC Subsidy Reduction Percent	P11	76	9.9999	None	If Applicable; else 0.
		BFR/VFR Subsidy Amount	Internal		9999999999	Round to whole number	Beginning Farmer Rancher/Veteran 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 Amount	P11	118	9999999999	Round to whole number	CC Subsidy Reduction Amount. If Applicable; else 0.
Subsidy Amount =	Base Subsidy Amount + BFR/VFR Subsidy Amount - Native Sod Subsidy Amount - CC Subsidy Reduction Amount	Subsidy Amount	P11	100	9999999999	Round to whole number	Subsidy Amount cannot exceed Total Premium Amount. Subsidy Amount will be cupped at $0.
Producer Premium Amount	= Total Premium Amount - Subsidy Amount	Producer Premium Amount	P11	103	9999999999	Round to whole number	