SPAN Process (in a nutshell)

I'll step you through the Initial Margin calculation for an option, which will hopefully help you understand a little more of the SPAN process.

Overview:

1) Scan 16 different price and volatility scenarios to determine risk
2) Applicable commodity spread credits are applied reducing margin (not performed in the spreadsheet)
3) The greater of the Short Option Minimum (SOM) or the highest risk scenario is used as SPAN Maintenance Margin (MM)
4) The SPAN MM is multiplied by the Initial-to-Maintenance Margin Ratio to determine SPAN Initial Margin (IM)
5) The dollar value of option is added to the SPAN MM to get the Total MM, and added to the SPAN IM to get Total IM

Breakdown of the Risk Array Record Types Needed to Calculate Margin:

I'll list the lines you'll need in order that you will see them. Each line of data in the risk array has a prefix. You need P, 3, 4, B and 8. This is an example of what they will look like and what information we are grabbing from them.

Type P

P NYMLO OOFCRUDE OIL OPTIO002002 0001000000000000000000001USD$STD 00AMERCRUDE OIL OPTIONS YFEQTY DELIV 0000001000000000

Settlement Price Decimal Locator = settlement prices are not shown in decimal format, this lets you know what to divide that number by to get the correct settlement price
Strike Price Decimal Locator (for options only) = same idea for getting the correct strike price
Settlement Price Alignment Code = this is used only be certain commodities like the grains and some treasury items, usually commodities that are quoted in fractions
Contract Value Factor (Multiplier) = once you get the settlement price you multiply it by this to get the dollar value
Standard Cabinet Option Value = for some options when they are close to being worthless they are marked cabinet, at which point it is assigned this value

You'll see that the CL example did not have some of the components, but the following S example does:

P CBTS OOFSOYBEAN OPTIONS003002000005000000000000000100001USD$STD 00AMERSOYBEAN OPTIONS YFEQTY DELIV 0000001000000000

Type 3

3 NY-CL 1005201507201604062016052017040720170520221 2 100010001100

Initial-to-Maintenance Margin Ratio = divided by 1000 will give you the percentage you multiply the MM by in order to get IM … most are either 110% or 135%

Type 4

4 NY-CL 01 0000030100100100 2

Short Option Minimum = this is the minimum risk per short option … $30 is the minimum risk for every short CL option

Type B

B NYMLO OOF201402 201402 00158402000400000315003000033000000001095890000000100002014011 5CL M 00000000N0009790+0001000000000000 00 00 010000000000

Time to Expiration (in years) = each monthly contract has one of these lines … not needed for initial margin, but if you are trying to calculate any kind of ROI you will need this

Type 8

81NYMLO CL OOFP201402 201402 0007800 00073-00047+00041-00053+00113-00037+00016-00057+00163-00000000000007N
82NYMLO CL OOFP201402 201402 0007800 00023+00003+00060+00226-00003+00021+00232-00200-00268318 0000007+ 00197-C

81 / 82 = each option has 2 lines of data, 81 first line and 82 second
NYMLO CL = NYM is the exchange code, LO CL is the commodity product code
OOFP = OOF is the product type code (option on futures); C or P is call or put
201402 = contract month of underlying futures contract
201402 = contract month of option
0007800 = strike price … divide by Strike Price Decimal Locator to give you 78
00073- = risk scenarios, #1-9 in the 81 line, #10-16 in the 82 line; the +/- symbol is at the end of the risk, so 00073- is actually -73
00200- = delta; most systems would list this as either a delta of 0.02 or 2.0
0000007+ = price in points … divide by Settlement Price Decimal Locator to get 0.07

Calculations:

1. Determine Risk
    a. Each risk scenarios need to be multiplied by the number of net positions … long as positive, short as negative
        i. If you sold 1x CLG4 P78, net position = -1
    b. Take the largest risk scenario (positive value)
        i. Scenario #16 is 00232- , so -232 * -1 = 232 … largest risk scenario = 232
    c. Take the Short Option Minimum and multiply that by the absolute number of short positions
        i. SOM is 30 * 1 = 30
    d. Compare the largest risk scenario to the short option minimum … the largest value becomes SPAN Maintenance Margin
        i. Risk is 232, SOM is 30, so 232 > 30 … SPAN MM = $232

    e. If you are looking at a spread it is almost the same, but you combine the risk scenarios of all the legs
        i. Scenario #1 * net positions for leg #1 + Scenario #1 * net positions of leg #2
        ii. Scenario #2 * net positions for leg #1 + Scenario #2 * net positions of leg #2, and so on
    f. SOM is multiplied by the absolute number all of the short options of all legs
    g. Take the largest combined risk scenario and compare it to the SOM of all legs to get the SPAN MM

2. Calculate Initial Margin
    a. The SPAN MM is multiplied by the Initial-to-Maintenance Margin Ratio to get the SPAN Initial Margin
        i. SPAN MM is 232, IMR is 110%, so 232 * 1.1 = 255 … SPAN IM = $255

3. Calculate Total (Initial) Margin
    a. Most folks just use SPAN IM, but your brokerage my use Total Initial Margin, which is where they add the option dollar value to SPAN IM to get Total IM
        i. The P78 settlement price of 0.07 points is multiplied by the Contract Value Factor of 1000 to get the dollar value of $70
        ii. SPAN IM is 255, dollar value is 70, so 255 + 70 = 325 … Total IM = $325

References:

CME's SPAN Methodology:
https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&ved=0CCoQFjAA&url=http%3A%2F%2Fwww.cmegroup.com%2Fclearing%2Ffiles%2Fspan-methodology.pdf&ei=U7CdUrHVN4jk2wWPj4DgAw&usg=AFQjCNHQJpRedBHgguFD4piucv_8JQJLNA&sig2=5D4EvNaMAnvG_TT0EUvypg&bvm=bv.57155469,d.b2I

ICE's SPAN Explanation:
https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=2&cad=rja&sqi=2&ved=0CDIQFjAB&url=https%3A%2F%2Fwww.theice.com%2Fpublicdocs%2Fclear_us%2FSPAN_Explanation.pdf&ei=i7CdUsTZG6Tu2AXMuID4Dw&usg=AFQjCNGQunZopraniGNittTISGTA3HjPmA&sig2=m8nCpj8zD3hBszcMmnosyQ&bvm=bv.57155469,d.b2I

CME Risk Array Record Type Description:
http://www.cmegroup.com/confluence/display/pubspan/Type+8+-+Expanded